

the Thalweg

Watershed Stewardship Program

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Eco-Logical...

Tips to Reducing Your Footprint On the Road



The next edition of *Eco-logical... Tips To Reduce Your Footprint* will highlight the importance of ensuring cigarette filters and other tobacco-related products are kept out of the environment.

Studies have shown that the chemicals remaining in used cigarette butts, along with the bits of tobacco still attached, can have detrimental effects on aquatic life and water quality.

When littered, cigarette butts are inevitably washed into the storm drains that lead to streams, and eventually into our drinking water supply. It happens every day. Some estimates show cigarette butts are littered about eight million times every minute worldwide. This number, coupled with the fifteen years it takes the typical cigarette butt to degrade in the environment, makes the accumulation probability staggering. Cigarette butts are the most common form of litter in the United States, stacking up as 38% of all roadside litter collected during clean-ups.

Cigarette Butts as Litter, Toxic as well as Ugly, (page 2) gives insight to some of the research conducted about the toxic effects of tobacco litter.

Tips to Reduce Your Footprint on the Road, the third release in the Eco-Logical series, is coming soon. To view this and past videos, visit the Cobb County Watershed Stewardship website at www.cobbstreams.org



38% of all roadside litter is tobacco-related products



If you note a cigarette butt litter issue, encourage your place of employment and/or the businesses you patronize to provide an ash receptacle.

CIGARETTE BUTTS AS LITTER— TOXIC AS WELL AS UGLY

By Kathleen M. Register

This study first appeared in the publication "Underwater Naturalist", *Bulletin of the American Littoral Society*, Volume 25, Number 2, August 2000

Beyond being unsightly, does cigarette litter present a threat to organisms? This article summarizes research conducted to determine if the compounds in discarded cigarette butts (the filters and remnant tobacco) are biohazards to the water flea (*Daphnia magna*). Short-term bioassays (48 hours) using the water flea as the test organism were conducted. The results indicate that the chemicals released into freshwater environments from cigarette butts are lethal to *Daphnia* at concentrations of 0.125 cigarette butts per liter (one butt per two gallons of water). Smokers discard billions of cigarette butts yearly, tossing many directly into the environment. Cigarette butts accumulate outside of buildings, on parking lots and streets where they can be transported through storm drains to streams, rivers, and beaches.

Some background on cigarettes

Ninety-five percent of cigarette filters are made of cellulose acetate, a plastic slow to degrade. Cellulose acetate fibers are thinner than sewing thread, white, and packed tightly together to create a filter; they can look like cotton. Cigarette filters are specifically designed to absorb vapors and to accumulate particulate smoke components. Tobacco leaves contain several alkaloids, including the highly toxic alkaloid nicotine. Nicotine is a powerful insecticide and among the deadliest of all plant products in its pure form. Nicotine is a colorless liquid, highly soluble in water, and readily absorbed through the skin in its pure form. Potentially hundreds of additives are mixed with tobacco during the manufacturing process. The complete list of 1,400 potential tobacco additives, which include sweeteners and flavors such as cocoa, rum, licorice, sugar, and fruit juices is considered a trade secret. Since tobacco is not classified as a food or drug, there are no legal maximums on agricultural chemicals or chemical additives cigarettes may contain.

Cigarette butts accumulate in the environment due to the popularity of plastic cigarette filters and the habit of some to "toss their butt" rather than use ashtrays. Prior to 1954, most cigarettes were non-filtered. In the mid-1950s, sales of filtered cigarettes increased dramatically as the cause-effect relationship between smoking and cancer was reported extensively in the press. The recent bans on indoor smoking have also appeared to cause a shift in cigarette butt deposition. Circumstantial evidence indicates that more cigarette butts are accumulating outside of buildings due to the popularity of indoor smoking bans.

How many discarded cigarette butts are there? Trillions. Global tobacco consumption has more than doubled in the last 30 years, and world cigarette production reached a record high in 1997 according to the US Department of Agriculture (USDA).

The USDA estimated that in 1998, 470 billion cigarettes were consumed in the US; world cigarette production was 5.608 trillion. The World Health Organization estimates that 1.1 billion people in the world smoke—that is one third of all people on earth over the age of 15.



