

ELEMENTS

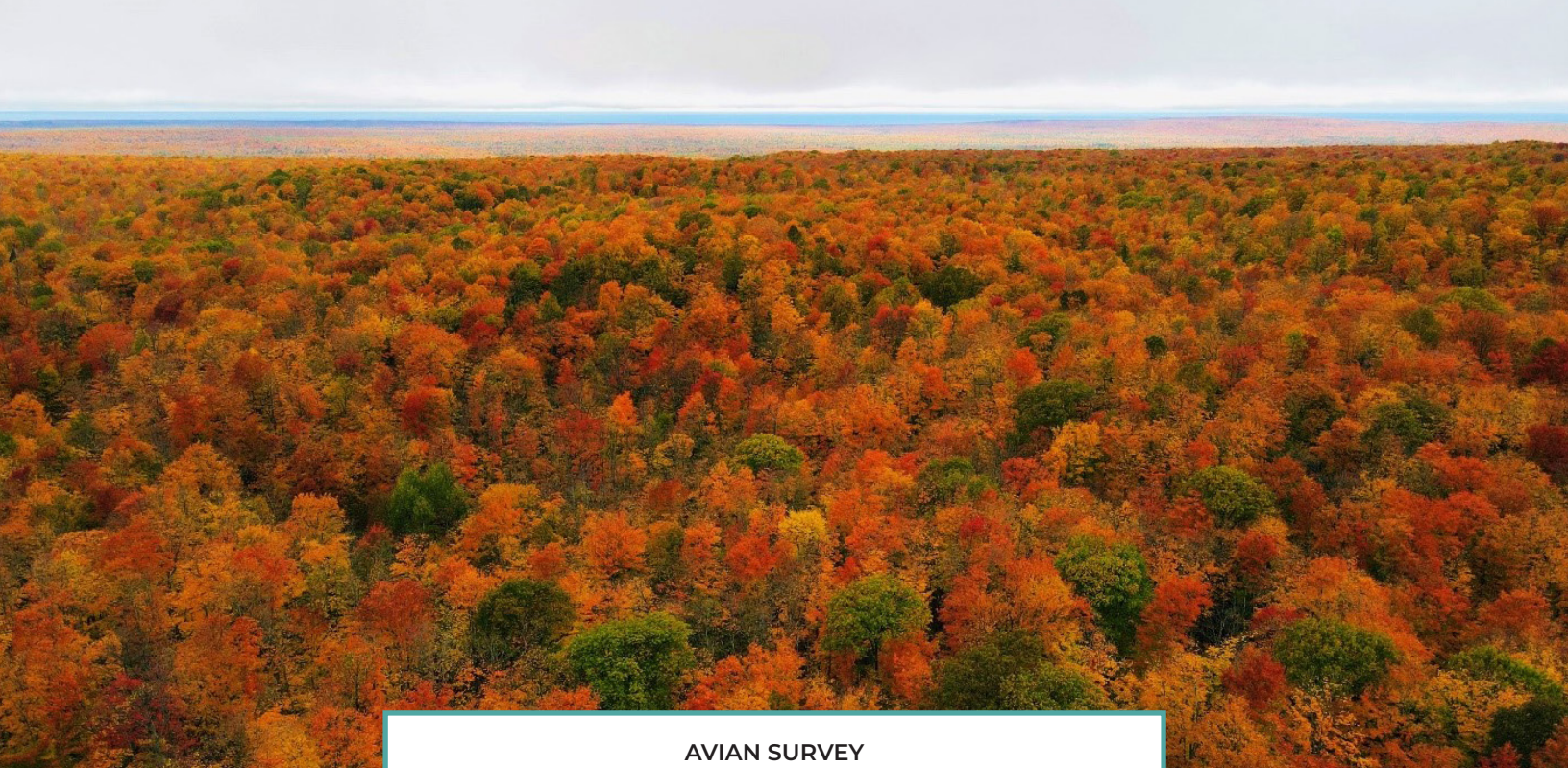


BALANCING NATURE & BUSINESS p. 10

Protecting species and habitats while meeting client needs

2021 Vol. 1





AVIAN SURVEY

Photo Credit: Kyle Filicky, Project Manager I, Pittsburgh office

CEC was hired to conduct an avian survey for a proposed wind farm development in the Upper Peninsula of Michigan. This photo was taken during the survey that Kyle and Ryan Slack (Indianapolis office) were performing. This avian survey has been conducted once a month since the project began in 2018.

CEC sponsors a photo-of-the-month contest encouraging employees to submit photos from their work sites. Winning photos are published on CEC's internal website and social media pages. One is selected for Elements.

Elements is published by Civil & Environmental Consultants, Inc. for clients, business partners, and other associates.

