Northern Great Plains Network
Inventory & Monitoring Program

National Park Service
U.S. Department of the Interior

# Great Plains Gazette

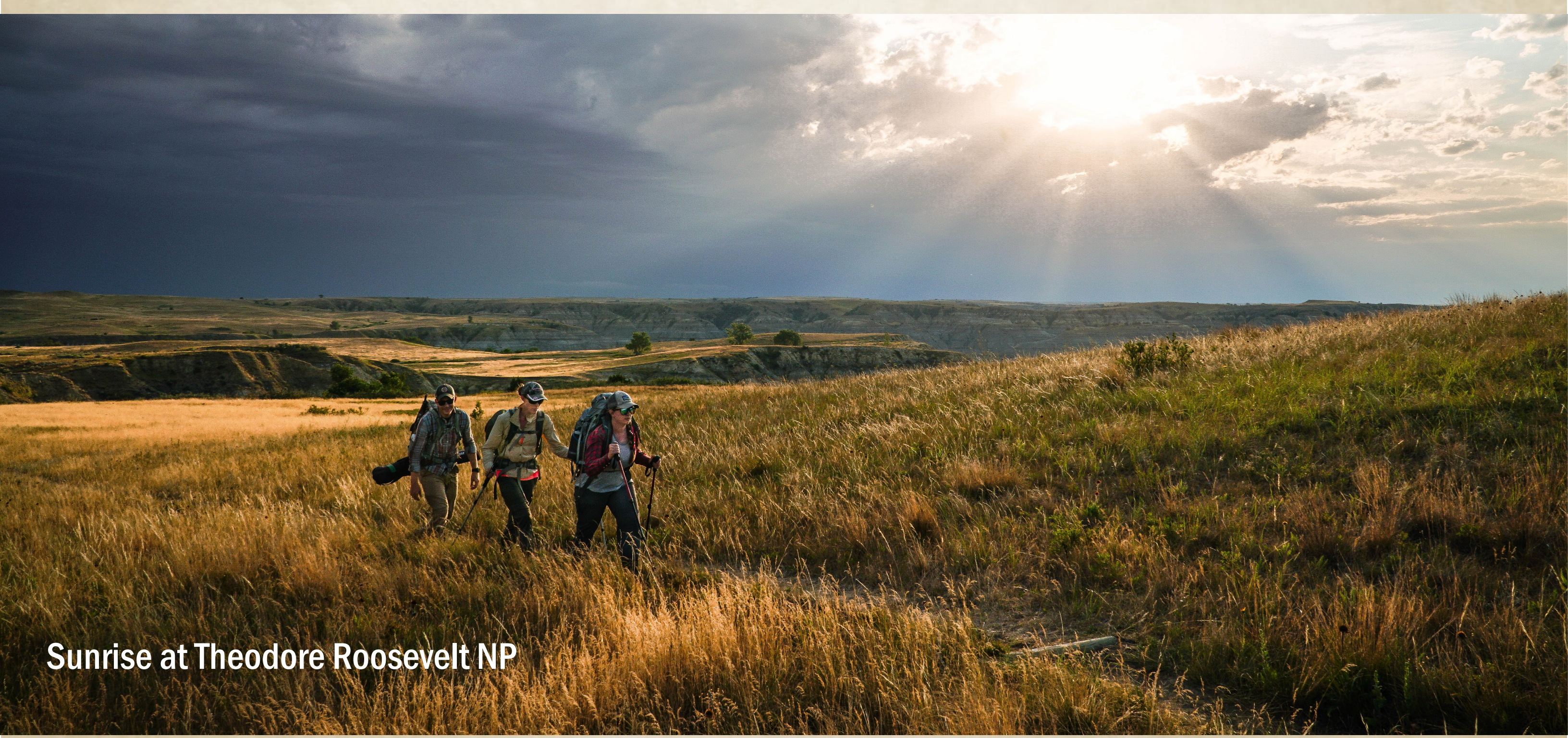
Newsletter of the Northern Great Plains Network