The 470 billion cigarettes smoked in the United States in 1998 translates to a total of 176,250,000 pounds of discarded butts in one year in the United States alone. The filters from 5.608 trillion cigarettes (approximate world production) would weigh more than 2.1 billion pounds.

The filters on one pack of 20 cigarettes weigh 0.12 ounces (with no tobacco attached) and displace a volume of 10 ml. With annual worldwide production of cigarettes at 5.608 trillion, the potential weight and volume of cigarette butts becomes enormous. Similarly, cigarette butts take up a large volume of space. If one person smokes a pack and a half a day, he will consume more than 10,000 cigarettes in a year. This number of cigarette butts (filters only—not including remnant tobacco) will fill a volume of five liters. Worldwide annual consumption of cigarettes creates enough cigarette butt waste to fill more than 2,800,000,000 liters.

Number of Filters

There is one measure as to how many cigarette butts are finding their way into streams, rivers, and coastal environments. The International Coastal Cleanup Day, organized annually by the Center for Marine Conservation, involves more than 500,000 volunteers picking up debris from beaches, rivers, and streams around the world.

Volunteers complete Marine Debris Data Cards indicating the quantity and type of litter they pick up. Cigarette butts were the most common debris item collected during the international cleanup, numbering 1,616,841 in 1998. Cigarette butts have topped the list in all CMC International Coastal Cleanups since they were added to the Data Cards as a separate item in 1990.

Because of the vast inflow of cigarette butts into the environment, experiments were conducted to determine if cigarette butts as litter present an environmental problem beyond aesthetics and have a measurable toxic effect when they enter the aquatic environment.

A series of bioassays (tests which use the response of a living organism to determine the effective level of a chemical in the environment) were conducted. One of the organisms most studied in aquatic bioassays is the planktonic animal *Daphnia magna*, often called a water flea. In aquatic ecosystems, water fleas occupy a critical position as they transfer energy and organic matter from primary producers (algae) to higher consumers such as fishes. Water fleas are small transparent crustaceans, have one central black compound eye, and swim in jerky motions. They feed by rhythmically beating their legs, collecting algae or bacteria on the filter-like bristles on their thoracic legs, and passing the food toward their mouths.



Water Flea, *Daphnia magna*

The Experiments

The large number of chemicals in used cigarette filters precluded toxicity testing of each chemical. Thus, a test that can estimate aquatic toxicity from the composite of chemicals and compounds found in cigarette butts was used. Using the US Environmental Protection Agency's 1996 "Aquatic invertebrate acute toxicity test for freshwater daphnids" standardized toxicology protocols and procedures, water fleas were introduced to petri dishes filled with dilution water and the test solution. For these experiments, the test solution was made by soaking the components of cigarette butts (remnant tobacco or the cellulose-acetate filters) in distilled, deionized water, and allowing the chemicals in the butts to leach into the water. Water fleas in the petri dishes were observed at 24 and 48 hours. In addition to death, any abnormal behavior or appearance was also recorded.

Experiment A - Used filters. To establish if the chemicals in used cigarette filters produce death in *Daphnia* after exposure to a specific concentration for a specified period of time. Remnant tobacco was removed from cigarette butts for this test. Filters from two cigarette butts were soaked in 500 ml of distilled, deionized water for one hour at room temperature.

Experiment B - Remnant tobacco. To establish if the chemicals in the tobacco found in smoked, discarded cigarette butts produce death in *Daphnia* after exposure to a specific concentration for a specified period of time. Remnant tobacco (totaling 28 mm) from two cigarette butts was soaked in 500 ml of water for one hour at room temperature.

Experiment C - New, unused filters. To establish if the chemicals in new, unused cigarette filters produce death in *Daphnia* after exposure to a specific concentration for a specified period of time. No tobacco was used in Experiment C. *Daphnia* were exposed to the chemicals that were leached out of new, unused filters to determine if any of the compounds in new filters were toxic to *Daphnia*. New filters were soaked in distilled, deionized water for one hour at room temperature.

