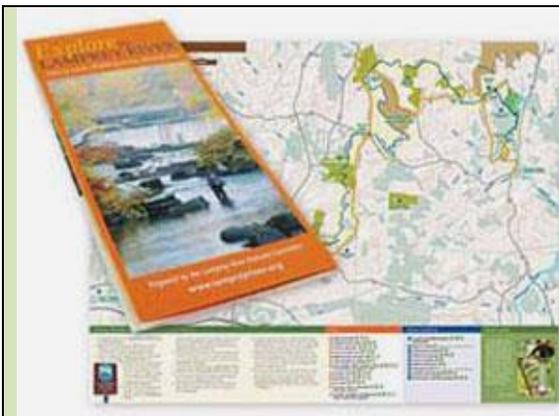


## Newsletter Summer 2015



### **Summer's Here, Time to Explore the Lamprey River**

Whether you have a house full of guests from away or kids or grandkids who need something to do besides play computer games, the Lamprey River can help keep them entertained.



The Lamprey River Map and Tour Guide highlights the many parks and scenic spots along the Lamprey River in Epping, Lee, Durham, and Newmarket. The guide offers suggestions for finding the destinations and things to see or do at each site. Copies are available at your local library and on-line at <http://www.lampreyriver.org/recreation>.

The *Lamprey Rivers Junior Ranger Study Guide and Activity Book* offers activities to help kids and their families become familiar with the geography, history, nature, recreational opportunities, and current issues in and along the river. Patches featuring the rare Blanding's turtle are available for free for kids who complete the activities. The activity book is available at <http://www.lampreyriver.org/for-fun-junior-rangers>.



### **Nitrogen Sources to Great Bay**

Great Bay is one of New Hampshire's natural gems and is a place of beauty and significant economic activity. Over the past two decades, Great Bay has made the unsettling transition from a healthy, productive estuary to a listing on the federal register of "impaired" waterways. In other words, Great Bay is showing signs of pollution and something must be done to correct the situation.

One of the problems in Great Bay is that too much nitrogen is in the water. Nitrogen in itself is not a bad thing. In fact, it is essential in small amounts; however, too much of a good thing is not a good thing. Excess nitrogen causes too much algae to grow. Too much algae causes a cascade of issues including water cloudiness, smothering of eelgrass, lowering of dissolved oxygen for aquatic critters in the water and in the mud, and unpleasant odors. Nitrogen comes from clearly defined sources called “point sources” (what comes out of a pipe) and “non-point sources” (what comes from the land, air, and rivers). What is the source of all this “non-point source” nitrogen?

Scientists looked at the relationship between how people use the land and the amount of nitrogen. They created a computer model to see how the nitrogen probably moves through the land and water around Great Bay. They then took samples to see how well the model held up. The results show that human activity is the source of much of the nitrogen. The biggest source of nitrogen is the atmosphere, contributing 42% of the total. Local and distant power plants, vehicles, and industries burn a lot of fossil fuel and release a lot of nitrogen up in the air. Nitrogen returns to Earth as small particulates and also mixes with rain. The next biggest non-point source of nitrogen to our waterways is human waste, with 29%. This comes from septic systems, leaky sewer pipes, and illicit sewer connections. Chemical fertilizer applied to lawns and a bit from farm land accounts for 15%. Animal waste, from both farm animals and dogs, accounts for 14%. In all, storm water run-off accounts for about 34% of the total nitrogen that reaches Great Bay. This is significant, because we all can help to make sure that storm water soaks into vegetated areas for purifying rather than running across roofs or pavement and down a storm drain without any treatment.

To view a summary of the non-point source study, please see <http://greatbay.org/documents/gbmspring2015.pdf>.

To view the full report, please visit

<http://des.nh.gov/organization/divisions/water/wmb/coastal/documents/gbnpss-report.pdf>.

## **Enough Is Enough, or Is It? The Lamprey River Instream Flow Management Plan**

With all the snow last winter, one would think that we would have had a very wet spring. That turned out not to be the case; we had a really dry spring. On the positive side, the dry spring did not deliver any floods. The downside, though, is that we are heading into summer on the dry side.

