Kemp's Point

Volume 21, Number 2, Fall 2020

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

A Strange Year for Kemp Station

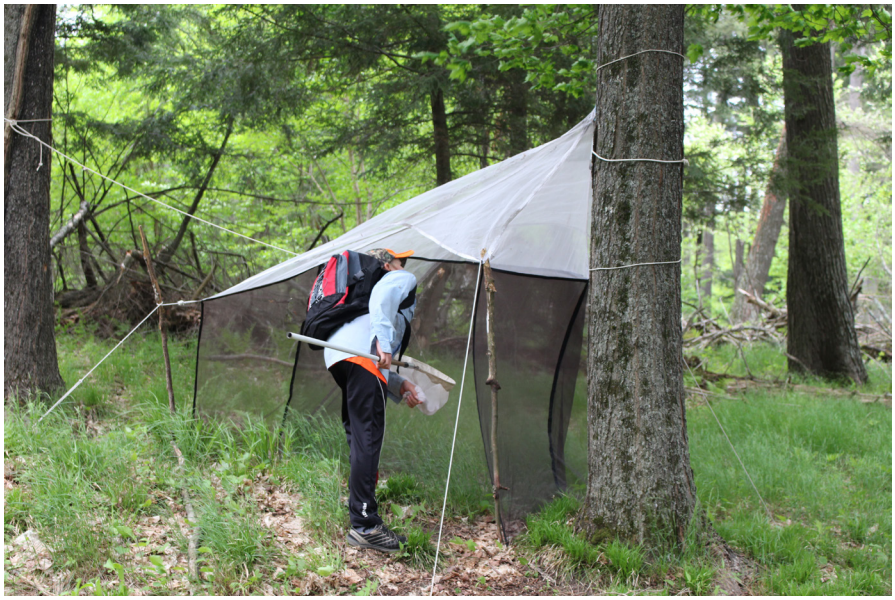
By Scott Bowe, Kemp Superintendent

I've been asked by many people how the year is going for Kemp Station. My response, "Quiet."

After an extremely busy 2019, 2020 has been a year of contrasts. Back in March, we were preparing for a repeat of 2019, maybe even more users! Early spring is the time of year when we open our buildings from the winter shutdown and prepare them for the spring field season. I was also preparing to teach my spring field course called Forest Operations. In early March, COVID19 was not part of our vocabulary. Sure, there was some kind of virus over in China, but we should be fine in the isolation of the Northwoods. Then it all changed overnight. We went from opening buildings and teaching classes to no classes and no one to use our buildings.

As time went on, we were able to develop a plan with the University to allow some users access to Kemp Station. These were mainly researchers that received permission from the UW to continue their work. These guests had to follow strict separation policies,

(Continued on Page 3)



Two of the few approved Station visitors since March were Nathan and his mother Dawn, who monitored the malaise traps on the property. Here Nathan peeks up into the trap, checking for insects.

A Consideration of Biodiversity, Birds and Beetles

By Daniel K. Young, UW-Madison

Do you like birds? Who doesn't?! (Excluding the "gifts" they may leave on your screens, windows, and porches!) The world, and of course good old Wisconsin, is full of bird watchers. I often encounter them when I am in the forests around the state looking for beetles, my area of specialization. But, before we get to that, let's reflect a bit about birds and biological diversity – biodiversity for short. Now, most all nature enthusiasts are big-time into biodiversity. I suspect that means pretty much everyone reading this newsletter right now – unless you grabbed the wrong thing!

To the ornithology & biodiversity buffs -- you are, at least in part, interested in birds because of their spectacular biodiversity – species richness and abundance, glorious array of anatomical forms, plumage, and calls, right? Well, as you invest in our fine-feathered friends, how efficiently are you allocating your time? How many species of birds are known from Wisconsin? Technically, about 440 as you may know, with about 250 of those

(Continued on Page 2)

Consideration... *(Continued from Page 1)*

species being seen at least somewhat regularly. OK, so how many bird species are really true Wisconsinites, living here year around – not just "fair weather friends?" Well, maybe about 75 species, but typically about 20-30 in a given area of the state!

