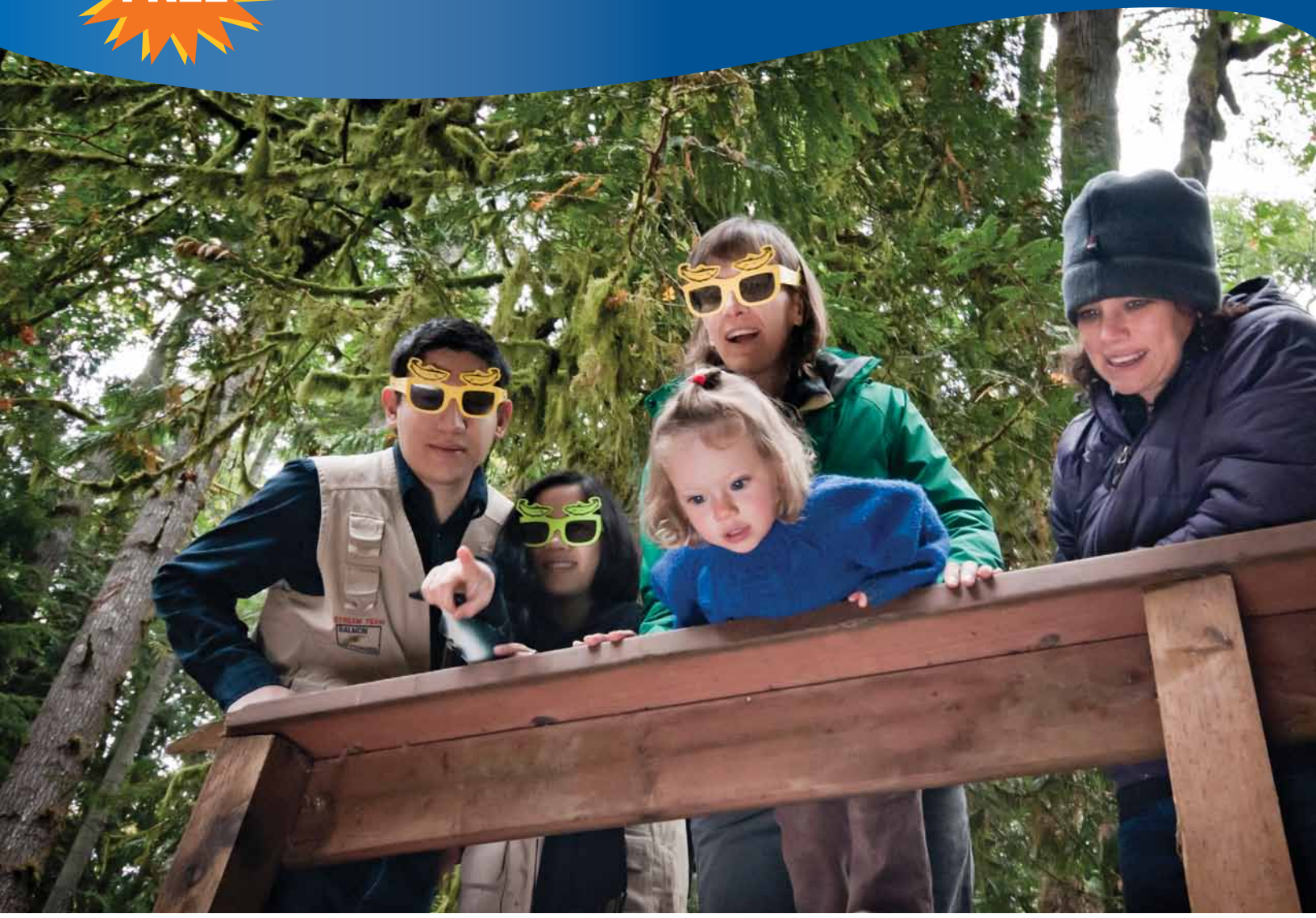
Stream Team NEWSLETTER

Olympia • Lacey • Tumwater • Thurston County

FREE



FALL EDITION
Sept–Oct–Nov 2013

Inside...

ON THE COVER: Viewing chum salmon in McLane Creek from the observation deck at the McLane Creek Nature Trail.

Clint Cole *Volunteer* SPOTLIGHT

Clint first got involved with Stream Team in the fall of 2011, when he helped Thurston County Stream Team install weed control fabric over invasive reed canary grass in wetlands located near Littlerock Road. The purpose of the project was to provide more suitable habitat for the Oregon spotted frog, a state sensitive species that is declining due to loss of habitat.

This past winter, Clint volunteered over 20 hours with Stream Team helping to survey ten local ponds for amphibian egg masses. The amphibian egg mass survey program is an ongoing Citizen Science project in cooperation with Washington Department of Fish and Wildlife (WDFW). The goal of the program is to track amphibian populations within Thurston County, and to assess how frog populations are changing or are affected by urbanization and water quality impacts from stormwater.

Clint is a 2013 Tumwater High School graduate, where he took multiple classes for advanced placement credit as well as Environmental Resources Management classes at New Market Skills Center. His goal for his senior year was to gain as much experience as possible in the field of resource management to prepare him for his college studies.

In addition to his resource management experience with Stream Team, Clint volunteered for WDFW at the Tumwater Falls Fish Facility and at WDFW's salmon research lab where he processed otoliths, coded wire tags, and scales and genetics data. Clint also conducted soil texture and diet analysis of the red-legged frog for WDFW.

For the past three years, in his free time between school and work, Clint has also volunteered with Thurston County Search and Rescue as an active responder for urban and wilderness searches across Western Washingon. Currently, he is the Youth Vice President and Field Leader.

Clint intends to finish his AA degree at South Puget Sound Community college this coming year and then proceed towards a bachelor of science in Natural Resources/Fisheries Management and eventually complete a Master's Degree in Environmental Studies.

Clint said he believes that Stream Team "provides an excellent opportunity for youth to make a difference in their local environment". What's his favorite Stream Team offering? Without a doubt, amphibian egg mass surveys!

STREAM TEAM MISSION

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

Steam 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.

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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

Interested in seeing Chinook or chum salmon?