The Lamprey River is one of two rivers in New Hampshire that has a pilot “instream flow management plan.” The goal of this plan is to create conditions that maintain the natural variability of flows (not strictly volume) to meet the basic survival needs of aquatic organisms. This sounds easy enough on the surface,

but achieving that goal is extremely complex. In fact, the plan took more than twenty years to be finalized. The early work involved figuring out the basic needs of aquatic organisms and then determining what flow conditions were natural and when flows should be considered to be outside that range. The final stage was establishing how to supplement flow when necessary. Managing the flow of water in the Lamprey occurs primarily through controlling the amount of water that humans take from the river and controlling the amount of water released by dams.



low water June 2015  
downstream of Rte. 27 bridge in Epping  
Photo by S. Petersen

For all the work that went into the plan, active management occurs only during low flows. The state carefully monitors both rainfall and the rate of flow in the river. Activation of instream water management is affected by how much (or more correctly, how little) water is flowing combined with the duration of different kinds of flow: allowable, persistent, and catastrophic. If flows are determined to be low enough to trigger management, the plan includes components for municipal water conservation, limiting water withdrawals, and dam management.

What does all this mean? Do people along the river have to do anything or expect noticeable changes? The short answer is...not really. If we have a long stretch of dry weather and flows in the Lamprey fall below a critical rate, the NH Dam Bureau will release a 48 hour pulse of water from Pawtuckaway Lake to the Lamprey, resulting in a lowering of the lake by about one half inch. This pulse mimics a two-day rain event and provides temporary relief to fish hiding in natural refuges in the river, but it will not be enough to enhance flows for recreational purposes. Once a pulse is released, the clock is reset. During low flows and persistent dry weather, the Town of Durham/UNH Water System is required to stop taking Lamprey River water and switch to another water source. (This happens almost every year in late summer.) Towns might also need to activate water conservation measures, such as limiting outside water use.

The Lamprey River Instream Flow Management Plan was adopted in August 2013. By statute, the state legislature will review the plan in late 2015. A public presentation is scheduled for July 29 beginning at 6:00 at the Lee Safety Complex, 20 George Bennett Road. Depending on this review, the instream flow management plan created for the Lamprey and the lessons learned along the way could well serve as a model for other rivers in New Hampshire.

## Twinkle, Twinkle, Little Firefly

The lightning bug is brilliant  
But he hasn't any mind.  
He blunders through existence  
With his headlight on behind.  
--Anonymous



Photo: Wiki Commons

Summer's here again, and love is in the air. Ah, l'amour! Depending on where you live, maybe lots of love. Love that comes and goes in a flash. Love that has its own rhythm and sometimes is deceptively alluring. Love we can't help but watch, magical yet painfully short-lived.

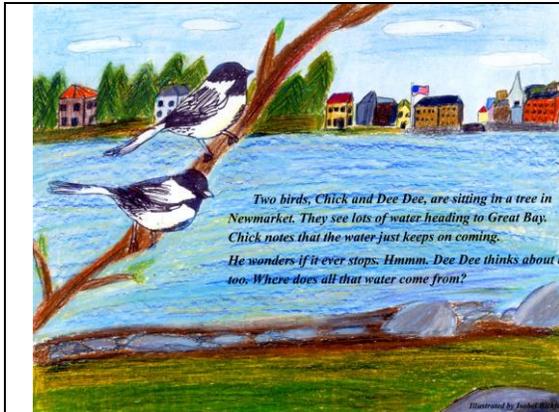
The firefly, or lightning bug, is more properly called a beetle. It has leathery forewing covers that conceal softer wings used for flying. Unlike other beetles, though, fireflies are fairly soft (in other words, easily squished by curious children). All fireflies have a unique shield-like covering, the pronotum, over their heads. Over 2000 species occur in moist tropical and temperate areas. Most firefly larvae eat worms or snails. Most adults do not appear to eat.

Unlike lightbulbs, fireflies do not get warm when they glow. The light is caused by a biochemical reaction. This reaction occurs in eggs, larvae, and adults. Adults use the light to seek sexual partners. Larvae seem to use the light to warn predators of their foul taste and eggs flash the light when they are disturbed. Each firefly species in a particular area has a unique signal. This ensures that the fireflies find the right partner. One signal might be to flash for one second then rest for two seconds. Another signal might be to form a "j" shape while flashing for three seconds. Males usually signal while flying, but females usually signal from a perch, such as a blade of grass or a twig. Females of some species also can imitate the signal of another species. They mimic the signal until some unwitting male approaches. Instead of mating, the female will attack and eat the male. Nobody said firefly love was always pretty.