Issue 8 - Spring 2019

## Coordinator's Corner

## Inside This Issue





Sunrise at Theodore Roosevelt NP

# Water Resources Monitoring

## Going with the flow

In the semi-arid region of the Northern Great Plains, surface water is ecologically important. We monitor water quality and flow to protect these water resources on our parks. In 2018, water quality and streamflow monitoring in Bow Creek at Missouri National Recreation River (NRR) and in the Laramie River at Fort Laramie National Historic Site (NHS) were implemented through interagency agreements between our network, the U.S. Geological Survey (USGS) Nebraska Water Science Center, and the USGS Wyoming-Montana Water Science Center.

How much oxygen a river has (dissolved oxygen), how acidic or alkaline it is (pH), and changes in water temperature and the water's ability to conduct electricity (specific conductivity) are indicators we use to determine water quality. Streamflow also affects water quality and changes in flow can be caused by changes in water use and water management, short- and long-term climatic changes, declines in streamside vegetation, or invasive species establishment.

In the upcoming 2019 monitoring season, the USGS Water Science Centers will collect water quality and streamflow information on the Belle Fourche River at Devils Tower National Monument, the Little Missouri River at Theodore Roosevelt National Park, and the Knife River at Knife River Indian Villages National Historic Site. Data will be made available in real-time during the sampling season for parks sampled through the USGS National Water Information System Website.


Theodore Roosevelt NP

## Aquatic macroinvertebrates


Aquatic macroinvertebrate sampling at Agate Fossil Beds NM

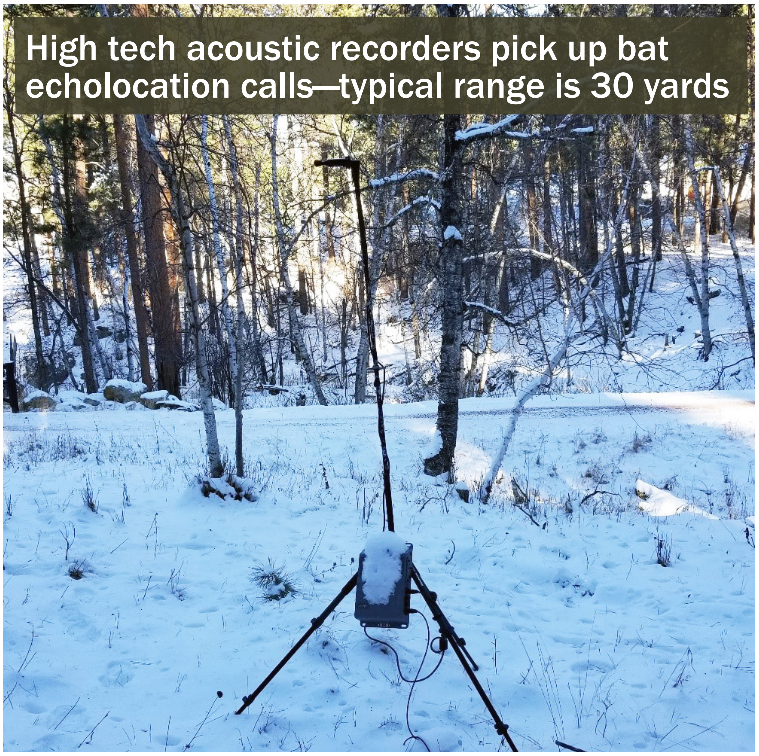
Aquatic invertebrate monitoring is another way of determining water ecosystem quality. Aquatic macroinvertebrates, such as insects, crustaceans, and mollusks, can be sampled relatively efficiently and effectively, are widespread in aquatic environments and the large number of species allow for monitoring a wide array of responses to environmental impacts. Since macroinvertebrates are relatively long-lived, their community response to environmental quality is less influenced by the high variability associated with physical and chemical analyses.