Experiment D - Cigarette butts' effects on the pH of freshwater. To determine if the presence of cigarette butts in freshwater changes the pH of the water. pH is an important factor to aquatic animals, and can affect the toxicity of pollutants. For this experiment, one cigarette butt (the filter plus 28 mm of remnant tobacco) was soaked for one hour in 100 ml of spring water at room temperature. The pH of the water was measured before and after the one-hour soak using a Hach brand pH tester that had been calibrated just prior to the test.

Results

Experiment A (filter only). In this "filter only" experiment, 100% of the animals died after 48 hours in the concentrations that were equivalent to the chemicals found in two or more used cigarette filters per liter. In the 25% dilution, equivalent to one cigarette filter per liter of water, 20% of the Daphnia died within 48 hours.

Experiment B (remnant tobacco only). In this "tobacco only" experiment, 100% of the animals died after 48 hours in the concentrations that were equivalent to the remnant tobacco from 0.5 or more cigarette butts per liter. In the solution that represented the remnant tobacco from 0.25 cigarette butts per liter, 80% of the animals were dead after 48 hours. In the most dilute solution, representing 0.125 remnant tobacco cigarette butts per liter, 15% of the Daphnia died in the testing period.

Experiment C (new filters). The survival rates of the water fleas after 48 hours of emersion were poorest in the solutions with the higher concentrations of filters. But even at the highest concentrations of 16 new cigarette filters per liter of water, death rates were less than 50 percent. Findings in control animals. At the conclusion of Experiments A, B and C, all water fleas in the control groups were alive, maintained a vigorous swimming pattern, and did not whirl or accumulate a dark substance on their swimming hairs.

Experiment D (effects of cigarette butts on pH). The pH of the tested water was 6.6 before cigarette butts were added, and remained 6.6 after cigarette butts soaked in the water for one hour. The presence of cigarette butts did not change the pH of the water.

Conclusions

Cigarette butts are the most common type of litter on earth. Collected, they weigh in the millions of pounds. The toxic chemicals absorbed by cigarettes' cellulose acetate filters and found in butts' remnant tobacco, are quickly leached from the butts by water. The evidence indicates that the toxic chemicals leached from discarded cigarette butts present a biohazard to the water flea at concentrations of more than 0.125 butts per liter, or about one butt per two gallons of water. The leachate from the remnant tobacco portion of a cigarette butt is deadlier at smaller concentrations than are the chemicals that leach out of the filter portion of a butt.

"...toxic chemicals leached from discarded cigarette butts present a biohazard..."



Permission was granted to reprint this article with credit given to the author, Kathleen M. Register, and to "Underwater Naturalist, Bulletin of the American Littoral Society."

To read the full article, visit www.longwood.edu/cleanva/ciglitterarticle.htm

Volunteers Recognized at 2013 Watershed Stewardship Fair

Each year, the Watershed Stewardship Program hosts a special meeting to recognize the efforts of our volunteers. On February 26, three awards were presented to volunteers for their ongoing and consistent service in the community.

Lasster High School is our "School of the Year"

In addition to monitoring Rubes Creek since October 2010, students and teachers at Lassiter High have worked to enhance their local community by participating in privet pulls, stream clean ups, and in-class lessons.

Simon Locke was named "Volunteer of the Year"

Simon started monitoring his site on Butler Creek in 2009. He has obtained chemical, biological, and visual training and has consistently submitted data. He recently helped locate a sewer spill in his area, ensuring the problem was reported for repair.

The David Zandstra Group (Sharon & Ric Donato and David Zandstra) were named "Group of the Year"

Sharon, Ric, and David monitor the chemical and bacterial parameters of their site in the Rubes Watershed. Ric and Sharon also participate in our frog monitoring program, submitting weekly frog call observations.

**Congratulations to this year's recipients!
We appreciate your hard work.**

Our Local Native Rabbits



Eastern Cottontail

The eastern cottontail is the most common rabbit in Georgia - occurring throughout the entire state. It has dense brown to gray fur on its back, a white underside, a white (or cotton) tail, a white spot on its forehead, the nape of the neck is rusty in color, and the feet are whitish. From head to tail, adults measure 14-17 inches and weigh 2-4 pounds.