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ON THE COVER: *Myotis septentrionalis*, also known as the northern long-eared bat. See "Balancing Nature & Business," p. 10

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Civil & Environmental Consultants, Inc.

WELCOME

This edition of *Elements* spotlights the capabilities of our Ecological Sciences Group and how they collaborate with our clients to help them achieve their business objectives. Since its founding, CEC has provided natural resource and life sciences services because we recognized that the majority of the projects performed by CEC for our clients have the potential to impact the environment. Our Ecological Sciences Group actively advocates for clients to help them mitigate those potential impacts.

Our Ecological Sciences Group initially included only a few biologists who focused on

potential impacts to wetlands and streams. The Ecological Sciences Group has now grown to include more than 100 professionals with expertise ranging from botanical services to ecosystem restoration to endangered species surveys to compliance strategies. This edition of *Elements* includes an article that presents one of the new additions to our Ecological Sciences Group, Leo Lentsch. Leo is an expert on the Endangered Species Act and Natural Environmental Policy Act and has helped a variety of industries operate in compliance with those regulations.

The articles herein demonstrate the range of services that CEC's Ecological Sciences Group can

provide our clients. Two projects are detailed where our ecologists either restored or developed actions to enhance habitats. Another article described how our ecologists can assist industries impacted by invasive species to an extent where major water treatment, manufacturing, and power generating facilities can be shut down.

We hope you enjoy reading about our Ecological Sciences Group's capabilities, and that you and your families are healthy.

Ken Miller, President & CEO

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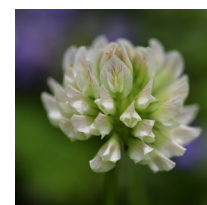
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PARTNERS IN EXSTREAM RESTORATION



Nyrrstar, a global metal-producing company with more than 150 years of manufacturing history, places high expectations on its operations to conduct business in an environmentally responsible way. So when they acquired zinc mines in Middle and East Tennessee, it was no surprise they prioritized the development of environmental strategies to ensure the mines were compliant with state and federal regulations, as well as meeting the needs of the local communities.

Nyrrstar planned to expand a tailings impoundment at their Middle Tennessee Mines operation in Smith County. The U.S. Army Corps of Engineers and the Tennessee Department of Environment and Conservation were requiring stream mitigation to offset the impacts to the headwater streams above the tailings impoundment that would be caused by the expansion. Approximately half of the required mitigation would be performed at the Gordonsville Facility, with the other half performed at the Elmwood Facility. Both the initial mitigation plans and associated 401 and 404 Clean Water Act permits were prepared by another consultant Nyrrstar had engaged.

Main spring with rock-step pools

“

I asked who the best firms were for the job. Civil & Environmental Consultants and Greg Babbit's names were on the list, so we asked them to bid on the work.