Dr. Lusha Tronstad from the Wyoming Natural Diversity Database coordinated with Northern Great Plain Network and park staff to implement aquatic invertebrate community monitoring at Agate Fossil Beds National Monument in July of 2018 and will

# Bat Acoustic Monitoring

## Five years of bat acoustic data

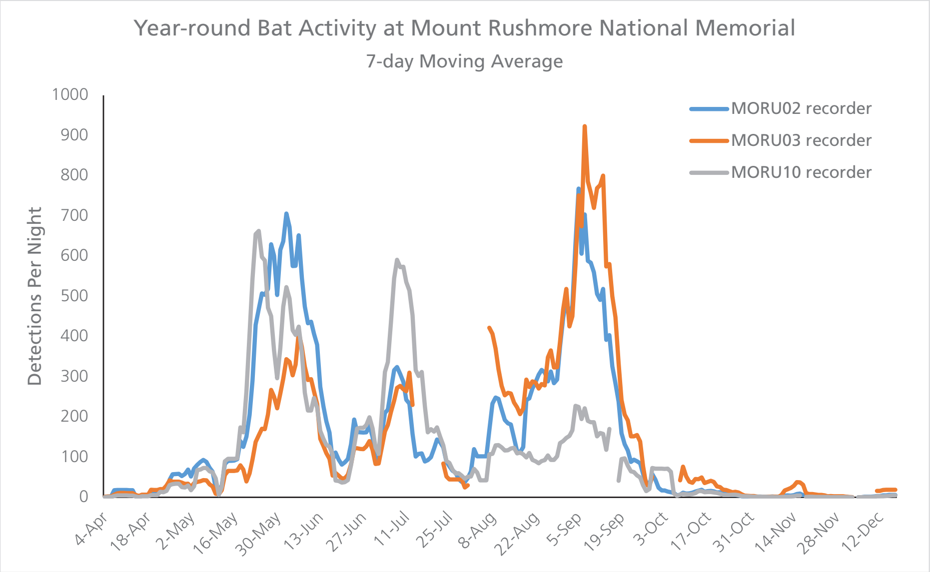
**Approximately 1.7 million bat recordings were collected in five years (2014–2018) from 2,900 survey nights across 171 stations and 130 road survey nights from 14 routes across 12 parks and four states, making the Northern Great Plains Network bat monitoring program one of the largest bat monitoring programs in the country!!**


High tech acoustic recorders pick up bat echolocation calls—typical range is 30 yards

Preliminary analyses of bat echolocation recordings indicate there has been no substantial change in overall bat activity since 2018. Statisticians at the U.S. Geological Survey's North American Bat Monitoring Program (NABat) will be conducting more sophisticated analyses, including species-specific research. We received funds for a term employee for the next three years and we submitted a proposal to procure funds to continue the monitoring partnership with the Wyoming Natural Diversity Database (University of Wyoming) for another 5-year period.

In 2018, we began deploying a subset of recorders year-round (Figure 1) for the purpose of better understanding earliest and latest bat activity, spring and fall migration peaks, and potentially, the presence of volant (flying) young. The results will help us better interpret the summer long-term monitoring data and can tell us whether bats are over-wintering in the parks (in addition to the known hibernating bats at Jewel Cave National Monument [NM] and Wind Cave National Park[NP]).

Three year-round recorders are operating at Agate Fossil Beds NM, Badlands NP, Mount Rushmore National Memorial (NMEM), and Theodore Roosevelt NP. Preliminary results from Mount Rushmore NMEM show both spring and fall peaks, a more modest summer peak (volant young?), and perhaps most interestingly, bat activity as late as early December (the last time the data was retrieved from the recorders prior to this newsletter), indicating potential over-wintering bats in the park (Figure 2). December activity was also detected at Badlands and Theodore Roosevelt NPs, but not at Agate Fossil Beds NM.