Cottontails breed from February to September. 80% of the young are born from April to July. Males are polygamous (i.e., have more than one mate at a time). Cottontails are very productive having 3-7 litters per year with 4-7 young offspring per litter. Their gestation period is 25-30 days. Young can start eating vegetation after 8 days and are weaned from their mother after 14 days.

The eastern cottontail is most active from dusk till dawn. Their home ranges cover 4-13 acres. Research has shown that cottontails use a variety of habitat types including crop fields, pastures, and briar and shrub thickets. Brush and briar thickets provide important cover from predators. Annual mortality rates average about 80% per year. Mammalian predators (coyotes, bobcats, foxes, etc.) account for the majority (55%) of cottontails mortality. Avian predators (owls and hawks) are second, at 25%. Most mortality of cottontails occurs during the breeding season and when rabbits venture into open areas with sparse ground cover.

Cottontails use a variety of habitats, but prefer early succession habitats (i.e., a mix of grasses, briars, forbs, and shrubs). Early succession habitat can be created or maintained by combinations of periodic ground disturbances that maintain ground vegetation in a 1-5 year old growth stage. Cottontails, as well as most rabbits, feed on a great variety of vegetation. However, rabbit management is targeted primarily at managing for quality cover and not food.

Swamp Rabbit

The Swamp rabbit, often called cane cutter, is the largest rabbit in Georgia and occurs mostly in the Piedmont region. It has coarse black to rusty-brown fur on its back with a white underside. The nape of the neck is small and indistinct. They have rust colored feet. From head to tail, adults measure 14-17 inches and weigh 3.5-6 pounds.

Swamp rabbits breed from January to August. Males are polygamous. The gestation period lasts 35-40 days. They have 2-5 litters per year, of 1-6 offspring. The two most important predators of swamp rabbits are domestic dogs and alligators. Other predators include bobcats, coyotes and owls. Swamp rabbits are good swimmers, taking to the water readily when pursued.

They will nest under logs, at the base of stumps, or in ground depressions. Unlike other rabbits in Georgia, swamp rabbits can be territorial. Swamp rabbits are found near water and wetlands, including beaver ponds, swamps, marshes, floodplains, canebrakes, and wet bottomlands. They can cover 5-19 acres over a year.



Finding young rabbits... A healthy looking baby rabbit with its eyes open and ears up, around 4-5 inches long, is able to survive on its own. It should not be disturbed. Rabbits in the nest are fed by their mothers during dawn and dusk hours, when they are less visible to predators. Finding a full nest without a mother is common; however it is not common for a mother to return to the nest when a human or their pet is hovering nearby. If a baby rabbit is injured and needs care, locate a local wildlife rehabilitator. To find more information about baby animals, visit: <http://www.schuylkillcenter.org/departments/wildlife/whattodoif/>

Sources: GA DNR Wildlife Resources Division <http://www.georgiawildlife.com/node/897> Photos: wikipedia

Stewardship Stars: Excellence in Data Collection

We would like to recognize the following volunteers who have monitored and submitted data every month during the previous quarter:



- Rick & Sharon Donato - Anuran Monitoring in the Rubes Watershed
- Sierra Club Centennial Group - Chemical, Bacterial, & Biological Monitoring on Rottonwood Creek
- David Zandstra Group - Chemical & Bacterial Monitoring in the Rubes Watershed
- Simon Locke - Chemical & Bacterial Monitoring on Butler Creek
- Keep Smyrna Beautiful - Chemical Monitoring in the Nickajack Watershed
- Norm Fagge - Chemical Monitoring in the Willeo Watershed
- Girl Scout Troop 2910 - Chemical Monitoring on Rubes Creek
- Pam Subalusky - Chemical Monitoring in the Willeo Watershed
- Boy Scout Troop 995 - Chemical Monitoring on Sewell Mill Creek
- Girl Scout Troop 2193 - Chemical Monitoring in the Willeo Watershed
- Friends of Gable Creek - Chemical Monitoring in the Sope Creek Watershed
- Morning Washburn - Chemical & Bacterial Monitoring in the Chattahoochee Watershed
- Isabel Ott - Chemical Monitoring in the Sope Creek Watershed
- McClesky Middle School - Chemical, Bacterial, & Biological Monitoring on Rubes Creek
- Tritt Elelmentary School - Chemical Monitoring in the Willeo Watershed
- Anne Ledbetter - Chemical Monitoring on Popular Creek
- Sally Brooking - Chemical Monitoring on Sope Creek
- Donna-n-Carmen - Chemical Monitoring on Olley Creek