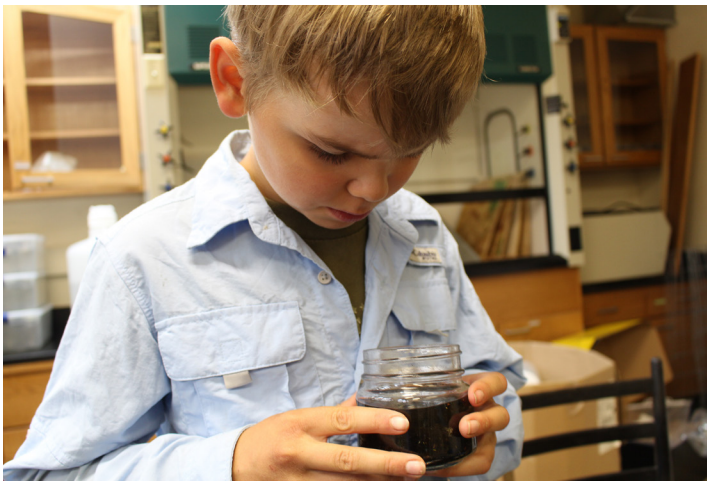
Not to "dis" our birding friends – honestly … but if you are really a naturalist interested in biodiversity – or good old home-grown Wisconsin biodiversity, I ask again: how efficiently are you spending your time?

Want a challenge? Looking for that elusive True Wisconsin Naturalist merit badge? Read on, my friends!

Insects account for more than half, some 55%, of all known species on the planet. Of this immense global biodiversity, nearly 40% of all insect species are beetles. This means that at present, approximately 22% of all species on Earth are beetles. Moreover, these numbers are far from static. Each year nearly as many new species of insects are discovered and named as all the known mammal species in the world, and a proportionally large number of these new species each year are beetles.

Over the past 25 years, I – and many of my graduate students – have been working at various sites in Wisconsin, as well as mining the rich UW-Madison Insect Research Collection (WIRC), to develop at least a baseline understanding of the beetle diversity in the state. Given the daunting beetle diversity, it should come as no surprise that most species can be recognized only by specialists with a given family or even genus of Coleoptera. Thus, a useful starting point is the hierarchical level of family.

Currently, I have recorded 105 families of beetles from Wisconsin. During the 24-hour BioBlitz, part of the 2019 Wisconsin Insect Fest hosted by Kemp Natural Resources Station, 28 beetle families were recorded. Many of these were collected as voucher specimens that will eventually be housed in the WIRC. In April, 2020, two malaise traps were installed on site at Kemp for the season. During that visit (23-24 April) I collected an additional four beetle families that had not been recorded during the 2019 BioBlitz. That modest start brought the April, 2020 Kemp Station site total to 32 families, this represents 31% of the familial diversity of Coleoptera for the entire state.



There was a noticeable increase in the collection volume from each malaise trap as spring progressed. Here Nathan checks out the "insect slurry" collected from one of the traps.

My wife and I returned to Kemp for another visit around the 1st of July. At this time, I did a bit more field work and also gathered the malaise trap samples that had accumulated since my April visit. I am very grateful to Karla Ortman for initially servicing the traps for me and then to Dawn and Nathan Andrews who have most diligently "minded" the traps most of the 2020 field season. Those samples have now been sorted and currently, the family list is up to 47 families, or about 45% of the 105 beetle families recorded from the entire state!

I returned to Kemp Station in late September to conduct additional field work and assess whether to "pull" the traps for 2020 or leave them up a bit longer. I had hoped to make this trip with students taking my *Advanced Taxonomy of Coleoptera* course (ENT 701) at the UW-Madison. Unfortunately, the COVID-19 pandemic had other plans for us as students are currently not allowed to meet face-to-face. Major bummer – and new reality! At the conclusion of the September visit, I brought back to Madison the malaise trap samples from July through early September for sorting and preliminary identification. I certainly expect the family totals to again increase, so stay tuned.

My hope and expectation are that future site visits, together with seasonal sampling by malaise

(Continued on Page 3)

Consideration *(Continued from Page 2)*

trapping, will substantively increase our knowledge regarding the beetle biodiversity at Kemp Station, and perhaps even document some highly unusual discoveries. As an example, last year during the 2019 Wisconsin Insect Fest, the enigmatic *Ischalia costata* (Family Ischaliidae; *photo at right*) was rather common on site right across from the office/lab building at traps baited with the equally unusual chemical compound, cantharidin. Currently, two specimens from the series collected in 2019 have been sent to the Smithsonian Institution (National Museum of Natural History, Washington, DC) for genomic sequencing to help further our understanding of the phylogenetic position of this wonderfully unusual beetle lineage.