# NGPN Bat Monitoring

## White-nosed syndrome has arrived

In addition to the acoustic monitoring program, we collaborated with the Midwest Regional Biologist and WYNDD to survey bats for evidence of white-nosed syndrome (WNS). We mist-netted bats in early spring when infected bats might still be carrying the fugngus that causes the disease. Sadly, the fungus was found on 10 bats out of 419 captured. The positive bats were in or near Missouri National Recreational River, Badlands National Park, Jewel Cave National Monument, and Fort Laramie National Historic Site. The positive detections in western South Dakota and eastern Wyoming were the first known cases in the region and show that the disease continues to spread westward across North America.

This Northern Great Plains Network project was the first to detect the fungus on the western small-footed myotis and the first confirmation of the disease (presence of the fungus as well as lesions) in a long-legged myotis. The findings received national attention and were disseminated in several press releases. Mist-netting will be conducted again in the spring of 2019. In addition to revisiting some of the sites sampled in 2018, the 2019 field work will be expanded to include the three North Dakota parks.

# Exotic Plant Management

## Annual Brome Adaptive Management project goes live

Invasive species reduce the historical and ecological integrity of Northern Great Plains parks, in part by reducing native plant diversity, but also by affecting forage and habitat for wildlife. Northern Great Plains Network data and analysis show that two species of invasive annual brome grass—cheatgrass and Japanese brome (a.k.a. field brom)—are widespread in Northern Great Plains grassland parks. Without targeted management, annual bromes have persisted and even increased in some parks since 1998. Additionally, managing annual bromes is a complex progblem due to the uncertainty about the effectiveness of specific annual brome management treatments as well as the limited capacity most parks have to apply management treatments. The Annual Brome Adaptive Management project (ABAM) is tackling this problem in a cooperative effort among two Inventory & Monitoring networks, two Exotic Plant Management Teams, one Fire Management Office, the U.S. Geological Survey (USGS), and seven parks!

Now in its second of three years of funding through the NPS Servicewide Comprehensive Call, ABAM has completed two major tasks since it was introduced our spring 2018 newsletter. First, team members conducted a survey of annual brome distribution and abundance in at least one management unit of each ABAM park. These surveys identify "hot spots" of brome invasion not necessarily captured by established monitoring plots which can then be used to guide targeted treatment or supplemental monitoring. Second, the USGS produced a working model to guide ABAM parks and their supporting networks in making more effective and strategic vegetation management decisions, and to learn from those decisions in a structured adaptive management approach.

USGS partners used data from Northern Great Plain Network and Rocky Mountain Network parks, scientific literature, and ongoing experiments to build the model, which rpedicts how various aspects of vegetation, including annual brome abundance, will changef rom one year to the next in response to realistic management actions and independent environmental drivers like precipitation and soil disturbance. The model also produces a utility value—basically, a measure of manager satisfaction with the expected outcome—for each possible management action in a specific management unit. The utility value considers manager preferences for various types of vegetation and tradeoffs between improving vegetation condition and saving money.

This spring, results from the ABAM model were used in prescribed fire and exotic plant management treatment planning meetings for 2019 management actions. Useful results inc luded not only the model's "recommended" action (the one with the highest utility), but also comparisons of utility between different burn seasons and comparisons of "recommended" actions when cost-savings are considered and when they are ignored.

Although already in use, the model is still a work in progress, and the real work is just beginning. Each year, the model will be used as a guide to select where and when management actions will occur. As management is applied and monitoring data collected and input into the model, the model will be updated to provide improved predicitons of management action effects. This long-term (perhaps decades!) protocol for continued learning is unique in the National Park Service, and it provides an example of how this type of approach could be applied to other complex management issues in parks across the nation.

Cheatgrass-dominated plant community

# Plant Community Monitoring

## ????

It has been a busy off-season for the plant community monitoring team! Isabel spent much of the autumn completing the Cave Water Quality Monitoring Protocol. Chris spent his winter as acting Chief of Resources at Devils Tower NM. Stephanie worked on projects for Mount Rushmore and then spent three months working for NASA Langley Research Center in Hampton VA, on a project to create reproducible land cover/land use mapping methodology to assess water quality change int he Patuxent watershed. Ryan worked on a project for Mount Rushmore and assisted with vegetation monitoring at two other I&M networks, Chihuahuan Desert and Northern Colorado Plateau. Theresa worked on projects for Mount Rushmore and the network. Despite all this extra work, we were able to publish 11 annual data reports, update our species databases, and clean out our office and laboratory space.