You can see Chinook salmon from mid-August through early September at the 5th Avenue Bridge in downtown Olympia. In mid-September through early October you can see Chinook salmon at Tumwater Falls Park. In early November through early December you can see wild chum salmon spawning at the McLane Creek Nature Trail. Trained Salmon Stewards are frequently on-site to help answer any questions you may have. For maps to the viewing sites, go to: www.streamteam.info/getinvolved/educate/salmon/

Would you like to be a Salmon Steward at McLane Creek this fall?

Contact Ann Marie Pearce for more information at 360-754-3355 ext. 6857 or email pearcea@co.thurston.wa.us.

The Tale of Two Salmon

One spawns in the cold water gravels of low gradient streams; one is spawned artificially. One is a determined jumper; one stops migrating at obstacles. One is visible in South Sound freshwater in September and October; one is visible in November and December. One weighs about 9 to 11 pounds; one weighs about 15 to 20 pounds.

What are these salmon? The hatchery raised Deschutes River Chinook and the wild McLane Creek chum.

These two salmon have the same general salmon life cycle, but they have different life histories and strategies. Both are anadromous, which means they return to freshwater to spawn. As smolts, they migrate to the Pacific Ocean where they will feed and grow large. Both the Deschutes Chinook and McLane chum spend about 3 to 5 years in the ocean feeding. The Chinook will have individual adults that will return earlier and stay longer. Chinook can grow to be the largest of all salmon. The salmon that escape predation and harvest, and fend off disease and other climate and ocean-related conditions that effect mortality, use "homing" to return to South Sound. Scientists know that salmon use a highly sensitive olfactory system to smell scents in the water, which help guide them back to their natal stream. After spawning, they die. But, within this general life history, there are differences that have evolved with these two species that would enable them to coexist in the same watershed and not outcompete with each other for spawning and feeding grounds. The life cycles described are "typical" for these two salmon. And, of course, there are always exceptions.

▷ *continued on page 4*

Join Stream Team at the 24th Annual Nisqually Watershed Festival

Sat., Sept. 28 • 10 a.m. – 4 p.m. • Nisqually National Wildlife Refuge

This year's festival includes numerous activities, exhibits and main stage presentations including, music, dance and live wildlife shows with fascinating reptiles and birds. The Red Salmon story tent will be back along with the Drain Dare trailer for kids, and "Claudia" the King Salmon. There will be activities and exhibits from many conservation-minded agencies and organizations including fish printing, plywood fish painting, a marine organism touch tank, and much more. You should, of course, bring your appetite as the famous Nisqually Salmon Bake will again be available. This event is FREE, except for the food, so come out and celebrate the Nisqually Watershed! To volunteer at the Stream Team booth, register online at www.streamteam.info and click on "Calendar".

Staff contact: Ann Marie Pearce at 360-754-3355 ext. 6857 or pearcea@co.thurston.wa.us

The Tale of Two Salmon ▷ continued from page 3

Natural ~ Wild Life Cycle – McLane Creek Chum

Over the last three decades, the chum salmon populations of Puget Sound have increased to the point that they are now the most abundant salmon species in the region. Chum salmon are distributed throughout the river systems of the Puget Sound region, which includes the streams of north and south Puget Sound, Hood Canal and the Strait of Juan de Fuca. This region's chum stocks have been grouped into three run timings; summer (spawning in September and October), fall (spawning in November and December) and winter (spawning in January and February). The fall run is the largest segment of overall chum returns; typically making up 90% of the annual total number of chum salmon returning to Puget Sound. (*Source: Washington Department of Fish and Wildlife*) McLane Creek chum are part of this fall run return.

At the beginning of the winter rains, adult chum salmon return to the icy waters to reproduce and then die. The chum salmon spawn anywhere from the lower mouth of McLane Creek up past the protected area of the McLane Creek Nature Trail. They also spawn in tributaries to McLane Creek: Swift, Cedar Flats and Perkins Creeks. WDFW staff do fish surveys during the spawning season to count the number of salmon along different reaches of the creeks. For the past ten years, an estimated 6 to 10,000 chum have returned to McLane Creek. Swift Creek had an estimated 12 to 25,000 and Perkins Creek, 700 to 3,000.

The adult salmon are colored with hues of brown, green, purple and black. The males have intricate mottling of purple, green and brown in bar patterns that circle the body cavity. The females have this similar coloration, but it is faint. Their primary distinguishing color is a dark stripe running from the gills to the tail. Both males and females have the ability to "adjust" the coloration on their bodies. Males can show a dark strip similar to a female, and females can minimize the coloration of their stripe. The color changes are part of the courtship behaviors swimming toward and on the spawning grounds.

Chum are not jumpers, and will stop migrating if a large obstacle is in the way. A few years ago, a large log jam up creek of the Delphi Road Bridge forced more chum to spawn in Swift Creek. Males arrive to the creek before the females. As the fish approach freshwater, their bodies are changing to spawn. They stop eating, change from marine colors to spawning colors, start developing eggs or milt, change osmotic body functions to adjust from salt to fresh water, and males and females develop teeth, with the males developing a prominent hooked snout and impressive teeth.

On the spawning grounds, it's the only time during the salmon's life that people can approach the fish and watch their amazing, but slow, courtship and reproduction. The observer must be quiet and still and be extra careful not to spook the fish, which an unsuspecting sudden movement can do. Children and dogs should be monitored and everybody needs to stay back and out of the creek. McLane Creek has three structures to watch the fish from: two viewing platforms and the bridge. Often the water is low, so it's easy to see the salmon. Salmon Stewards carry polarized viewers, which can enhance viewing on the rare sunny November day. Eventually, the spawning grounds will include both live and dead salmon. Late in the season, you can smell the salmon carcasses from the trail.