Birders, pardon – I've meant no offense. Keep enjoying our wonderful fauna. But, please feel free to take up the challenge to look deeper into

the wonderful world around you. Put down your binoculars, get on your hands and knees, look into the leaf litter on the forest floor, look closer to examine the complex community of life on a mushroom or *Pleurotus* oyster fungus fruiting body. Debark a fallen log – consider augmenting your binoculars with a hand lens! And by all means, do check out the incredible biodiversity of the *cool Coleops*!

Strange Year *(Continued from Page 1)*

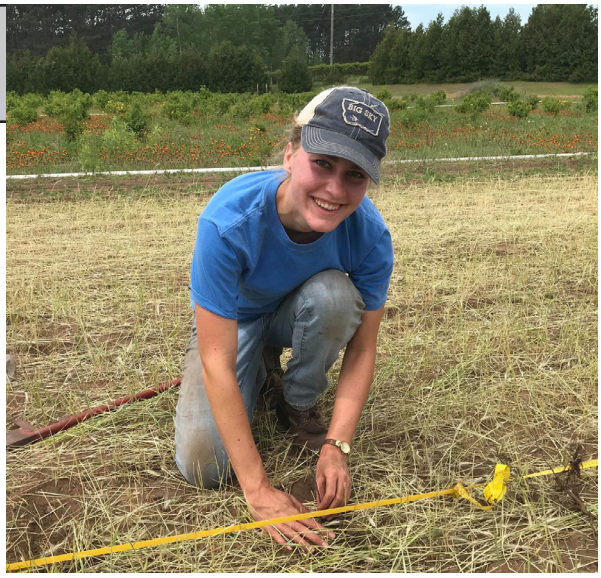
which limited overnight guests to about a dozen people when the usual capacity is 66. Our teaching and outreach plan at Kemp Station did not fare as well. The UW cancelled all in-person spring and summer classes. Real life field experiences are what Kemp Station is known for. These field experiences endear Kemp Station to so many students. Sadly, it is hard to teach a hands-on field course virtually. We also placed our summer outreach programs on hold until next year, closing Kemp Station to the general public.

But the work at Kemp Station did not stop because of COVID19. Kemp Station officially turned 100 years old in 2020. Our staff work diligently maintaining, cleaning, and managing this wonderful gift to the UW. Our 100-year-old buildings and even our new buildings need care to keep them ready for tomorrow.

What we need to do now is look to the future. Winter is always a quiet time at Kemp Station, but 2021 is just around the corner. We broke all of our previous records in 2019. The most overnight users, the most day users, the most research and outreach projects, and more. Let's put 2021 in the same league as 2019. Let's break records and welcome people back to Kemp Station.

A Few Favorites from the Kemp Snapshot Wisconsin Trail Camera

Kemp Profile: Gwendolen Keller



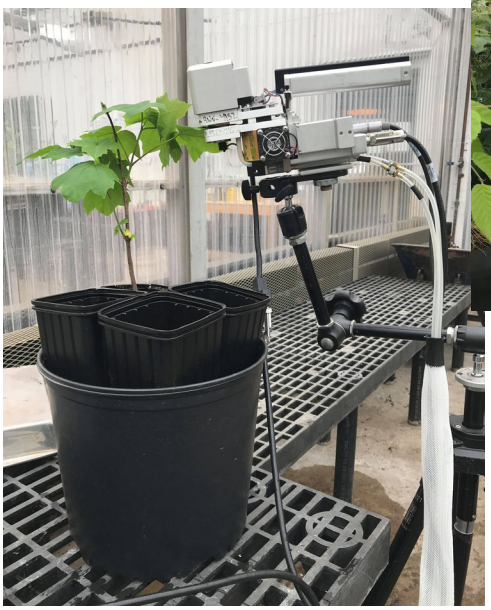
Hometown: Clarkston, Michigan

Educational background and current area of study:
I received my bachelor's degree in General Studies at the University of Michigan in 2018. Currently I am working towards my master's degree at the University of Minnesota in the Natural Resources Science and Management graduate program. My master's thesis research concerns investigating potential canopy tree species that can be planted in black ash wetlands in the northern Great Lakes region to ameliorate effects from emerald ash borer (EAB) invasion.

How is your research funded?
The Wisconsin Department of Natural Resources, University of Minnesota Department of Forest Resources, Minnesota Forest Resources Council and US Forest Service are all contributing to funding my research.

What questions does your field research answer?
Primarily my research seeks to answer this question: What trees can managers in the northern Great Lakes region plant in black ash wetlands either pre- or post-EAB invasion to restore the overstory? The factors I am evaluating in my research are the influence of cold, shade, and flood tolerance on tree survival and growth.