2019 will be the ninth year of plant community monitoring at 11 national parks in the Northern Great Plains Network. We are looking forward to revisiting sites that we haven't been to since 2015 and others that we visited last summer. Recent firess, well-timed moisture and moderate temperatures made for spectacular wildflower displays in many of our parks last summer. It is too early to tell what is in store for us this summer, but as of late March, we were heading into the growing season with no indication of drought in any parks. Long range forecasts fromt he National Weather Service suggest that May, June, and July may be wetter than average.

NGPN staff drying off

In late summer and early fall, we will be revisiting 20 riparian forest sites in Knife River Indian Villages National Historic Site, Fort Laramie National Historic site, Scotts bluff National Monument to better understand the condition of cottonwood forests. We also hope to complete riparian monitoring at Agate Fossil Beds National Monument and assist with Wind Cave National Park riparian monitoring.

A sunny day at Badlands NP

Chris and Isabel will be leading a very experienced crew this summer, including Ryan Manuel (crew lead, 6th season), Stephanie Rockwood (crew lead, 7th season), Molly Davis (field tech, 4th season), Theresa Schaffner (field tech, 2nd season), and Eric Duda (new seasonal tech, starting mid-May). Last year, some of our crew memebers were able to help with exotic plant management at Devils Tower NM and they will conntinue to retain their applicator licenses. Three of our staff were able to assist the Badlands and Wind Cave national parks' engines, and they look forward to more opportunities this summer.

Wood lilies at Wind Cave NP

We have a MOSAICS in Science intern joining us fo rthe summer to work on a collaborative project with Badlands Interpretation Division. Christian Knutson, originally from Red Shirt and now a student at Black Hills State University, will be helping develop a project to look at a plant phenology in Badlands NP and inspire the public to learn more about phenology and prairie diversity. He will be leading a public prairie walk and collecting data for the National Phenology Network using Nature's Notebook.

# Climate Analyzer—A Data Portal

The Northern Great Plains Network, in collaboration with other inventory and monitoring networks, has brought climate data to the public and to parks through a tool called Climate Analyzer that was developed by Mike Tercek with Walking Shadow Ecology, Gardiner, Montana. Climate Analyzer (www.climateanalyzer.org) is a data portal that provides resource managers, scientists, and the public access to climate data from a variety of locations in and near parks.

Anyone can instantly create visuals such as maps, graphs, and tables dynamically from historical weather station data. The Climate Analyzer tool pools data from the National Weather Service's Co-operative Observer and Global Historical Climatology networks (COOP and GHCN), the Natural Resources Conservation Service's Snow Telemetry sites (SNOTEL), U. S. Geological Survey stream gages, the interagency Remote Automated Weather Stations (RAWS), Hydrological Automated Data System, and a variety of other met (meteorological) stations and data loggers.

Climate Analyzer users choose a weather station and the time period they are interested in and it calculates averages, totals, and other summaries such as departures from 30-year averages and extreme day counts. this has been an invaluable tool for both climate and other vital signs monitoring and is available to the public as well. For parks in the Black Hills and Badlands, there is an added component—the dashboard—that provides current temperature, forecasts for the parks, drought information, and real-time heat index. Check out Climate Analyzer for yourself and les us know what you think! Please send your feedback and ideas to Isabel Ashton and Kara Paintner.

iPad running Survey 123 data colletion software

# Cave Water Quality Monitoring Protocol

We worked with Jewel Cave National Monument andWind Cave National park to complete the Cave Water Quality Monitoring Protocol Implementation Plan. Water quality data collection in two groundwater lakes at these two parks will begin in 2021 and be repeated every three years thereafter. The samples will be collected by park staff and cavers, analyzed by the U.S. Geological Survey, and the data will be managed by the Northern Great Plains Network. We will measure physical characteristics, nutrients, metals, and hydrocarbons in teh water. This suite of analytes could serve as indicateors of contaminants entering the cave system from roads, developments, or changes in land use.