Behaviors to watch for:

Guarding (a nest), resting/holding, quivering (males), fighting, digging (females), spawning (eggs and milt deposited in gravel)

The female digs a pit or nest in the gravel for each spawn. The final "redd" is comprised of a few nests. She spawns with different males for each nest and often more than one male "sneak" in to fertilize the eggs. The female will cover the eggs with gravel as she digs the next nest. The eggs are heavier than water, so they sink into the gravel. At this point, they are shock resistant when the female is digging gravel to cover them, but they will lose this temporary protective coating and will be vulnerable for a period of time before another process occurs to protect the eggs. The survival of the eggs is dependent on clean, oxygenated water flowing through the gravel. Sediment-filled water can smother the eggs. Polluted water can kill the developing embryos. High water flow that causes scour can also kill the eggs. Once the eggs hatch, the tiny alevin can move between the gravel spaces. After the egg develops and the tiny salmon emerges from the gravel, this species typically migrates directly to marine waters, at the size of 1 to 1.5 inches. Because of their small size, chum fry are particularly vulnerable to predation. The estuary habitat is critical for the survival success of chum fry. A healthy estuary provides the food resources necessary for early growth, and can offer refuge from numerous fish and bird predator species. In the near shore environment and open ocean, competition for food resources with other fish species has been shown to affect growth and survival of chum salmon.

Last fall, chum salmon were spawning in the newly restored pocket estuary in Eld Inlet at Allison Springs, located between Mud Bay Road and Highway 101.

Deschutes River Hatchery Chinook

Chinook salmon are associated with big rivers with large gravel. The largest salmon caught on record weighed 126 pounds (caught in 1949 in Alaska), so it's easy to imagine these fish need a large river with lots of water and large gravel. The Deschutes River did not have a historical salmon run, due to the lower falls creating an impassible barrier, when the Green River salmon were planted in Capitol Lake in the 1950's. When the adult salmon returned to Percival Creek, some were moved by truck to the upper Deschutes to start a natural run. Shortly after, the fish ladders were built around the falls and the small dam above the falls. In the early 1960's, the holding ponds were built in Tumwater Falls Park, creating an adult trapping facility managed by Washington Department of Fish and Wildlife.

Over the past 50 years of managing this hatchery run, different strategies have been used. The best science and the Endangered Species Act (ESA) are the current drivers for the fish management at the facility. As a hatchery run, these Chinook salmon do not fall under the ESA. This salmon run is managed specifically for commercial, tribal and sport fisheries. The returning adults are the "escapement" salmon – the ones that escaped harvest. When they arrive at the 5th Avenue Dam in August, these salmon have been thousands of miles from Olympia feeding in the Gulf of Alaska. Their bodies no longer have the silver marine coloration, but now are shades of brown and green with black. The males have the hooked snout and teeth. As the females have begun to develop the eggs, the lower body cavity begins to swell. Both males and females have stopped eating. The fish weigh about 15 to 20 pounds; although, a much smaller fish is often spotted. This salmon, called a jack, is a mature male that only spent one year feeding in the ocean before beginning the return migration back to freshwater.

The salmon congregate and swim around below the 5th Avenue dam, often in pursuit by hungry seals. The fish ladder is always open, so the fish can swim into Capitol Lake whenever they are ready. They may hold longer in Budd Inlet because Capitol Lake water is too warm or they are not ready to spawn, or their bodies are adapting from salt to freshwater. After they pass the dam and swim through the lake, they are met with the challenge of swimming up three fish ladders, for a total of 82 feet elevation. The last fish ladder ends in the holding ponds. The journey stops here for the salmon. Beginning in the third week in September, on Monday, Wednesday and Friday mornings, the salmon are processed. The processing goes on for 4 to 6 weeks. Over 1,000 males and 1,000 females will be artificially spawned. The egg take goal is 4.8 million eggs. The eggs and milt are kept separate and transported to Minter Creek hatchery near Gig Harbor for the fertilization and incubation. Some of the hatchery-origin Chinook (without an adipose fin), will be sent upriver for nutrient enhancement of the Deschutes River. The remaining salmon are sent to a fish processor: much of the salmon will be filleted and frozen and given to food banks, the lower quality salmon will be used for animal food or fertilizer, and the eggs (in the unspawned females) will be sold for bait or food.

In the spring, the hatchery-raised baby salmon are now 2 to 3 inches big. They are brought back to the holding ponds and held for two weeks to imprint the scent of the Deschutes River. In total, 4 million fry will be released in batches of about 500,000 every two weeks from April to June. The cycle continues, as these fry migrate out of Capitol Lake and into Budd Inlet, then out to the wider Puget Sound and eventually to the Pacific Ocean. Within a few years, some of them will return to complete the life cycle again.

For your dog's safety,

keep your pet at home or in your vehicle when salmon are spawning. Salmon can be infested with a parasite that causes "Salmon Poisoning Disease" in dogs, which can sicken and even kill your dog.

CREATURE FEATURE • Moss

Mosses are bryophytes, which are non-vascular land plants that lack specialized structures for carrying water and minerals through their plant bodies. Bryophytes remain small, growing in groups, and usually grow in wet, shady places that are poorly drained and slightly acidic. During times of drought, moss have the ability to dry up and come "back to life" upon re-wetting, which can be instantaneous.

Mosses reproduce by spores that blow through the air and eventually grow where they land on the ground, a branch, or the trunk of a tree. If the area where a bryophyte spore lands is moist, it will grow. Bryophytes lack true roots; instead they attach themselves by rhizoids (hair like filaments) and grow in many diverse habitats. In the Pacific Northwest, where rainfall is plentiful, mosses are abundant. Spore reproduction allows moss to grow everywhere in our environment, residing in the cracks of sidewalks and lawns, as well as covering the ground of our forests and trees. There are tens of thousands of moss species worldwide.

The role of bryophytes (moss) is important to the health and function of our ecosystem. Bryophytes are essential in initiating soil formation, maintaining soil moisture, preventing erosion and recycling forest nutrients. Moss provides a seed bed for germinating larger plants, and is essential in the formation and maintenance of wetland habitats. Moss is also used by numerous animal species for food and nesting materials.

Interested in rare mosses? Go to the Washington Department of Natural Resources Natural Heritage Program site http://www1.dnr.wa.gov/nhp/refdesk/lists/mosses.html

Learning to Cope with Bossy Moss

As the rainy season of Western Washington returns again, many of you are probably noticing moss growing in different places around our homes: the roof, lawn, decks, patios and driveways. As a native to the Pacific Northwest, moss loves overcast skies, wet winters and compacted, acidic soil. So, naturally, moss grows just about everywhere in Thurston County!