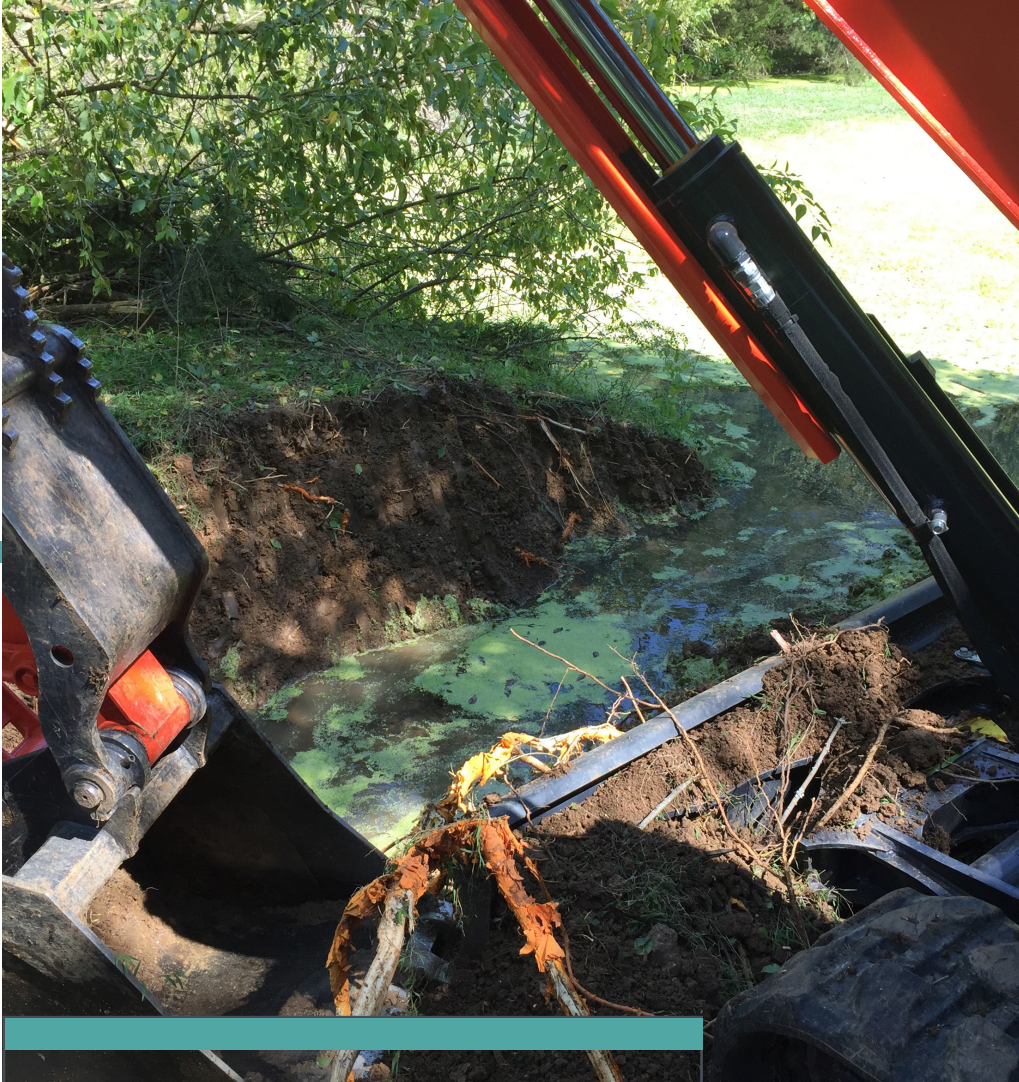
STEVEN TURASKI,
NYRRSTAR REP

START OF CEC'S AND NYRRSTAR'S COLLABORATION

CEC's relationship with Nyrrstar began in 2014. At that time, Nyrrstar was preparing to implement the initial stage of the mitigation plans that would be performed at the Gordonsville mine. In preparation for implementing the initial stream mitigation, Nyrrstar representative Steven Turaski reached out to a colleague at the Tennessee Stream Mitigation Program seeking a recommendation for a consultant to oversee construction of the project.

“We had a permit and mitigation plan in place,” says Turaski. “We wanted to start construction, so I asked who the best firms were for the job. Civil & Environmental Consultants and Greg Babbit's names were on the list, so we asked them to bid on the work.”

When Babbit, CEC Principal in the Ecological Sciences Practice, went to the site and reviewed the previously approved plan prior to preparation of a proposal, he identified some alternative concepts that he believed would be more feasible to construct and more likely to achieve Nyrrstar's goals. CEC submitted a proposal for construction of the alternative approach. Nyrrstar agreed with the



The upper pond breached and allowed drainage into the lower pond for the first phase of restoration.

Before construction, the main spring was submerged under this algae-covered pond.

alternative approach, CEC won the work, the project was a success, and that was the beginning of a new client partnership.

CONTINUING THE RELATIONSHIP

In 2017, Nyrrstar selected CEC as its consultant to provide the services needed to implement the mitigation construction at the Elmwood Facility because of CEC's successful completion of the Gordonsville project in 2015. The mitigation at the Elmwood Facility would complete the mitigation needed for



the impoundment expansion. The stream restoration project involved the reestablishment of 970 linear feet of stream channel within the footprint of the two ponds (upper and lower ponds) that historically had been used to supply water.

There were two significant unknowns associated with the proposed construction. “One issue was not knowing how much sediment was going to need to be excavated from each of the ponds,” explains Babbit. “It was going to be difficult to predict the potential volume and flow rate of water entering the mitigation area once the ponds were drained. Managing the sediment and the potential water issues were the two big unknowns, and turned out to be the most challenging aspects of the project.”

PULLING BACK THE CURTAIN

Construction was planned to be performed in phases that spanned two years. As Babbit anticipated, water management was a considerable part of the construction activities. During the construction, the team was faced with hillside springs and continuously flowing water as a result of removing the upper pond. One major spring that was designated as the Main Spring was exposed when the upper pond was removed and was a continuous source of water flowing into the mitigation area.

“Once the ponds were drained, it was like pulling back the curtain,” says Babbit. “We found several springs emerging from the hillside we had to manage.”

The team utilized pumps, pipes and created diversion channels that were later used to create wetland pockets as part of the new ecosystem. Sediment



A look at the upper pond breach



A perennial spring was the main water source.

from the ponds was disposed of at a site adjacent to the tailings impoundment by implementing a combination of pumps, excavators and off-road dump trucks.

Turaski says the field team’s ability to respond to unpredictability

in real-time is part of what makes Nyrstar’s partnership with CEC so valued.