Describe a typical day of fieldwork:
Almost all of my "field" work occurs in the greenhouses at the US Forest Service's Northern Research Station in Rhinelander, WI. Every morning I head over to maintain, observe, and take measurements from the two experiments we have set up there. These experiments are investigating the ability of seedlings from 18 potential replacement species to survive various durations and intensities (as represented by water table depth) of flooding. On any given day I may be found taking countless measurements of photosynthesis rates, height growth, assessing mortality, and more.

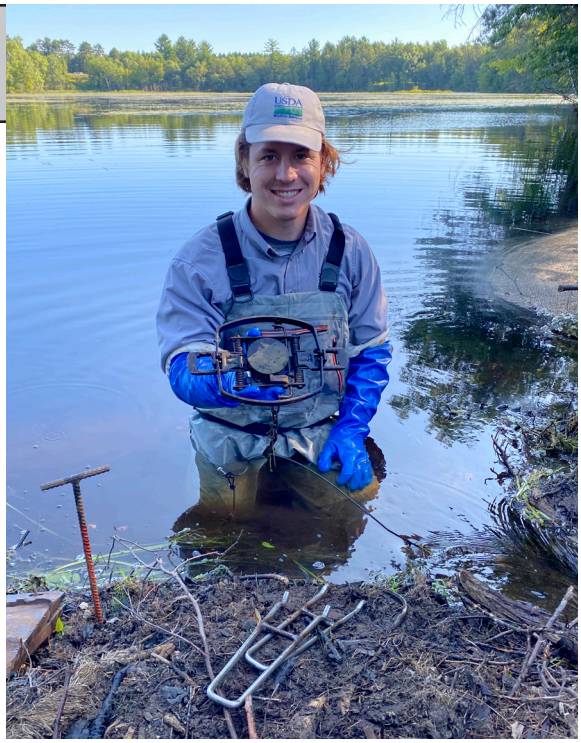


What challenges did you face working on this project?
One of our main challenges has been to manage fungal pathogens in the greenhouse. If allowed to spread too

Above right: Gwen planting seedlings at WDNR's nursery in Hayward. The seedlings will be observed to see if they can survive the winter. Far left: The Licor machine takes measurements on a sugar maple seedling. It is measuring photosynthesis, stomatal conductance, and transpiration; all of which are good indicators of flood tolerance. Above: Gwen measures the height of one of the seedlings in the greenhouse. Height growth is a good indicator of flood tolerance.

(Continued on Page 7)

Kemp Profile: Thomas Simms



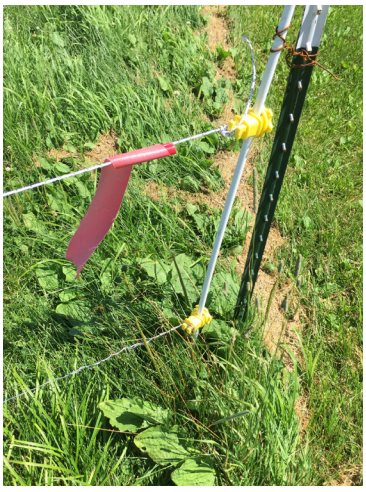
Hometown: Rosemount, Minnesota

Educational background and current area of study:
I am currently attending University of Wyoming as an undergrad. I am studying Wildlife and Fisheries Biology and Management. I am working toward a career in fisheries management in the Rocky Mountain West or Lake Superior Region of the United States.

How is your research funded?
Through the United States Department of Agriculture Wildlife Services (USDA-WS).

What question does your field research answer?
How effective is non-lethal deterrence on wolf depredations on cattle?

Describe a typical day of fieldwork:
We worked with local farmers/ranchers to determine if they have had a wolf depredation and if there is a wolf problem in their area. Data was collected with four trail cameras on each farm and sent back to the USDA-WS. After reviewing the data from the field site, we determine how to best solve the problem. Due to the protection of wolves, (a very hot topic that I will not try to answer) non-lethal deterrence is our only option to help with the farmer's situation. In most instances we install a seasonal electrified fence called fladry. Fladry has a nylon outer sheath with a 'live wire" core. Additionally, there are 2 foot by 2 inch flags that are spaced about every 18 inches. To install, we pound insulated rods into the ground and hang the fladry about 2 to 3 feet above the ground so the flags drape close to the ground. Wolves will travel along this fence line in an attempt to find an opening, but will not pass beneath the fence. The fence is installed entirely around the pastures the farmer wants to protect.