There are approximately 14,000 different species of moss around the world. Mosses are an essential part of the earth's ecosystem. Like a sponge, moss absorbs many times its weight in moisture while soaking up rainfall, which helps prevent erosion, plus provides nutrients and organics to soil, provide food and habitat for numerous wildlife species and fuel in the form of peat.

Despite its many ecological benefits, many homeowners do not welcome this annual visitor and are looking for ways to get rid of it. However, many of the well-known methods to eradicate moss are toxic, especially to people, plants and aquatic life. Luckily, there are also non-toxic methods you can use to help control moss if you must.

Concerns with Moss and Your Home

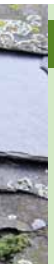
Moss is potentially harmful to certain areas of your home. A roof with excessive moss can erode the shingles and widen tiny cracks in the roofing materials causing damage. On driveways and walkways, moss can be very slippery.

Lawns are a little different. While moss in a lawn causes no harm to grass, it can be a symptom of other problems such as soil compaction or low pH. Moss thrives in damp, full-shade, high acidic conditions that exist in the Pacific Northwest. Many Pacific Northwest dwellers have learned that moss can make a nice alternative to grass as it provides many of the benefits of grass, it is green and soft, but is very low maintenance. Moss does not need to be mowed, watered or fertilized!

Moss Killing Products

There are many products readily sold in stores to rid your home of moss. However, most contain zinc, which, while it is highly effective at killing moss, it is also highly toxic to aquatic life, plants, pets and humans. When it rains, the product will run off your roof and driveway, into your lawn and gardens, and into storm drains leading to local streams and Puget Sound. Also, these products do not remove the moss, so you will still need to remove the dead plants.

Become the Boss of Your Moss
Through Prevention



Rooftops

A clean roof will generally not support moss. Eliminate the source of organic debris by cleaning the entire roof surface in the fall and spring. Use a broom or stiff brush to remove any debris such as leaves, sticks, dirt and fir or pine needles. Trim any branches that hang directly over your roof. If your roof is due for an upgrade, consider installing a metal roof as moss is unable to grow on smooth surfaces.

Driveways and Walkways

To control moss on driveways and walkways, you can use a rake or shovel or power-wash the area with clean water to get rid of the moss. Remember, power washers are powerful and NOT recommended for your roof as they may cause damage. When power-washing, only use clean water, no chemicals, and make sure the water goes into the grass, not into the road or storm drains. The best time to use these methods is in the summer when it is drier and the moss is easier to break loose.

Lawns

Though we mentioned that moss is a great, low to no maintenance alternative to grass, and recommend learning to live with it or cultivate it as it can form a lush green lawn of its own, we realize that some neighborhood and homeowner associations require the control of moss in lawns. If moss is growing in your lawn, it is a sign that growing conditions are not ideal for grass. You may have low soil fertility, poor drainage, acidic soil and/or shady conditions. If necessary, below are a few steps you can take to discourage the moss growth in your yard:

1) Use a thatching rake (or rent a de-thatching machine) to remove the moss and other dead material from your lawn. Labor Day through Oct. 15 is the optimal time.
2) Apply topsoil and over-seed any bare areas that resulted from the de-thatching with a Pacific Northwest grass seed blend.
3) Assess the drainage of your lawn; soggy areas are more likely to attract moss. If there are areas that remain soggy during the rainy season, there may be design solutions you can make to improve drainage. To learn about options to improve drainage/infiltration on your property, you can schedule a free site assessment with a Stream Team Stormwater Steward. For more info., go to www.streamteam.info/getinvolved/educate/stormwater
4) Test the soil's pH using a soil test kit you can purchase from your local gardening supply store. If the pH is lower than 5.5, consider adding lime to the soil. You can find lime at any local gardening store. Moss prefers acidic soil and sweetening the soil with lime helps to discourage its growth. Keep in mind that the closer your lawn's soil gets to 7.0, the more prone it will be to disease, so always test your soil before adding lime.
5) If you have a well-shaded lawn, consider trimming the trees and shrubs to let more sunshine reach the shady places.

Alternatives to Zinc Products

If you choose to use chemicals to kill the moss, there are some alternatives that are not as toxic as zinc. These can be found in the "Grow Smart, Grow Safe" publication at www.growsmartgrowsafe.org.

You can also use baking soda to kill moss anywhere around your home. For moss in your lawns, Washington State University Extension recommends mixing 12 oz. of baking soda with 2 gallons of water in a garden sprayer. Spray the moss with the solution on a warm sunny day. Reapply if needed in a few days. Remove dead moss and reseed with grass. This solution can also be used for moss in driveways and walkways. Sprinkle baking soda directly on the moss on your roof or walkways/driveways, and wait about a week for the rain to wash the baking soda into the moss. Once the moss is dead, use a broom to sweep it up or a rake it if it's in your lawn.

Baking soda is a safer alternative than other chemicals for killing moss, but it can be toxic to aquatic life. Always make sure to read labels for any chemicals you may use. When used in small amounts, it won't kill your plants or lawn.

If you use any chemicals (including baking soda) to eradicate moss, even if the package says, "safe for the environment," make sure the contaminated rinse water runoff does not flow into a storm drain or the street. Remember, "Only Rain Down the Storm Drain!"

Pacific Shellfish Institute's: "Shellfish at Work!"

A stroll along Olympia's downtown waterfront, an afternoon sail or a visit to one of several amazing waterfront parks are just a few ways to enjoy the beauty and splendor of southern Budd Inlet. The unsuspecting observer might be surprised, therefore, to learn that water quality in the Deschutes River, Capitol Lake and Budd Inlet is below state standards for many monitoring parameters. In particular, the Department of Ecology has listed Budd Inlet as an "impaired" waterbody for dissolved oxygen (DO) levels. Similar to Hood Canal, Budd Inlet experiences dangerously low levels of DO in late summer and early fall. This condition is caused by eutrophication, or the manner in which a waterbody becomes enriched in dissolved nutrients (nitrates and phosphates) stimulating the explosive growth of algae. As the algae die and settle to the bottom, they are decomposed by bacteria that utilize oxygen in the process. Low DO levels can be harmful to fish and other marine life, raising concerns about the overall health of the Puget Sound ecosystem. In fact, scientists have identified eutrophication as one of the most serious threats to coastal environments worldwide.

Where do the nutrients come from?