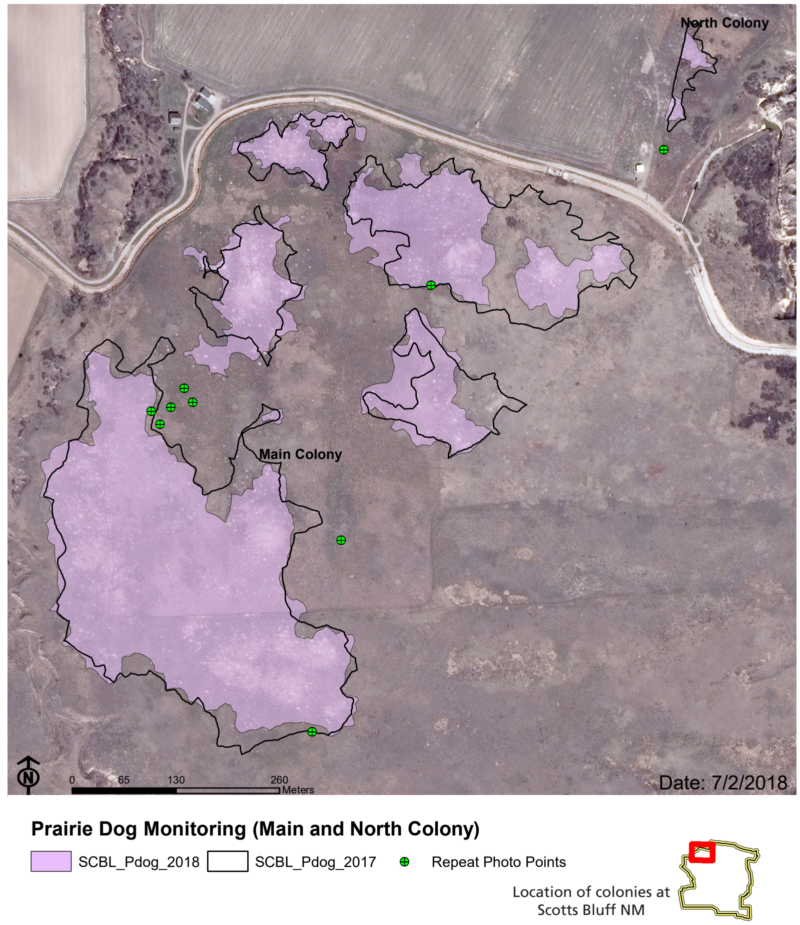
Plant data collection at Devils Tower NM

# Prairie Dog Monitoring

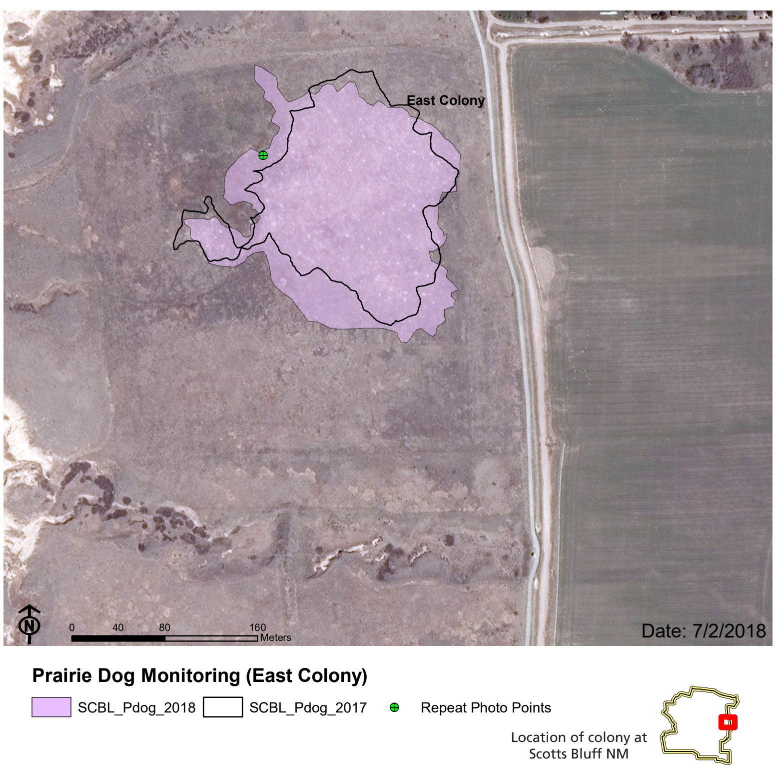
## Prairie dogs are on the Map!