Close up of the fladry fencing. Above right: Thomas deploys beaver traps in a stream adjacent to private land.

In addition to fladry, we use two other deterrence methods: scare radios and strobe lights. Scare radios are tuned to any local station and played at a loud volume at night. Strobe lights are installed on top of wooden posts and flash multicolor lights at night. Both are solar powered and are only effective for finite amounts of time.

We also receive data on how many depredations each farm has after the installation of the deterrence. This summer we had no new depredations after our efforts on these farms.

As the USDA's seasonal intern, I had other responsibilities and experiences as well. I participated in beaver trapping (in response to timber and watershed complaints), beaver dam removal via manual labor and/or explosives (to improve trout streams), wildlife damage response (related to bear, geese, turkeys, and wolves), as well as Canada goose management (public parks complaints).

What challenges did you face working on this project?
The greatest challenge was the amount of labor we had to put into installing the fladry fences. On

(Continued on Page 7)

Mycorrhizal fungi: the underground partners of trees

By Glen Stanosz, UW-Madison

A bounty of mushrooms brightened the forest floor this fall at the Kemp Natural Resources Station. Many of these mushrooms are evidence of the special relationship between fungi and trees. These very different organisms are linked in a "symbiosis" (a way of "living together"). Indeed, without the mutually beneficial relationship between fungi and plant roots, the familiar forests we know and enjoy would not exist.

The symbiosis of trees and fungi are a partnership. The tree is an autotroph "producer" using energy of sunlight in the process of photosynthesis to incorporate carbon from the air into carbohydrates, its own "food." But water and nutrients from the soil are also necessary ingredients in the mix that ultimately produces the cellulose and lignin and other components of trees incorporated into the incredibly beautiful and useful material we know as wood. To obtain water and nutrients from soil, trees actively trade with mycorrhizal fungi.

Above: Mycorrhizal fungus mushroom with pores, commonly associated with oaks. Right: Puffball-like fruiting body of a common mycorrhizal fungus of pines

The fungus is a heterotroph "consumer." Like humans, animals, and most other organisms, fungi need to obtain their nutrition from others. Food sources can be producers (we eat a salad, fungi decompose a tree), or other consumers (the deer that provides a venison steak). As heterotrophs, mycorrhizal fungi obtain carbohydrates and many other substances required for growth and reproduction during their intimate association with tree roots.

A common type of mycorrhiza formed between trees and fungi is known as the "ectomycorrhiza," from the Latin "ecto" for outer or external. Fine roots of trees that have become ectomycorrhizal can be recognized by a sheath or mantle of the microscopic fungal strands (hyphae) that cover the root tips. These tiny mycorrhizal root tips can be variously colored, from white to yellow to reddish brown to black. Mycorrhizal root tips also vary in morphology from remaining single to being multiply branched. Extending from the sheath or mantle of the ectomycorrhizae are innumerable fungal hyphae. A single square foot of the Kemp forest floor contains miles and miles of ectomycorrhizal hyphae, which greatly expand the functional area of the root for absorption. Trees are dependent on these mycorrhizal fungus hyphal networks to obtain the vast majority of the water and nutrients they need for growth, defense, and reproduction.

The mutually beneficial exchange between plants and their mycorrhizal fungi takes place within fine roots. Materials absorbed by the massive network

(Continued on Page 7)

Fungi... *(Continued from Page 6)*

of fungal hyphae in soil are transported to roots. Within the fungal sheath or mantle covering the root tip surface, other hyphae actually penetrate the root to grow between and surround individual tree root cells. The water and nutrients obtained from the soil by fungal hyphae are transferred to root cells which in turn release carbohydrates and other substances absorbed by the intercellular hyphae. These hyphae transport the tree-produced materials out of the root throughout the entirety of the fungus to support its growth and eventual reproduction.

To understand the mycorrhizal mushroom observed in the forest, one must recognize that what is seen by the eye it is not the "whole fungus", but just the fruiting body. These structures release spores that are the propagules for dissemination and ultimate production of new fungal individuals. It is useful to compare the mushroom to the apple on a tree, a fruit containing seeds from which new apple trees will grow. But just as the apple is not the whole apple tree, the mushroom is just a small (albeit easily visible) part of the whole fungus.