The nutrients that fuel the proliferation of phytoplankton in Budd Inlet come from a variety of sources including ocean inputs (coastal upwelling), sediments, the Deschutes River, smaller tributaries and wastewater treatment facilities. In 1994, to address nutrient loading in southern Puget Sound, the LOTT Clean Water Alliance implemented state-of-the-art advanced nitrogen removal treatment, which runs April through October each year. Still, ever-increasing growth pressure throughout the watershed over the past decade has resulted in many small, uncontrolled sources of nutrient pollution, largely from fertilizers, septic systems and animal waste that enter Budd Inlet via groundwater and stormwater that flows into the Deschutes River and other tributaries.

Fear not! It's not all Bloom and Doom!

Reducing sources of nutrients, or source control, has become a top priority for many jurisdictions. By decreasing nutrient loading, widespread problems with thick algae blooms and oxygen depletion can be prevented.

Shellfish at Work – A Nutrient Bioextraction Experiment

Source control is a critical step in reducing nutrient pollution into Puget Sound. But can nutrients be removed once they enter the marine environment? In spring, Pacific Shellfish Institute (PSI) initiated the "Shellfish at Work" project that uses a combination of nutrient bioextraction principles and community engagement to meet the goal of reducing nutrients in Budd Inlet. Over three hundred nylon straps were affixed to existing dock structures at Swantown, Boston Harbor, Port of Olympia and West Bay Marina to provide an attractive home for blue mussel larvae to settle upon and grow. Throughout the summer, these mussels filter phytoplankton from the inlet improving water clarity and incorporating nitrogen into their tissues. In September and October, the mussels (and their incorporated nutrients) will be harvested, tested for contaminants, and, if acceptable, turned into rich compost. By doing so, the project creates a closed loop nutrient cycle that embraces the 3 R's (reduce, reuse, recycle) by reducing nutrient loading, reusing excess nutrients to build mussel tissue and recycling mussels into valuable compost.

What is Nutrient Bioextraction?

Nutrient bioextraction, or nutrient bioharvesting, is the practice of farming and harvesting shellfish and seaweed for the purpose of removing nitrogen and other nutrients from natural water bodies.

About the author: Aimee Christy is a research biologist at Pacific Shellfish Institute where she enjoys viewing plankton under microscopes, dreaming up ways to convert dog waste into energy and compost, and promoting a clean and healthy Puget Sound for all to enjoy. She can be reached via e-mail at aimee@pacshell.org.

Get Involved!

The Shellfish at Work project offers many ways to get involved. While biologists at PSI have been keeping track of the mussels and water quality since spring, the majority of sampling will take place in September and October. Come visit one of the sites, collect real data (mussel growth rates, biomass measurements, water quality data, species diversity) and assist with end-of-season mussel harvesting. For questions or more information, contact the Pacific Shellfish Institute at 360-754-2741 or aimee@pacshell.org.

Household Tips to Protect Our Water from Nutrient Pollution

- ☑ **Use fertilizer sparingly and keep it off hard surfaces such as sidewalks.** Look for slow-release fertilizers with at least 50% insoluble nitrogen on the label. Read labels and buy phosphate-free fertilizers, laundry detergent and dish detergent.
- ☑ **Properly dispose of pet waste.** Scoop It, Bag It, Trash It....every dog, every doo, every time!
- ☑ **Manage farm manure responsibly.** Keep animals out of creeks and manure off the ground and under cover.
- ☑ **Maintain your home's septic system.** Have septic system inspected and pumped every 3-5 years.
- ☑ **Pick up a free portable pet waste bag holder for leashes** (pictured above) and/or pet waste sign and bag dispenser for your neighborhood from your local Stream Team Coordinator. For more info., go to www.streamteam.info/actions/petwaste/

Don't Let Your Pooch Pollute

Did you know...?

- Based on 2007 census data, dogs generate approximately 6 TONS OF FECES PER DAY in Thurston County (that's the weight of a full size Killer Whale!).
- A single gram of pet waste (the weight of a business card) contains an average of 23 million fecal coliform bacteria.
- Bacteria in pet waste creates a health risk to people in parks and yards, especially children who often play in the grass and dirt.
- Waste from dogs and humans contains more fecal coliform bacteria per gram than cows, horses and other wildlife. The following table shows that, on average, a dog will produce over 7 billion fecal coliform bacteria per day and a human will produce close to 2 billion fecal coliform bacteria per day.

This is why it is so important to properly maintain home septic systems and to bag and trash pet waste – every dog, every doo, every time!

Anmimal Type	Fecal coliforms per gram of animal feces	Fecal coliforms per day
Dog	23,000,000	7,728,000,000
Human	13,000,000	1,921,920,000
Cow	230,000	5,358,080,000
Horse	12,600	293,529,600
Wild Rabbit	20	No data availalbel
Mouse	330,000	No data avilaalbel

Source: www.co.thurston.wa.us/shellfish

Stream Team can help! Stream Team can supply you with a free pet waste bag dispenser for your dog's leash and/or you can get a **free** pet waste bag station (includes sign and durable bag dispenser) to install in your neighborhood community space area, multi-family housing complex or other approved community space. Contact your local Stream Team Coordinator (page 2) to find out how you can receive your **free** bag dispenser and/or pet waste station.

Featured Watershed

The Lower Nisqually

The Nisqually River flows 78 miles from its source at Mt. Rainier to the delta at the Nisqually National Wildlife Refuge. Its watershed constitutes 761 square miles of land, yet only a small portion of it, 134 square miles, lies within Thurston County. The majority of the watershed lies within Pierce and Lewis Counties. In contrast to the more pristine designated wilderness areas, working forest lands and rural communities of the upper Nisqually, the Lower Nisqually, which includes portions within the cities of Lacey, Yelm and unincorporated Thurston County, is far more developed. Yet it still contains many fascinating and unique features and habitats.

The Lower Nisqually consists of three general areas: McAllister Creek, Delta Bluff and Nisqually Bluff. Each of these areas has been subject to urban growth and development as the population of Thurston County grows. This results in an increase in roofs, roads and pavement, all of which are impervious to rainfall. This creates two problems: increased volumes of stormwater runoff and degraded water quality as stormwater washes pollutants into streams, creeks and, eventually, Puget Sound.