“When choosing a consultant, you need to trust that they are thinking in your company’s best interest and making sound decisions, sometimes in the field,” explains Turaski. “That comes from experience. Greg and the CEC team were able to develop a functional solution to overcome the challenges.”

BRINGING WORK AND NEW LIFE TO THE REGION

The Middle Tennessee Mines have brought much-needed employment opportunities in the region. And thanks to the success of the stream restoration projects, habitat was restored. As a result, native aquatic and terrestrial plants and animals are making the area their home again. ■

WHAT FLIES BENEATH

CEC AIMS TO PROVIDE A TEMPLATE FOR IMPROVING SURVIVAL ODDS FOR BATS IN CLOSED MINES AND RAILROAD TUNNELS

Few of nature’s animals are as misunderstood as bats. Perhaps because of their nocturnal nature, secretive habits and unique appearance, not to mention superstitions — bats long have been misunderstood and often feared. Bats do, however, play an important role in a healthy ecosystem as well as a healthy economy. By eating insects, bats save U.S. agriculture billions of dollars per year in pest control. Many types of plants rely on bats for pollination and seed dispersal as well.

The biggest threat to our bats during hibernation is a fungal disease called white-nose syndrome (WNS), which has claimed the lives of more than 5 million bats since its discovery in 2006. Researchers call the disease WNS because of the visible white fungal growth on infected bats’ muzzles and wings. This cold-loving fungus infects bats during hibernation, when the bats reduce their metabolic rate and lower their body temperature to save energy over the winter. Hibernating bats affected by WNS wake up more frequently, which results in using up fat reserves and then starvation before spring arrives. Since many bats hibernate in the same caves over the winter, the fungus can decimate an entire bat colony, once established.



A winter bat hibernacula survey takes place at the Casparis Mine in Fayette County, Pa.

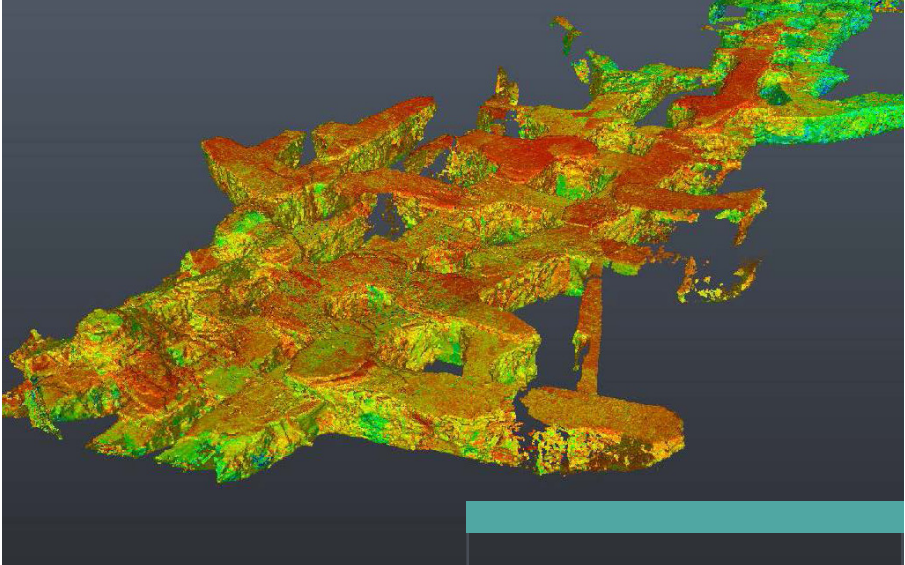
PARTNERING TO SAVE BATS

CEC is working in collaboration with the Pennsylvania Game Commission (PGC) and CNX Gas Company, LLC (CNX) to enhance bat habitat at three previously closed mines and one abandoned railroad tunnel located in southwestern and northeastern Pennsylvania. Those mines and the tunnel are being used as bat hibernacula — spaces where bats hibernate during the winter months.

Bats of the Northeast have specific requirements for temperature and humidity in their hibernacula. Research has shown that the fungus that causes WNS grows best within a temperature range of 54.5 to 60.4 degrees Fahrenheit. PGC has recently observed bats occupying cooler areas of caves and mines during hibernation, in a possible response to combat WNS.

Therefore, PGC has hypothesized that by having greater control over the temperature of hibernacula, they can provide winter hibernating conditions suitable for bats but below the optimum growth temperature of the fungus, thus increasing the bats' chances of survival.

The key to providing cooler caves for hibernation is to locate the warmer areas (or “heat sinks”) of the hibernacula and provide a release of the warmer air. Theoretically, this cooling process would benefit all species of bats that use the hibernacula. However, it is also the intent to target bat species that are especially vulnerable, such as the federally endangered Indiana bat (*Myotis sodalis*).



