



Kemp's Point

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News from the University of Wisconsin-Madison's Kemp Natural Resources Station

From Bog to Bog -- *By Lorraine Rodriguz-Borilla, PhD Student, UW-Madison*

If someone would have told me a year ago that I was going to spend my summer travelling from bog to bog searching for cranberries, I would have not believed it. But that's exactly what happened! Coming from Villalba, a small town in the middle of Puerto Rico, where the climate is extremely warm and humid, nothing would have prepared me for this experience.

As an undergrad, I worked on different research projects that took me to tropical rainforests and farmlands, but wetlands are a whole other environment. Even though I majored in Microbiology I always felt inclined to work with plants. For this reason I decided to pursue a Master's degree focused on plant genetics. I studied the genetic diversity of sweet potato in Puerto Rico in order to understand and know the resources available for breeding programs and for conservation. My interest in these particular areas brought me to the University of Wisconsin-Madison in order to work with wild cranberries and small cranberries.

Why am I interested in non-cultivated fruits? Food security is becoming an important aspect of plant breeding programs. Food security is not only concerned with access to sustenance, but with access to healthy food and optimal nutrition. Therefore, many current breeding efforts have focused on improving minor crops, particularly "superfruits," which contain vast amounts of healthy antioxidants and other phytochemicals, which is the case with cranberries. Wild plants can be a large and important source of favorable genes which could become essential for the development



of new and more nutritious varieties. Before we can analyze important traits it is necessary to understand the genetic composition of the wild cranberries. Once we know the genetic makeup of these populations found in different natural areas, we can start developing new strategies to help ensure these important resources are protected.

This summer, we worked in more than 20 different locations in northern Wisconsin and I had the amazing opportunity to have my brother as my co-worker in this incredible adventure. A typical day for Fabien and me consisted of traveling hours to get to a State Natural Area protected either by the Wisconsin Department of Natural Resources or USDA Forest Service, lands such as those contained in the Nicolet-Chequamegon National Forests. We would set up transects to collect runners from the

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Bog (From page 1)

wild cranberries inside the bogs (20 different points per bog) and record the GPS coordinates of each one. We collected in as many locations as possible in one day which was usually two per day.

After collecting the material we stored it in a small cooler with icepacks to keep it cold so that collected leaves could be used for DNA extractions.

Making these plant collections may sound like an easy task, but it was actually much more complicated than it seems. The areas in which the plants were growing were very harsh -- sometimes the water level was really high and we would get stuck in the middle of the bog. Mosquitoes really appreciated our

presence and were ready to greet us every day, making it a little bit more gruesome. To be sincere, not even the bugs could change our excitement and appreciation for these pristine locations we visited. Even though the summer research

to get out of the lab and enjoy all the beautiful places Wisconsin has to offer is just amazing. But we must say that one of the best things about this experience was being able to have Kemp Station as our base. At Kemp we met really

amazing people working on so many interesting projects. We created our own community at the Mead Residence Hall and we learned a little bit about all the great things everyone was doing. Karla, Tom and Lynne made us feel at home even though

we were very far from Puerto Rico and that made the summer even better. We look forward to our next summer season which hopefully we will again spend at Kemp Station. 🐼



Fabien holds up the runner from a wild cranberry plant.

trip was work related I enjoyed it so much. Having the opportunity to get to know places in the state that are still perfectly preserved is just breathtaking. Being able



On June 9, two unique bee hives, designed and constructed by local bee enthusiast, Wayne Newby, were deployed on Kemp Station property. According to Newby, "The goal is to have a hive that is something the bee wants, something that emulates what it was designed to work with. The hexagon seems like a natural choice for the shape because of its compromise between the perfect circle and something a beekeeper can work with." Between 2,000-3,000 bees were placed in each of the two hives.



Remarkable Journeys

By Karla Ortman

While there is a lot in the natural world that is beautiful, impressive and amazing, I continue to have my mind blown by insects. Insects can be found in all types of environments and their species count (estimated at over one million) represent more than half of all living organisms on the planet. There have been days....like when the mayflies hatched out at Kemp this summer or a recent warm fall day when the Asian Lady Beetles were swarming my house....when a person can't help but think that one day the insects will rule this planet!

First, let's review some of the basics. Insects do not have a spine, or vertebrate, making them "invertebrates." Instead they have an exoskeleton, or external skeleton, that protects their body. Animals with exoskeletons are known as arthropods, so crabs and lobsters are also arthropods. An insect has a three-part body – head, thorax (mid-section) and abdomen – six legs, compound eyes and one pair of antennae. Most insects hatch from eggs and then grow from the immature, pupal form, to the adult form in either a 3- or 4-stage metamorphosis. Insects move by walking or flying and some even swim. Some insects form communities that are large, social and well-organized. Insects communicate with sounds, pheromones and with light.