An immense variety of fungi can form mycorrhizal relationships with trees. Many form familiar mushrooms with gills or pores, others produce puffball-like fruiting bodies. The truffle prized by a gourmet is the spore-producing body of a mycorrhizal fungus. Some mycorrhizal fungi are "free-living", meaning that they can grow symbiotically with a tree or independently by decomposing organic matter such as woody debris and forest floor litter. Other mycorrhizal fungi can only grow and reproduce in symbiosis with their trees.

The mushrooms and other "fungal fruits" that blossom in the forest are a reminder of the complexity of this ecosystem. Trees and shrubs dominate, and animals attract our attention (and capture our hearts), but these are not sufficient for the existence of forests or the many benefits forests provide. The existence and productivity of forests are dependent on mycorrhizal fungi, the underground partners of trees.

Keller Profile... *(Continued from Page 4)*

extensively, damage from the fungus will obscure the seedling's ability to survive flooding. Of course, one cannot overlook the many challenges of COVID-19 as well. I am very grateful that my research has been able to happen at all.

What have you enjoyed most working on this project?

I really enjoy working with the seedlings and observing how varied their responses are to the treatments. It is very interesting how, even at this young age, it is clear which species have evolved to tolerate "having their feet wet" while others prefer drier conditions. I am constantly marveling at the complexity and beauty of these tiny trees.

Simms Profile... *(Continued from Page 5)*

some farms we ran the fence through swampy areas and each step would result in us getting stuck mid-thigh in mud. Additionally, these fences are no "white picket fence around a modest suburban home" -- we put these fences around entire farms which could be anywhere from 80 to 200 acres.

At one farm, we had set up fladry and within a few weeks, the neighboring farm had a depredation on a calf. There's no perfect solution to the wolf depredation problem, but we are utilizing the best solutions we have.

My summer intern experience was not impacted much by the pandemic. I had to drive my own government truck everyday to abide by COVID rules. That was a lot of driving! Also there was a limited number of people that could be in the office, which restricted who I was able to see on a daily basis.

What did you enjoy most working on this project?

What I enjoyed most was seeing a wolf in person! One day I rode along with a contracted wolf trapper. We caught a young female wolf and radio collared it for population research. It was amazing to see such a magnificent animal so close, an opportunity few people have. I also enjoyed working with each individual farmer/rancher. They all seemed very grateful for our efforts and services. It felt good to sit back at the end of the day knowing that we helped make someone's life a little easier.

Kemp Natural Resources Station
9161 Kemp Road
Woodruff, WI 54568

Find us on Facebook

Eastern Phoebe (*Sayornis phoebe*)

The raspy "fee-bee" call in spring signals that the male Eastern phoebe is back from his winter vacation. A member of the fly catcher family, phoebes eat mostly just that -- flying insects. Perched low on a branch or fence, wagging its tail up and down, the bird makes short, dashing flights to easily grab unsuspecting flying insects in its short, thin bill. I often worry he won't find enough to eat if the weather is cool, but they also eat spiders, ticks, millipedes and some small fruits and seeds. Over the years, numerous phoebes have nested in our yard, and this year our phoebe couple was keen on the west side of the house. They investigated several spots under the eave where retractable window awnings are installed. After what seemed much debate amongst them, they chose the awning cover above our bedroom window. Only the female builds the nest, taking anywhere from 5-14 days to place mud, moss, leaves, grass and animal hair, forming a nest measuring about 5 inches across. The nest is often used more than one year, with minor remodeling completed as needed from year to year. Clutch size varies from 2-6; our first nest boasted 5 youngsters, who looked mighty crowded as they prepared to fledge. For as many as 20 days both parents are constantly busy feeding their brood. With more time spent at home this spring, I had the pleasure of watching these seemingly tireless parents bring mouthfuls of insects to their young, often with wings and legs protruding from their beaks! The pair raised two families this year, in the same nest, which is not uncommon. Our bird tenants have left now for their stay in the southern US or Mexico, but it won't be long and they will be back, and the nest will be waiting for them, along with plenty of flying insects!

Art by Catherine Clark, catherineclarkstudio.com

Kemp's Point
Volume 21, Number 2

Published semi-annually by the University of Wisconsin-Madison's Kemp Natural Resources Station. To receive this free newsletter or update your address contact:

Karla Ortman, Editor
Kemp Natural Resources Station
9161 Kemp Road
Woodruff, WI 54568
(715) 358-5667
kemp@cals.wisc.edu

This newsletter is also available as a PDF at the Kemp website, www.kemp.wisc.edu