MAPPING IT OUT

In order to achieve the objective of cooling warmer areas of the hibernacula, potentially warmer areas would first be identified by mapping the internal workings of the mines and tunnel. Once identified, vents would be installed by drilling from the surface into those warm areas. The vents would release the warm air, thus producing a cooler environment.

Prior to the mine mapping, CEC ecologists assisted PGC in conducting a winter survey in one of the mines to locate and identify bat species currently occupying the abandoned mine. Individual bats were identified, and rock temperatures near the bats were recorded in an effort to document roosting preferences. It became clear that the majority of bats preferred to roost in cooler areas of the mine.

CEC performed the mapping using Light Detection and Ranging (LiDAR) surveys within each mine and tunnel. CEC prepared floor and roof topographical mapping as well

CEC used a Leica P20 Terrestrial Laser Scanner to create a 3D map of the depths and locations of caves. This is a point cloud of the Dunbar Mine.

as overall site maps of the mine and tunnel locations. These data were required to correlate underground workings to surface locations where drilling is proposed to occur.

The PGC is currently waiting for additional funding to install the vents within the mines and tunnel. Once the vents are installed, internal cave temperatures will be monitored in an attempt to create optimal conditions for hibernating bats.

The collaboration between CEC, CNX and PGC represents a unique partnership that tackles a significant ecological problem. These projects incorporate current technology along with detailed scientific data relating to bats and their preferred habitats. If successful, these projects may serve as a template to use at other mines throughout the state and/or country and would give these flying mammals a much-needed boost for survival. ■

Note: At the time of this article, PGC had also requested a proposal to provide LiDAR mapping within the Indian Caverns located in Spruce Creek, Pa. The Indian Caverns are the largest karst limestone cave in Pennsylvania and had been a tourist attraction until its closure in 2018.

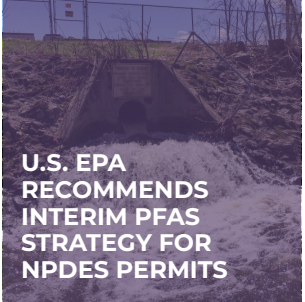
In case you missed it ...

A look back at regulatory updates

We're always monitoring the regulatory landscape so we can keep you up to speed on important changes and impacts you need to know about.

Here, we've collected a couple of our recent regulatory-related posts from our blog, just in case you missed them. We send our clients regulatory updates via eblast, but we invite everyone to subscribe to our blog!

cecinc.com/blog



U.S. EPA RECOMMENDS INTERIM PFAS STRATEGY FOR NPDES PERMITS



NEW JERSEY'S NEW ENVIRONMENTAL JUSTICE LAW REQUIRES EVALUATION OF IMPACTS TO OVERBURDENED COMMUNITIES FOR SOME PERMITS



U.S. EPA PROPOSES CHANGES TO THE BOILER MACT RULE



OHIO LAW PASSED TO SPUR REDEVELOPMENT OF BROWNFIELD SITES



Environmental Training Courses

2021 Course Schedule

-  April 8, 2021 / Intro to OSHA Regulatory Requirements
-  May 18, 2021 / Intro to Environmental Regulations
-  August 26, 2021 / NEW: Endangered Species Act (ESA) Compliance
-  September 9, 2021 / NEW: Air Compliance Challenges
-  September 21, 2021 / Intro to Environmental Regulations
-  October 12, 2021 / Clean Water Act & NPDES Overview
-  October 26, 2021 / Introduction to RCRA Regulations
-  November 4, 2021 / Maintaining Compliance for the Natural Gas Industry

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The candy darter was listed as endangered in November 2018.
Photo: U.S. Fish & Wildlife Service

BALANCING NATURE & BUSINESS

There is no shortage of challenges CEC staff face to protect species and habitats while also meeting a client's needs. It's a vital, complex task when dealing with industries that impact our everyday lives.

How much can one little fish impact the way our clients conduct their business? Quite a bit, if that little fish is found on the federal list of endangered species.

Finding a species protected by the Federal Endangered Species Act (ESA) at one of our clients' project sites often triggers additional studies, which are often followed by species conservation actions required for the project to proceed. Balancing species and habitat protection and a client's needs often is complicated. It's even more complex when you involve industries needed to sustain our way of life.

CEC ESA compliance expert Leo Lentsch shares

that CEC clients want to protect endangered species and our environment while effectively operating their businesses, so it's important for CEC to help our clients find solutions that meet both the federal and state conservation mandates and business operations goals.

"For many clients, it's about finding the right combination of innovative solutions to protect the species and their habitats while still being able to conduct business," says Lentsch. "Sometimes, the solution may change the way a client has done business in the past. But the important idea is that they are able to continue to do business while protecting vulnerable species and habitats."