Thank you for heading out in our coldest months!!

ECOPEDIA

Fair Trade

Fair trade is a trading partnership, based on dialogue, transparency and respect, that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers – especially in the South. Fair trade organizations, backed by consumers, are engaged actively in supporting producers, awareness raising and in campaigning for changes in the rules and practice of conventional international trade.

Fair trade products are produced and traded in accordance with these principles - wherever possible verified by credible, independent assurance systems.

Source: World Fair Trade Organization

REMINDERS

Amphibians are Indicators

Listen for frogs and toads... they are indicators of a healthy aquatic habitat- their absence or presence is telling us something about our environment.



Welcome Kathleen Lemley



We are pleased to introduce Kathleen, our new Watershed Stewardship educator.

Kathleen started in March as a part-time environmental programs specialist. Many of you may already know her from her work with Georgia Adopt-A-Stream, Project WET, and Rivers Alive. She brings a wealth of experience and knowledge to our program. We are thrilled to have her on board.

Please join us in welcoming Kathleen to Cobb Water!

OBSERVATIONS



male



female

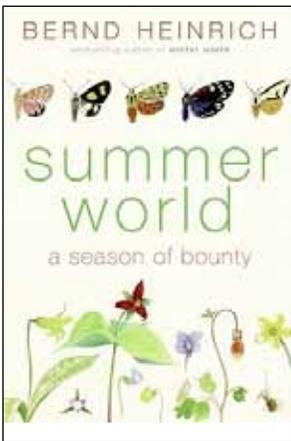
Ruby-throated Hummingbird (*Archilochus colubris*)

After wintering in Mexico and Central America, Ruby-throated Hummingbirds are on their way back in Georgia! Welcome them with some fresh sugar solution in a clean hummingbird feeder (basin style feeders are easier to keep clean than the inverted bottle kind). Just dissolve one part sugar in four parts water and cool before filling your feeder. You can also provide nutrition by planting nectar-producing flowers. Plants that have red or orange tubular-shaped blooms (like Trumpet Creeper, Crossvine, Coral Honeysuckle, and Salvia) are especially attractive. Hummingbirds also eat soft-bodied insects and spiders, so refrain from using pesticides in your yard if possible.

Bud Ellis, Georgia DNR, Wildlife Resources Division

RECOMMENDED RESOURCE

Summer World: A Season of Bounty by Bernd Heinrich



How can cicadas survive—and thrive—at temperatures pushing 115°F? Do hummingbirds know what they're up against before they migrate over the Gulf of Mexico? Why do some trees stop growing taller even when three months of warm weather remain? With awe and unmatched expertise, Bernd Heinrich's *Summer World* never stops exploring the beautifully complex interactions of animals and plants with nature, giving extraordinary depth to the relationships between habitat and the warming of the earth.

In *Summer World: A Season of Bounty*, Bernd Heinrich brings us the same bottomless reserve of wonder and reverence for the teeming animal life of backwoods New England that he brought us in *Winter World: The Ingenuity of Animal Survival*.

Now he is focusing on the animal kingdom in the extremes of the warmer months, with all its feeding, nesting, fighting, and mating. Whether presenting disquisitions on ant wars, the predatory characteristics of wasps, the mating rituals of woodpeckers, or describing an encounter with a road full of wood frogs, *Summer World* never stops observing the beautifully complex interactions of animals and plants with nature, giving extraordinary depth to the relationships between habitat and the warming of the earth.

Exquisitely illustrated with dozens of the author's own drawings, *Summer World* is Bernd Heinrich's most engaging book to date, a fascinating work from one of our very best science writers.