Our Data Management Team (Angela Jarding, Justin Mills, and Carlos Serratos) mapped the extent of the prairie dog colonies on Scotts Bluff National Monument in 2018, the 23rd year of prairie dog spatial data collection at the park. This was the first year we completely switched to using iPads to collect field data, which made mapping much faster and easier, both in the field and when processing the data in the office.

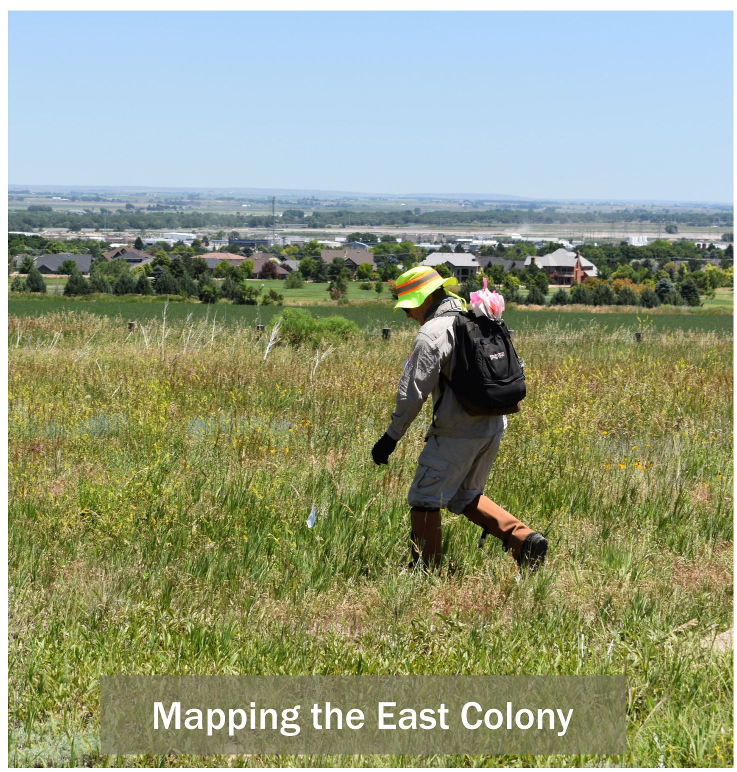
The largest prairie dog town shrank from 45.5 acres in 2017 to 41.1 acres in 2018 (most of the change was in the northern sections). During the same one year period, the East town grew from 6.3 acres to 8.2 acres and the tiny North town shrank from 0.7 acres to 0.4 acres. The wet spring and early summer was evident in abundant plant growth and greenery compared to previous years–this can affect both how well we detected the prairie dog holes and how much area the prairie dogs are able to keep clear around their town. This was also the first year in recent memory where the team didn't encounter any rattlesnakes!