FINDING COMMON GROUND

According to Lentsch, something CEC does really well is balancing our clients' business needs with protection of endangered species and the environment, whether we are representing industry or a government agency.

"Knowing the client, what their goals are, and their challenges — it's all wrapped up together. And one of those challenges is the protection of endangered species while ensuring our clients their projects will move forward. It's about being able to listen, understand different perspectives, recommend innovative solutions, and implement the project while providing exceptional service," says Lentsch.

Lentsch says this was a valuable principle he learned early in his career working on the Virgin River system, a tributary of the Colorado River, in southwestern Utah as an employee of the Utah Division of Wildlife Resources (UDWR).



Rusty patched bumble bee

In the Western U.S., water is a precious commodity. At the time, a local water district was concerned that the listing of a new fish species would impact their operations. It was Lentsch's responsibility in his role with UDWR to ensure long-term conservation of the species. Knowing that most of the big impacts to fish occur when water

is withdrawn from a water body, he engaged the water district early in the process while opportunities to offset impacts to the species were plentiful and impacts to the water supply were minimal.

Lentsch worked with the water district to understand their needs and find solutions that protected the fish and allowed the district to develop their water supply. Most importantly, the water district and Lentsch built a relationship and worked together to find common ground. Although the solution may not have been ideal for the water district and regulatory agencies, it was important to provide the assurance that both water supply and species conservation mandates were going to be met.

Both CEC and Lentsch have vast experience working with both industry and federal and state agencies on comparable issues. Similar to our industry clients, our agency clients execute their mandates and engage in projects that may have impacts on natural resources. They also have the responsibility to offset potential impacts with species conservation measures. Lentsch noted a recent example from working with the Pennsylvania Department of Conservation & Natural Resources Bureau of Forestry.

The Bureau of Forestry has a mandate to ensure a sustainable level of timber harvest. At the same time, the Department of Conservation has a mandate to ensure the long-term viability of the state's wildlife resources, including conservation of imperiled species

CEC Expands Ecological Services

In fall 2020, CEC expanded its ecological sciences arsenal with the hiring of nationally recognized Endangered Species Act (ESA) compliance expert Leo Lentsch. Lentsch brings more than 38 years of experience with Endangered Species Act (ESA) compliance, National Environmental Policy Act (NEPA) compliance, Federal Energy Regulatory Commission (FERC) compliance, resource conservation planning and management, ecological studies, instream flow assessments, ecological restoration, habitat assessment, species status assessments, distribution studies, invasive species management, climate change, and endangered species recovery planning. To this end, he has served on multiple interagency and industry-based advisory teams tasked with offsetting environmental impacts across the U.S.

protected under the ESA. To achieve a balance between these two mandates, the state engaged with CEC in the development of a Habitat Conservation Plan (HCP). While it is still in the final stages of development, this HCP includes assurances for both agencies by committing to implement a series of measures that balance timber harvest with conservation of endangered bats species such as the northern long-eared bat. CEC has demonstrated similar successes across the U.S., with federal, state and local agencies, as well as the full range of industries that ensure strong and sustainable economic growth. At the heart of those successes were strong client relationships centered on trust.

CEC places the highest regard on maintaining relationships and understanding the ever-changing goals of clients.

“At the end of the day, clients want assurance that we have them covered and will find a solution to meet their needs,” says Lentsch.



A CEC employee performing a botanical survey

INNOVATIVE SOLUTIONS

CEC provides services that support our clients as they balance protecting the environment and endangered species and conducting their business operations. These services range from assessments and permitting to more advanced solutions, such as bird conservation.

Today, there are many innovative solutions for offsetting impacts to endangered species that were once thought difficult to mitigate. For example, wind is an excellent source of energy. However, there are issues with bird and bat species flying into the wind turbines.

Currently, CEC is working with clients to develop conservation plans to mitigate this problem.

“For years, we have struggled with wind turbine collisions. Now there is new technology that can be installed in or around the area of the turbines that detects birds electronically and shuts down the turbine until the bird flies by,” says Lentsch. “Innovations like this make finding workable solutions possible. It’s a win for the species and the industry.”

For more information about services related to endangered species, contact Leo Lentsch at llentsch@cecinc.com. ■



SPOTLIGHT /// LEO LENTSCH

CEC'S ESA COMPLIANCE EXPERT

What is one of the most unique projects you've worked on?