Over the last few months I had the occasion to encounter or learn about some insects or things about insects that I find simply fascinating! Two such insects are the monarch butterfly and the common green darner dragonfly. It's what they have in common that is particularly amazing to me.

Let's start with the monarch butterfly, a very popular insect lately as there

is a great deal of concern regarding its population decline over the last few decades. Causes of the decline include a lack of milkweed plants required by the insect for its life cycle, as well as a loss of overwintering forest land. Kemp Station is home to a large plot of common milkweed used by monarchs each year. Eggs are laid on the plant by the butterfly. When the egg hatches, the caterpillars eat the milkweed plant until fully grown. This year, some youthful eyes (at just the right height) spied one monarch



caterpillar while it was in its "J" shape before forming a chrysalis, and another already completed chrysalis.

These beauties were spied in late August. I knew monarchs migrated, but I wasn't clear on the details so I did some research. These late August

finds were the 4th generation of the 2015 monarchs and they are different from generations one through three. The 4th generation monarchs migrate. Yes, migrate, like birds. This concept alone is mind boggling because my perception of a butterfly is that of a very delicate creature. To make this even more incredible, the 4th generation monarchs from Wisconsin fly all the way to central Mexico – this is over 2,000 miles from Woodruff, Wisconsin!

Once in Mexico, high in the mountains, where it is cool and damp with fog, these 4th generation monarchs literally hang out in tree tops for the winter. Come spring, sometime in March, they begin their journey north, looking for milkweed plants on which to lay eggs. Once they lay eggs, the 4th generation monarch dies, somewhere in the southern United States. The offspring of this mighty traveler, is now the 1st generation of the year and they continue the trip north, each laying 300-800 eggs on milkweed along the way. The process continues for generations 2 and 3. These "northern generation" butterflies live only an average of 2-4 weeks, until generation 4 comes along. Triggered by external factors, like the angle of the sun and a drop in temperature, this generation heads south, travelling 10 times the distance and living 8 times longer than its ancestors.

While pondering the concept of a monarch migrating such a distance, I happened to see some common green darner dragonflies zipping about and remembered that some populations of common green darners migrate. Measuring up to 3 inches long, with a 3 inch wingspan, this large dragonfly reminds me of a helicopter with its short, thick thorax. While much is known about monarch butterfly migration, less is known about the migration of the common green darner,

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Kemp Profile: Brian Zweifel

Hometown: I grew up on a small dairy farm just southwest of Madison in Verona, WI

Educational background & current area of study:

After working as an electrician for eight years I returned to UW-Madison and received my BS in Forest Science in December 2013. While an undergraduate I worked as a restoration ecology and forestry intern for Adaptive Restoration LLC in Mount Horeb. There I gained valuable field experience doing timber cruising, Managed Forest Law enrollments, invasive species eradication, prescribed burning, tree and prairie planting, and two winters of horse logging. I am currently a graduate research assistant at UW-Madison, working towards my MS degree in forestry.

How is your research funded?

My project is funded through the generosity of the Gordon R. Connor Center of Excellence.

What question does your field research answer?

My research seeks to optimize the rotation length for northern red oak (*Quercus rubra*) in Wisconsin. For many years the trend has been to promote “big trees” and “extended rotations” of oak without knowing what kind of costs are associated with these management recommendations. This project will investigate harvest age effects on profitability by sampling tree harvest age, log cull, and log degrade on active oak harvest sites around the state. Data will be used to develop favorable economic harvest recommendations to promote forest health, resource sustainability, and industry efficiency, as

well as maximize returns for Wisconsin woodland owners, state and local governments, and mills alike.

Describe a typical day of fieldwork:

A typical day in the field brings me to some of my favorite areas in the state of Wisconsin. My sites are scattered across north-central Wisconsin and the Driftless Area in the

southwest part of the state. Before travelling to a site I usually contact the logger to see if they have trees that have been harvested, but are

still lying near where they were felled. When I arrive onsite I locate these logs, measure their total volumes, determine log grades, collect information on site quality, stand age, soil type, slope, aspect, and finally use a GPS to mark the tree locations for later mapping. If there is decay present, I photograph each end of the log for later image analysis to calculate decay volume. Once I have collected data on five trees I move to the next site. By doing this I hope to capture any spatial variation that may occur across given harvest sites. In the evenings I am usually inputting the data I have collected, doing the imagery analysis of the decayed logs, and planning the routes for later in the week.

What is the biggest challenge you’ve faced working on this project? The current markets for red oak have not been very strong, leading many companies to hold off on their oak harvesting until market conditions improve. This has made the beginning portion of my data collection period a little slower going than I would like to see. As winter approaches, I am guessing I will run into more weather related challenges, but for now the autumn weather around Woodruff has been spectacular.