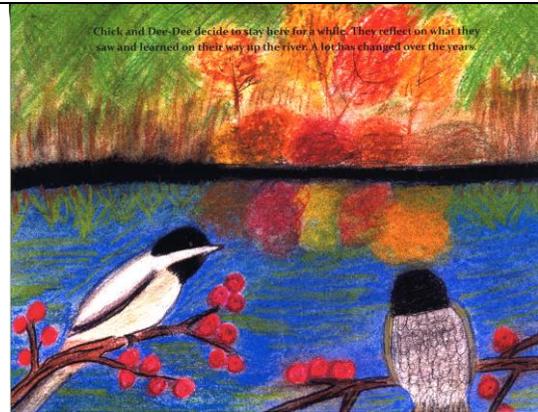
As is true with many insect populations, firefly numbers are dwindling globally. Loss of suitable habitat is certainly a cause, but bright lights, pesticides, and fertilizers also seem to interfere with natural firefly behavior and physiology. If your family wants to enjoy nature's little light show, turn the lights down, avoid pesticides on your lawn and garden, keep fertilizer use to a minimum, and don't over-mow the lawn (fireflies hide in the grass during the day).

## Children's Lamprey River History and Tour

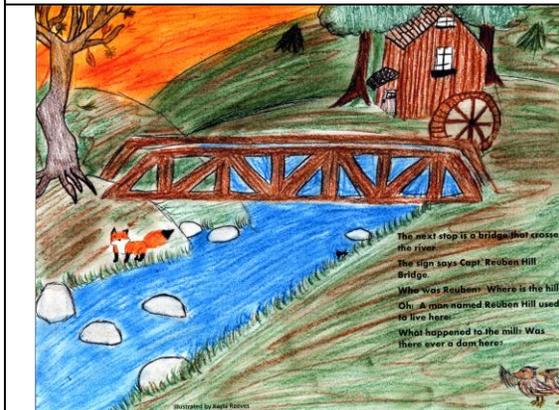
This past spring, the Lamprey Rivers Advisory Committee began a project to write and illustrate a children's book that would highlight some of the Lamprey's rich history and natural features. The story will be narrated by two chickadees. Students in an honors art class at Newmarket High School took on the challenge of taking one page of text and interpreting how best to illustrate the content or message. Here is a sample of their creative work:



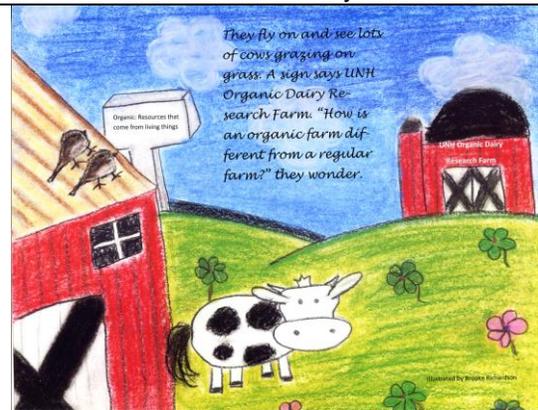
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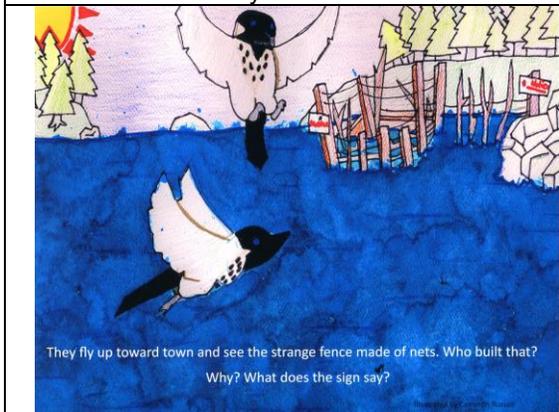
Rachel Dailey



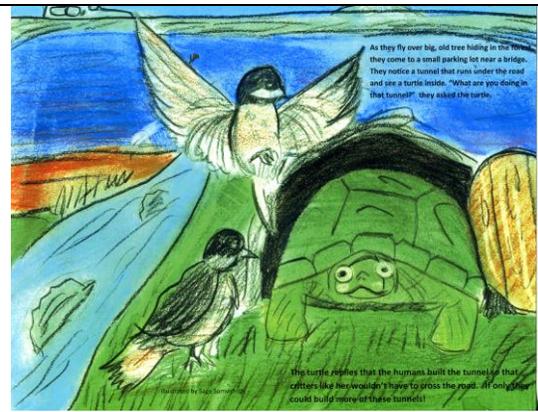
Kayla Reeves



Brooke Richardson



Cameron Russell



Sage Somvich