Prairie Dog Monitoring (Main and North Colony)




Prairie Dog Monitoring (East Colony)



Mapping the East Colony

# *Bird Monitoring*

Wood lilies at Wind Cave NP

iPad running Survey 123 data colletion software

NGPN staff drying off

# Staff Updates

## Welcome Theresa Schaffner, our new Permanent Biological Science Technician

Theresa first encountered NGPN last year while working as a seasonal employee for the Northern Great Plains Fire Effects crew, based out of Wind Cave National Park. She is excited to begin her permanent career with NPS. Prior to working in Fire Effects, Theresa worked in Resource Management for a year at Fire Island National Seashore in New York. Her primary responsibilities were trapping and tracking radio-collared White-tailed Deer, and monitoring vegetative change in dune regeneration and an old growth maritime forest. Following a short foray into the private sector, collecting climate change data in California, she landed back with the NPS in South Dakota. Theresa earned a B.S. in Sustainable Management from Bucknell University. In the off season, she stays with her boyfriend in New York City and family in Pittsburgh, identifying local plant species for anyone who will listen.

## NGPN staff also welcomed two new babies in 2017

Two NGPN employees had new additions to their families last year.

Darren Thornbrugh, aquatic ecologist, and his wife Julianna welcomed baby Lily in August.

Carlos Serratos, GIS technician, and his wife Danielle welcomed baby Luna in September.

If you see these folks around your park, give them a pat on the back and a cup of

## Thanks to our field help and seasonal staff

Thank you to our seasonal employees Carlos Serratos, Will Vogel, Rachel Oltjenbruns, and Logan LaFleur, as well as all of the park staff and interns who joined us in the field to help with data collection. Without their hard work our fruitful field seasons wouldn't be possible.

Also, congratulations to Logan on her acceptance to law school at University of Arizona, where she began classes last fall.

# Monitoring Schedule

## 2019 Field Schedule

### When you can expect to see us and our partners at your park!

| Park | Bats (WNS) | Bats (Acoustic) | Birds | Prairie Dogs | EPMT | Plant Community | Forest/ Riparian | Water Quality | Aquatic Invertebrate |
|---|---|---|---|---|---|---|---|---|---|
| AGFO | – | June | | | | May | August (Riparian) | | July or August |
| BADL | May | June–August | | | | June | | | |
| DETO | April | TBD | | | | July | | May-Oct (ice free periods) | |
| FOLA | May | June | | | | May | Sept. (Forest & Riparian) | | |
| FOUS | May | June | | | | July | | | |
| JECA | May | July | | | | July | | | |
| KNRI | May | June | | | | July | August (Forest & Riparian) | May-Oct (ice free periods) | |
| MNRR | – | June–August | | | | | | | |
| MORU | April | July | | | | July | | | |
| NIOB | April | July | | | | | | | |
| SCBL | – | June | | June | | May | September (Forest & Riparian) | | |
| THRO | April/ May | June-July | | | | July-August | | May-Oct (ice free periods) | |
| WICA | May | July | | | | June | September (Riparian) | | |

## Acronyms

| | |
|---|---|
| AGFO | Agate Fossil Beds National Monument |
| BADL | Badlands National Park |
| DETO | Devils Tower National Monument |
| FOLA | Fort Laramie National Historic Site |
| FOUS | Fort Union Trading Post National Historic Site |
| JECA | Jewel Cave National Monument |
| KNRI | Knife River Indian Villages National Historic Site |
| MORU | Mount Rushmore National Memorial |
| MNRR | Missouri National Recreational River |
| NGP EPMT | Northern Great Plains Exotic Plant Management Team |
| NGP FE | Northern Great Plains Fire Effects |
| NGPN | Northern Great Plains Network |
| NIOB | Niobrara National Scenic River |
| NABat | North American Bat Monitoring Program |
| SCBL | Scotts Bluff National Monument |
| THRO | Theodore Roosevelt National Park |
| USGS | U.S. Geological Survey |
| WICA | Wind Cave National Park |

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# NGPN Documents

Available for download on our website!

NGPN reports, briefs, and protocols are available on the Reports and Publications page, including:

## Plant Community Monitoring 2017 Data Series Reports

Badlands National Park
Devils Tower National Monument
Fort Laramie National Historic Site
Fort Union Trading Post National Historic Site
Knife River Indian Villages National Historic Site
Scotts Bluff National Monument