What have you enjoyed most working on this project? I think for me it has been the people I have interacted with and the places I have seen. So far I have met some really great DNR and private consulting foresters, mill owners, log buyers, and loggers. These people have been nice enough to take time out of their busy days to help me get the data I need, and it has been a great experience so far. I also have the pleasure of staying at Kemp Station while doing my data collection in the northern part of the state. I feel extremely fortunate to be working and living in a Wisconsin northwoods paradise, surrounded by friendly people, and researching something I truly care about.

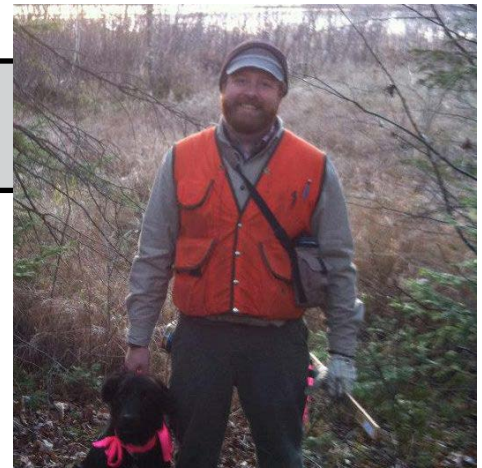


Photo at left: Decayed log for later image analysis. Ruler allows the image software to be correctly scaled, thus allowing accurate calculation of the area of decay



Station Snapshots



Above: Lakeland College students from Dr. Paul Pickhardt's Comparative Forestry class take tree measurements in the forest at Kemp Station.



Left: UW-Milwaukee's Dr. Jim Reinartz talks with students in his Vegetation of Wisconsin course about the contrast in forest plants in and outside of one of 12 deer exclosures on the Kemp property.

Right: Hadley Boehm, a graduate student at UW-Stevens Point with the Wisconsin Cooperative Fishery Research Unit, holds up a vial containing larval fish, each about 1/2-inch long. The species of each larval fish will be determined as part of her project examining recruitment bottlenecks of walleye in specific lakes.



Journeys (From page 3)

but more is being learned each year. The Migratory Dragonfly Partnership uses research and citizen science to understand the North American dragonfly migration and promote conservation.

The dragonfly life cycle begins when the female deposits her eggs in a slit she cuts in a plant growing in a calm lake or pond. From the egg hatches the nymph, a wingless creature, which will live in the water for a period of time, which is different for each species of dragonfly. The nymphs eat other insects, and even other dragonfly nymphs smaller than themselves. As they eat, they grow, molting into a larger form of themselves. Once full grown, and weather conditions are appropriate, the nymph crawls from the water and positions itself on a plant stalk or other vertical surface –

sides of boathouses and dock posts, for example. In a final molt, the adult dragonfly emerges from the exoskeleton of the nymph. The vacated exoskeleton is the exuvia, and is evidence of what species of dragonfly lived in that water body.

It has been observed that common green darners tend to migrate south, following cold fronts. Those that migrate south in the fall will breed while overwintering in the southern United States, Mexico or in the Caribbean. Their offspring then make the one-way trip north in spring.

These dragonflies often travel in large groups – hundreds of thousands of individuals– following lake shores or coastlines. Besides being large, the common green darner is also fast,

so its predators are limited to larger birds, like hawks. At the Hawk Ridge Sanctuary in Duluth, Minnesota, migrating kestrels have been observed feeding on migrating common green darners.

What is particularly interesting is that scientists have learned that dragonflies carry stable isotopes of hydrogen in their wings that can be used to identify the general location of the pond or lake from which the dragonfly emerged. This will help researchers to better map migration patterns.

Come spring, when migration season arrives, I will not only be welcoming back the birds, but also the monarchs and common green darners. And at the end of summer, I will bid the final generation of these critters “safe travels” as they embark on a truly remarkable journey. 🦋



On Fish, Life and Tadpoles

By Brandon Maahs, UW-Stevens Point

As a university student, the summer months are meant to enhance our schooling and to gain valuable experience in our field of study. This summer was, for me, definitely one for the books. It was filled with travel, adventure and my passion for the field of fisheries. I am a student studying fisheries and biology at the University of Wisconsin-Stevens Point (UWSP) and I will be entering my senior year in fall. I started my summer off with a five week mission trip to Australia. After such a life changing trip I was asking myself, "how could my summer get any better?"

This question was soon answered when I arrived at Kemp Station for work. I had a job with the UWSP Fisheries Cooperative Research Unit working with a graduate student on her Masters research. The research project is a study on four different lakes in northern Wisconsin trying to figure out why the walleye population has been declining in two of these four lakes.