I have completed over 30 complex, contentious and challenging ESA compliance projects, but some of the unique projects I worked on did not involve ESA compliance. Among those, was when I was the Managing Editor and Principal Author of the Bureau of Reclamation and U.S. Army Corps of Engineers' National Large Wood Manual. I led a team of scientists and restoration practitioners to develop the more than 600-page manual. The manual is designed to assist with the planning, design, placement, maintenance and assessment of large wood in rivers and streams, with an emphasis on restoring ecosystem forms, processes and functions.

Is there a hot-button species out there right now that could be affecting projects?

While there are some species that have a broad historic geographic distribution and get a lot of attention, such as the rusty patched bumble bee, northern long-eared bat, piping plover, American burring beetle and dwarf wedge mussel, the listing of species across CEC's geographic footprint is quite variable, and any listed species can be a hot-button species if it stops or delays one of our clients' projects. It is important for us to recognize what is listed in the states we work in and be prepared to deal with listed species issues that may impact a client's project.

Are there any impending regulatory issues or concerns that people should be aware of?

A number of environmental regulations implemented by the last administration are currently under review. Any reversals that may occur will be posted to the Federal Register. As such, we monitor the Federal Register on a daily basis and post significant announcements for our staff while also informing our clients.



WREAKING HAVOC

HOW INVASIVE ZEBRA MUSSELS
CAN COMPROMISE U.S. WATERWAYS
... AND HOW TO HANDLE THEM

Dealing with zebra mussels is a sticky business, especially for power, drinking water and industrial plants that rely on U.S. waterways to conduct daily operations.

Aquatic biologists theorize that zebra mussels, a species of freshwater bivalve mollusk, were introduced to the Great Lakes in the 1980s by a ship carrying ballast water from Eastern Europe. These mussels have three characteristics that make this nonindigenous species problematic to North American water users. The first is its microscopic free-living larva form, which is so small it can easily glide through the screens used by most industries to filter out unwanted natural water source byproducts. The second is that each female adult mussel can produce up to one million of these larva each year. And maybe most importantly is that the zebra mussel is the first freshwater mussel species in North America that has the ability to stick to hard surfaces.

“Since their introduction, zebra mussels have continued to invade a great number of rivers and tributaries beyond the Great Lakes, causing issues for many industries,” says Cameron Lange, CEC Principal and nationally recognized nonindigenous aquatic nuisance species expert.

When in larva form, the zebra mussels can drift long distances until they find the right environment to settle and grow into large mats of adult mussels, according to Lange. Often the best environments are the hard surfaces — such as pipes and screens — inside power, drinking water and manufacturing plants. They can quickly cause impacts such as constricting intake water flow, which can hamper or halt operations. And if not treated, this nuisance species can cause long-term damage, as well. The mussel mats build up on one another, creating mats upwards of 2 1/2 feet thick at times.

Lange shared some horror stories that happened early in their introduction to the U.S. In one instance, the mussels caused a water supply facility to shut down during Christmas, which rendered the facility unable to provide drinking water to local communities during the holiday. In another instance, the mussels caused a power plant to shut down, triggering the need for extensive repairs.

“The build-up of mussel mats can cause some really serious impacts because eventually the mussels on the inside of the mat die and rot because they no longer have access to food or oxygen. So the mats come off all at once because the dead ones can no longer adhere to the surfaces,” explains Lange. “These big clumps of mussels, called druses, then drift further into the plant or facility.”

Lange describes that the way most of the facilities work is there is a large intake pipe that conveys water into smaller and smaller pipes. When a large mat of mussels makes its way through the pipe system, sooner or later it cannot fit, causing blockage and preventing flow to critical plant systems.

STAYING AHEAD OF THE GAME

So how can water-dependent industries prevent zebra mussels from disrupting business? Lange says it starts with choosing a firm with expertise in dealing with the species. With more than 30 years’ experience, Civil & Environmental Consultants offers a number of services to help treat existing zebra mussels, as well as prevent future damage caused by the invasive species.

“For example, in areas where the zebra mussels aren’t present but they’re likely to be, CEC offers



Mussels inside of mussel mats can die and rot, causing clumps of mussels to detach and drift further into power plants of facilities.

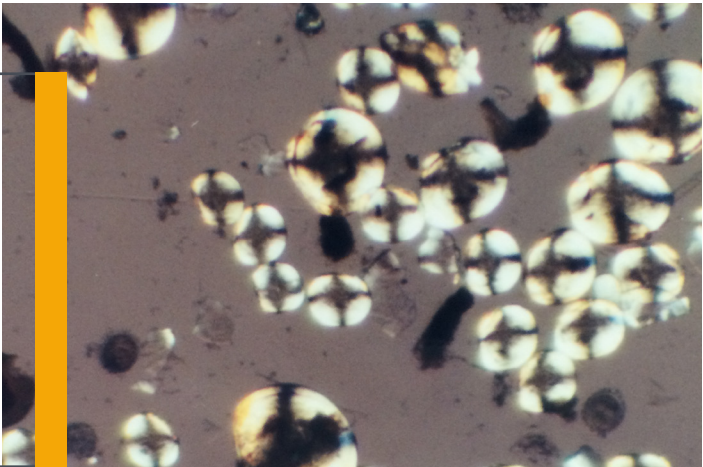
monitoring services,” says Lange. “In those cases, we go out and take water samples and examine the samples to see if the larva are present. We also set artificial substrates where we can take a look and see whether larva are attached to the substrates.”