The McAllister Creek sub-watershed, which incorporates McAllister Springs, Medicine Creek and McAllister Creek, flows northwards through the Nisqually National Wildlife Refuge, where it creates the Nisqually Delta and enters Puget Sound. The sub-watershed is bound by the mainstem of the Nisqually River on the Thurston County side of the river, which includes the Washington Department of Fish and Wildlife's 6th Avenue public access site. This facility is an important place where the public can access the river for fishing, picnicking and boating (Discover Pass required).

The McAllister Creek area currently consists of 21% total impervious surface. As development increases, the total impervious area also increases. In contrast, the Powell Creek area in the Upper Nisqually, southeast of Yelm, is the least affected by development, and has only 1% impervious surface!

The Delta Bluff area lies north of I-5 and can be easily viewed looking west from the trails of the Nisqually Refuge. It extends back from the bluff-line above McAllister Creek to Meridian Road, then to the north for approximately a mile and a half. The Delta Bluff area has a total impervious surface area of 18%.

The third general area of the Lower Nisqually watershed, the Nisqually Bluff area, extends north and west. The Nisqually Bluff areaincludes the majority of the marine nearshore environment, from Luhr Beach and Nisqually Head to the tip of Johnson Point. This area has a total impervious surface area of 20%. It is in this area where the city limits of Lacey stretch all the way north to Puget Sound near Butterball Cove.

Located in this rich and diverse area is the Nisqually Reach Nature Center at Luhr Beach, where the intertidal zone is accessible to the public (Discover Pass required). Almost directly west is a shellfish farming business that grows oysters on 300 acres of intertidal Puget Sound beach and ships fresh shellfish from the Nisqually to locations throughout the country on a daily basis.

Shellfish farming is dependent on good water quality. While some small areas remain off limits to harvest, the good news is that the Washington State Department of Health has lifted harvest restrictions on over 1,000 acres of tidelands that were formerly downgraded in the Lower Nisqually watershed due to bacterial pollution. As part of the effort to reduce potentially harmful bacteria pollution that impacts shellfish

▷ *continued on page 12*

The Benefits of Lawn Aeration Straight from a Lawn Care Professional

Lawn aeration has many benefits, plus it helps make your grass beautifully green and healthy. Aerating your lawn reduces compaction and creates more space for water and air, allows for more nutrient uptake by the roots of the grass and reduces stormwater runoff by absorbing rainfall.

But how in the world do you go about obtaining and operating a lawn aerator, and what are the steps you take to encourage healthy lawn growth? Here are some easy tips for you to follow:

Here are some easy tips for you to follow:

1) Start with a reputable rental company. Use a company that maintains their equipment and takes the time to go over safe and proper operation with you.
2) Team up with your neighbors to rent a lawn aerator. Aerating takes a little longer than mowing the lawn, so you and a few neighbors could chip in and aerate a few lawns in one day. Between all of you, someone will have a small truck to transport the aerator to your neighborhood. The rental yard will usually have some straps and ramps you can use.
3) Timing is key. Fall and spring are the best times to aerate. Fall is an especially opportune time because grass is working on building roots rather top growth. It's good to aerate when it's not too soggy and not too dry. If the soil is too wet, then it becomes a difficult and sloppy job. If the soil is too dry, it can be difficult to pull a good plug.
4) It's important to "pull a good plug." To pull a good plug, make sure you are using a "core" type aerator, and that the aerator pulls a 2 to 3 inch plug
5) Before you start aerating, walk and scan the lawn for debris and obstacles. Flag sprinkler heads, and look for meter and valve boxes.
6) When you start, remember it's not a race. Safe and steady is the way to go. Walk the aerator around the edges 3-4 times. Do the edges in opposite directions to get the hard to reach spots, but don't sweat it if you can't get all the nooks and crannies.
7) When going back and forth, overlap 25 to 50 percent. Don't worry, you won't hurt anything.
8) After you aerate, it will be a good time to add lime, over-seed (with a mix of grass suitable for the Pacific Northwest) and apply slow-release fertilizer. I recommend buying these products from a trusted local source, such as a turf farm. The knowledge of the staff and quality of materials will save you time and money.
9) Lime will help to adjust soil pH, helping to control the moss and increase nutrient uptake. Lime is generally applied at 50 lbs. per 1000 square feet, but testing the pH of your soil will give you a more accurate idea of what you need for your lawn . A "prilled" type lime is recommended over the powder type.
10) Use a quality, certified seed that is grown for use in the Northwest. If you have some shady areas, then use a shade mix. Usually, seeding at 6-8 lbs. per 1000 square feet is adequate. Again, fall is great for this because the soil is warm from the summer months, we still have moderate nights, there is some natural rainfall and the new seedlings can establish good roots.
11) Use a slow-release or organic fertilizer. With the soil surface being opened up, the food can get right down to the roots of the grass. Be sure to read the label carefully and don't over apply.

To make aerating easy, efficient and effective: team up with a neighbor, take your time and time it right. Apply quality products and repeat these steps every 12 to 18 months. Aerating your lawn will go a long way to encouraging a healthy lawn.

If you live in the City of Olympia or Thurston County, they have a great program for teaming up with your neighbors and renting an aerator for free. Check out Olympia's website for more information: olympiawa.gov/city-utilities/storm-and-surface-water For Thurston County, contact Jane Mountjoy-Venning at 360-867-2582.

About the author: Rick Longnecker is a native of Western Washington, a landscaper and a dad who wants to be a responsible steward, so a thriving environment can be passed on to the next generation of gardeners. He can be reached via email at rickl@budsandblades.com

Join Stream Team for a Lower Nisqually Watershed Tour

Sat., Sept. 21 • 10 a.m. – 2:30 p.m.

Join the Stream Team for a deluxe tour of the Lower Nisqually River Watershed. Visit several sites along the mainstem and tributary streams and learn how local efforts to protect and enhance water resources are contributing to the health of the Nisqually watershed system.

Climb aboard a yellow school bus and learn about innovative actions to reduce the impacts of stormwater, improve salmon habitat, and keep our shellfish population viable and healthy. Local experts will be on hand to answer your questions. Participants will have the opportunity to help improve the health and water quality of this area through participation in the Clear Choices for Clean Water program on the day of the tour.