Not only is Kemp a beautiful place to live, but our daily work duties, from my perspective, could hardly even be considered work. Throughout the last half of this summer my colleagues and I used various sampling methods such as seine netting, gill netting, tow nets and light traps to seek out little walleye that were born this spring. Zooplankton and water quality measurements were also tested throughout this summer to insure we would obtain a wide data set.

Going into the job after my return from Australia I had expectations that my colleagues and

I would have a set sampling routine with nights free to do what we pleased. The reality of a field season in Fisheries soon hit me! I don't recall having two similarly scheduled weeks all summer. One week we were gill netting and staying up until the wee hours of the morning while the next week we would spend most of our work hours looking at samples under a microscope in the lab. Looking back I am thankful for the hectic and busy schedule. I was always doing and learning something new which kept work interesting.

A valuable lesson I learned this summer is to always expect the unexpected. I've been told this many times throughout my life, but this summer I got to understand the meaning behind it in a different way. The unexpected seemed to always meet up with us, which in some ways was exciting, but other times the unexpected added stress to our night.



The underside of a bullfrog tadpole, showing the developing legs of the frog.

One exciting unexpected occurrence was the discovery of bullfrog tadpoles. I had never realized I had such a fascination with these creatures. There was something about their calm, careless style of swimming that brightened even the hottest and longest of our days on the lake. These tadpoles became a common sight on one of the lakes we sampled. We enjoyed watching them grow and transform into mature frogs!

On the other side of things, there was the time when our boat battery died and left us stranded on the opposite side of the lake from the boat landing. We soon found out how difficult it was to paddle the work boat. We eventually pulled started our motor and made



Brandon driving the research boat. Fisheries students complete boat safety training, usually held at Kemp Station.

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Forestry Field Trip!

Third graders from AV-W Elementary School visited Kemp Station this fall to learn about trees and forestry. Clockwise from right: Students don forestry field gear for a lesson in tree measurement led by UW-Madison Forestry Graduate Student, Brian Zweifel; UW-Madison Forestry Professor, Scott Bowe, demonstrates the components of a tree before the students make leaf art; Tom Steele, Kemp Superintendent, talks about how trees touch our lives each and every day.



Tadpoles (From page 6)

in back to the landing to retrieve the spare battery and all was well.

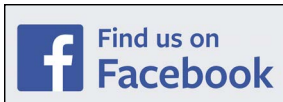
One last highlight from my time in the Northwoods of Wisconsin were the many late nights we spent on the lakes. For part of my time at Kemp we had to gill net each of our study lakes a few times. This required us to set the nets around 9:00 pm and leave them soak for three hours, then repeat one more time for another three hours. There were some long sleepless nights but talk about peaceful! Imagine yourself in the only boat on a glass calm lake under a star filled sky and you'll get a taste of what I experienced many nights this summer. Star gazing became a

nightly event that we all looked forward to. We saw countless shooting stars as well as one meteor that lit up the night sky with many different colors as it fell through the Earth's atmosphere ending with a bright flash.

I feel very blessed to have had the opportunity to experience so much this past summer. Staying at Kemp Station was definitely the cherry on top of an already memorable summer. My experiences have taught me lessons I could not have learned if I hadn't taken steps of faith and they have made me a more knowledgeable fisheries student. I am excited to see what my future has in store for me in the school year and beyond. 🐸



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Dark-eyed Junco (*Junco hyemalis*)

What is a sure sign that winter is on it's way? Snowbirds! Since I was a little girl, I knew these birds only as "snowbirds" -- that's what my mom and my grandparents called them. It wasn't until I was much older, that I learned their common name of "junco." Dark-eyed juncos are most often seen in flocks, hopping about and scratching the ground in search of seeds. When startled, they fly off, the white of their outer tail feathers flashing, making them easy to identify. These birds spend their summers in Canada, where they breed, raise their young and then migrate south for the winter, arriving in Wisconsin in October. Some may find it funny that "flying south" takes these birds to northern Wisconsin where it is still quite cold! The birds stay in flocks throughout the winters, foraging, and there is a constant battle for dominance while feeding. In response to this, the birds have developed their own wintering levels. The less aggressive, younger males do not migrate as far south as the older, more dominant males. While they must endure potentially harsher winter conditions, the advantage they have is being able to return to breeding grounds earlier in the spring. Females migrate even farther south than the older males, since they don't need to be back to the breeding grounds until after the boys have returned. Juncos are found throughout the U.S. and they vary in color patterns by region. At one time, these were considered 6 different species, but because of range overlaps and interbreeding, ornithologists now consider them all as the dark-eyed junco with six different races -- ours being the slate-colored junco. Enjoy these little birds this winter!

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