Concurrent with monitoring, a systems vulnerability analysis is performed by studying the body of water to evaluate the likelihood of mussels actually proliferating in the

water should they get introduced, and examining the facility’s system to see where zebra mussels may cause issues.

“By monitoring and analyzing an area before the zebra mussels are introduced, it provides facilities with time to develop and implement controls,” says Lange. “This data is paramount to assess what type of treatments might be available to treat and prevent issues within a facility.”

Zebra mussel veligers are seen under a cross-polarized light, the microscopic method used to identify them.



We need to work with our clients to recommend actions to control the mussels while also addressing their particular needs.

CAMERON LANGE,
CEC PRINCIPAL, NONINDIGENOUS
AQUATIC NUISANCE SPECIES EXPERT

EVERY CLIENT IS UNIQUE

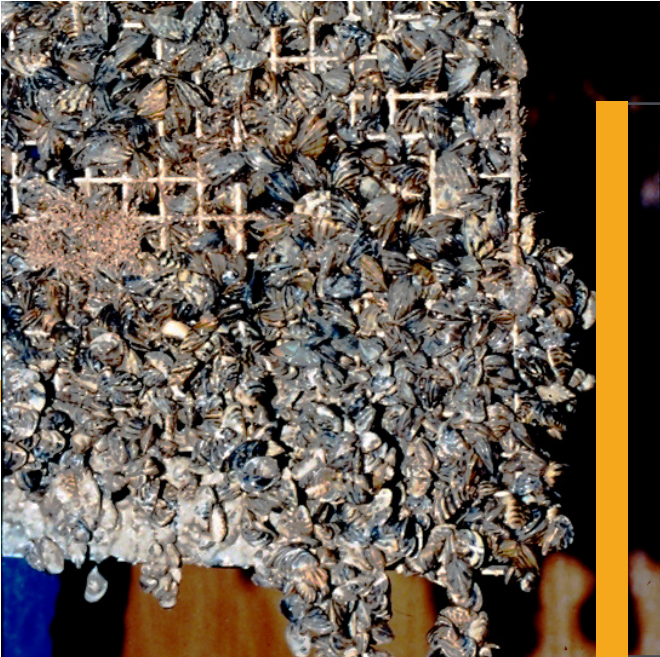
Lange says it is important to note that treatment and controls are not one size fits all. Each project is specific to the facility and its environment, which is why experience with the species is of great importance.

“Our clients expect an environmentally sound, functional control system that is economically feasible,” says Lange. “To do that, you really have to have knowledge of what mitigation options are available and how they will perform in certain situations to protect the facility and its systems.”

To demonstrate the importance of understanding the unique nuances of each client, Lange shared an experience working with a botanical garden, which used water from their ornamental ponds for irrigation and air conditioning through an intricate system of pipes.

“For years, the botanical garden was unaffected because their water did not have zebra mussels,” explains Lange. “But during maintenance on one of the ponds, they unknowingly refilled it with zebra mussel-contaminated water.”

The solution for this client was complicated because they couldn’t allow mussels to infest and clog the sprinkler system, but the chemicals normally used to protect such a



Zebra mussels can gather on screens that are meant to prevent large debris from infiltrating power plants, manufacturing plants or drinking water facilities. This image shows the build-up of mussels over just three months.



When a large mat of mussels makes its way through a pipe system, it eventually can fit through, causing an immediate outage.

system could not be utilized because of their potential to harm the ornamental plants. To mitigate the mussels, the team designed an ultra-fine mesh filter that could remove all particles down to about 125 microns in order to remove all the mussel larva before they enter the system.

“It was a challenging project because the restrictions required our team use atypical mitigation

techniques,” shared Lange. “The situation emphasizes that every system you look at is different, which leads to the need to assess a variety of control strategies. We need to work with our clients to recommend actions to control the mussels while also addressing their particular needs, which in this case involved protection of the ornamental plants.” ■



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A large, stylized graphic of a vintage microphone on the left side of the podcast introduction section. The microphone has a mesh grille and the CEC logo on its body.

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The CEC logo, consisting of the letters 'CEC' in a stylized, bold, orange font with a black outline, set within a parallelogram shape.

EXPLAINS

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