The tour is free, but registration is required. Residents of the lower Nisqually watershed area will be given priority seating on the tour. Space is limited, so register early. For more details, or to register for this free event go to www.streamteam.info.

Staff contact: Chris Maun at 360-754-3355 ext. 6377 or maunc@co.thurston.wa.us

The Lower Nisqually ▷ *continued from page 10*

harvesting, Thurston County Environmental Health established a Septic System Operations and Maintenance program in 2013. Modeled after the successful Henderson Inlet septic program that contributed to a remarkable increase in water quality in the inlet, the Nisqually program is designed to assure that on-site sewage (septic) systems are functioning properly. Through required inspections and certification, systems found to be improperly functioning can be identified and repaired, resulting in cleaner, healthier waters in the Lower Nisqually watershed (for more information go to: http://www.co.thurston.wa.us/health/ehrp/nisqually.html).

Tolmie State Park, with 1,800 feet of marine shoreline, is also a great place to enjoy the beauty of the Lower Nisqually watershed (Discover Pass required). To learn more about the Lower Nisqually watershed, join Stream Team for a Lower Nisqually Watershed Tour on Saturday, September 21 (see above).

You Flushed WHAT Down the Drain?!

From time to time, maintenance crews are called out in an emergency to unclog sewer lines. Clogged sewer lines can lead to backups and spills, potentially endangering human health and our environment. Spills that reach our local waterways can be serious threats to human health and aquatic wildlife. Emergency maintenance and spill cleanup add extra expense to the regular maintenance budget.

In December of 2012, clogged pipes led to a spill near the Deschutes River. Maintenance crews discovered wads of rags in the pipes which had caused the incident. Crews were able to clean up this spill without a great risk to human or aquatic health.

If it didn't come out of your body, or it isn't toilet paper, it does not belong in the toilet.

The risk of clogged pipes leading to a spill can be reduced if we all remember not to treat the toilet as a trash can. If it didn't come out of your body, or it isn't toilet paper, it does not belong in the toilet. Most products with packaging claiming the product to be "flushable", such as baby and personal hygiene wipes, are not flushable because they do not break down in the sewer system and can clog home and municipal sewer pipes.

Wipes, paper towels and rags tend to collect upon each other in sewer pipes. Items with "strings", such as dental floss, tampons and hair, attract additional material to their "tails" and get wound around the pumps at the lift stations. This can disable the pump and back up the whole system.

In addition to the toilet, people often send items down the kitchen drain which can lead to clogged sewer pipes. The prime culprit is fats, oils and greases (FOGs) from cooking. When FOGs are allowed to go down the drain, they coagulate in sewer pipes. Even if you run hot water and soap down the drain, the FOGs will harden in the pipes as soon as they cool down.

After cooking, scrape FOGs into a can. Cover the can and store in the freezer to cut down on kitchen odors. When the can is full, throw it in the trash. Free FOG kits, consisting of a scraper, reusable can lid and educational information, are available from LOTT Clean Water Alliance at 360-664-2333 or www.lottcleanwater.org.

Please think before you flush or wash anything down any drain or toilet!

Do not flush products labeled "flushable", such as baby and personal hygiene wipes. They do not break down in the sewer system and can cause backups.

Kids' CORNER

Chum salmon, like other Pacific salmon, are born in fresh water creeks and streams, then swim to an estuary, where they feed for awhile before heading off to the ocean to grow into adults. When they are old enough, they return to the stream they were born in to reproduce.

DIRECTIONS: Help this salmon find the way from the ocean to its spawning stream! Draw an "X" over the things that are bad for salmon, and CIRCLE the things that you can do to help salmon!

Illustration courtesy of our very own AmeriCorps volunteer, Anne Schuster

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

by participating in four types of Stream Team events:

Macro Monitoring
Salmon or Sound Stewarding
Tree Planting or Maintenance
Educational Workshop

Earn your own tote bag and show everyone that Puget Sound is in your heart! Look for the "P.S. I Love You" stamp next to the events in our calendar for qualifying events.

HOW TO REGISTER FOR EVENTS

1. **Visit: www.streamteam.info and click on "Register"**
2. **Select the event for which you plan to register**
3. **Click on the register button near the bottom of the "Event Detail"**
4. **Follow the instructions to either log in as an existing volunteer or create a new secure profile**

Stream Team Events

For additional events, event details, and who to contact for more information, please visit our website and click on "Calendar": **www.streamteam.info**

To talk with Stream Team staff about any of the events listed on this page, please call **360-438-2672**

SEPTEMBER

Amphibian Migration Survey Training

Date, Time, Location TBA

Every fall local frogs and other amphibian migrate back into the woods. Certain roadways show high mortality as the amphibians cross them. Learn how to monitor roadways and help provide important data.

Register online.

For more info., contact Michelle at 360-753-8336 or mstevie@ci.olympia.wa.us

Lower Nisqually Watershed Tour

Sat., Sept. 21 • 10 a.m. – 2:30 p.m.

See page 12 for details.

Register online.

Nisqually Watershed Festival

Sat., Sept. 28 • 10 a.m. – 4 p.m.

Nisqually Wildlife Refuge,
100 Brown Farm Rd. NE, Lacey

Volunteers are needed to help staff the Stream Team booth.

See page 3 for details.

Register online.

OCTOBER

Return of the Chinook Salmon Celebration

Sun., Oct. 6 • 10 a.m. – 4 p.m.

Tumwater Falls Park

The celebration is held in conjunction with Tumwater's Cider Sunday event. Volunteers are needed to help staff the Stream Team booth.

Register online.

Plant Trees along Woodard Creek

Sat., Oct. 26 • 10 a.m. – Noon

Woodard Creek at 36th Ave. NE

Register online.

For additional events and event details, including who to contact for more information, please visit our website and click on "Calendar":

www.streamteam.info

NOVEMBER

Naturescaping for Water and Wildlife Workshop

Thurs., Nov. 7 • 6 – 9 p.m

Tumwater Fire Hall

See page 16 for details. Register online.

Plant Trees at Nature Nurtures Farm

Sun., Nov. 3 • 1 – 3 p.m.

Nature Nurtures Farm @ Delphi Rd.