Source: Waratah Communications

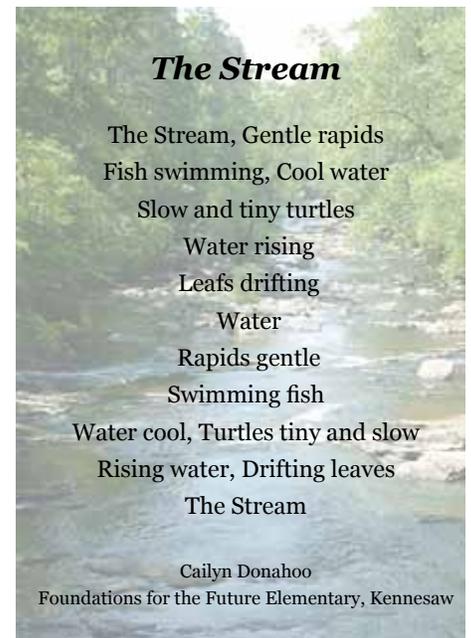
CONSERVATION TIP

Buy Local

Farmer's Market vs. Supermarket...

Try doing some of your shopping at a local farmer's market, and if you can, walk or bike there. Of the total energy used in the United States per year, four percent is used to produce food, and between 10 and 13 percent is used to transport it. On average, U.S. supermarket food travels 1,500 to 2,500 miles before it reaches the family table. Buying local food can reduce the amount of petroleum consumed to transport your dinner by as much as 95 percent. Better yet, find a local farmer and go to the farm!

Source: *The Green Book 2007*



w e l c o m e

Big Shanty Elementary

Stream Sentenials

Noonday Watershed

Naimi Kai Strickland

Rottenwood Watershed

Don't forget...



we post twice weekly updates, workshop information, natural history tidbits, and more!



Cobb County...Expect the Best!

This is an official publication of the Cobb County Water System, an agency of the Cobb County Board of Commissioners.

Calendar of Events

April

- 4 Garden Work Day • 9am - 11am • Cobb County Water Quality Laboratory
- 4 Watershed "Cigarette Butt Clean-up" Mob • 4pm - 6pm • Location TBD
- 11 Garden Work Day • 9am - 11am • Cobb County Water Quality Laboratory
- 18 Garden Work Day • 9am - 11am • Cobb County Water Quality Laboratory
- 25 Garden Work Day • 9am - 11am • Cobb County Water Quality Laboratory
- 25 Adopt-A-Stream Chemical Monitoring Workshop • 6pm - 8:30pm • Cobb County Water Quality Laboratory
- 26 Rain Barrel Workshop • 10am - 11am • Cobb County Water Quality Laboratory

May

- 2 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory
- 2 Watershed "Stream Clean-Up" Mob • 4pm - 6pm • Location TBD
- 4 River Rendezvous • 8am - 1pm • Cobb County Water Quality Laboratory
- 9 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory
- 11 Cobb County Master Gardener Plant Sale • 10am - 4pm • Cobb County Water Quality Laboratory
- 13 Rain Barrel Workshop • 3pm - 4pm • Cobb County Water Quality Laboratory
- 16 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory
- 21 Adopt-A-Stream Bacterial Monitoring Workshop • 6pm - 8:30pm • Cobb County Water Quality Laboratory
- 23 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory
- 30 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory

June

- 5 Summer Family Program • Scavenger Hunt • 9am - 11am • Lost Mountain Park • contact: karen.faucett@cobbcounty.org
- 6 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory
- 13 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory
- 13 Rain Barrel Workshop • 12pm - 1pm • Cobb County Water Quality Laboratory
- 19 Summer Family Program • Fairy Houses • 9am - 11am • Wright Center • contact: karen.faucett@cobbcounty.org
- 19 Adopt-A-Stream Chemical Monitoring Workshop • 6pm - 8:30pm • Cobb County Water Quality Laboratory
- 20 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory
- 27 Garden Work Day • 8:30am - 10:30am • Cobb County Water Quality Laboratory