Register online.

For more info., contact Ann Marie at 360-754-3355 ext. 6857 or pearcea@co.thurston.wa.us

Salmon Stewards Chum Salmon Training: Part I

Wed., Nov. 6 • 6 – 8 p.m.

Thurston County Building 4

Part I of two-part training for Salmon Stewards who are interested in stewarding at McLane Creek Nature Trail. No prior experience necessary.

Register online.

Salmon Stewards Chum Salmon Training: Part II

Sat., Nov. 9 • 10 a.m. – Noon

McLane Creek Nature Trail

Part II of two-part training.

Register online.

For more info., contact Ann Marie at 360-754-3355 ext. 6857 or pearcea@co.thurston.wa.us

Chum Salmon and Cider Celebration

Sun, Nov. 17 • 11 a.m. – 1 p.m.

McLane Creek Nature Trail

Enjoy hot cider and snacks while learning from trained Salmon Stewards about the wild spawning chum salmon.

For more info., contact Ann Marie at 360-754-3355 ext. 6857 or pearcea@co.thurston.wa.us

COMMUNITY EVENTS

Native Plant Salvage Foundation's Annual Water Wise Plant Sale

Sun., Sept. 29 • 11 a.m. – 4 p.m.

4131 Mud Bay Rd. NW, Olympia

Hard-to-find native and water-wise plants, including a special rain garden section. Personal Plant Shoppers will help you select the perfect plants for your garden. For more info., visit www.nativeplantsalvage.org

Free Vehicle Safety and Leak Inspections

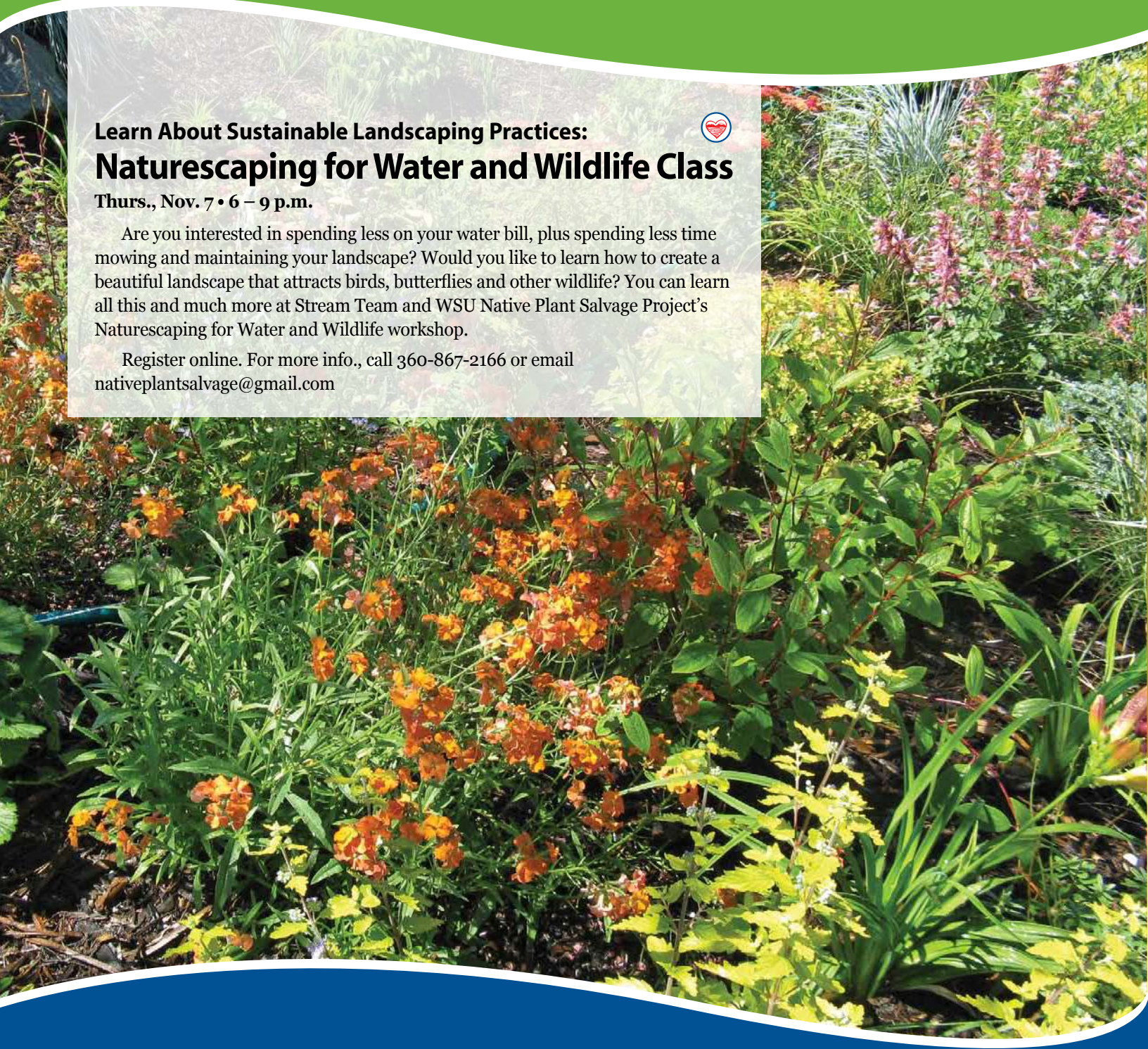
Thurs., Oct. 3 • 11 a.m. – 9 p.m.

South Puget Sound Community College Automotive Building – Building 16

Sponsored by the SPSCC Automotive Club

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

929 Lakeridge Dr SW
Olympia, WA 98502
www.streamteam.info



Learn About Sustainable Landscaping Practices:

Naturescaping for Water and Wildlife Class

Thurs., Nov. 7 • 6 – 9 p.m.

Are you interested in spending less on your water bill, plus spending less time mowing and maintaining your landscape? Would you like to learn how to create a beautiful landscape that attracts birds, butterflies and other wildlife? You can learn all this and much more at Stream Team and WSU Native Plant Salvage Project's Naturescaping for Water and Wildlife workshop.

Register online. For more info., call 360-867-2166 or email nativeplantsalvage@gmail.com