BOB DUNCAN
Executive Director

As a youngster growing up in southwest Virginia, I never gave a second thought to the abundance of water in the New River or Claytor Lake. It was a time of wooden boats, drinking from a garden hose, and fishing with a steel rod and open face bait-caster reel. We had plenty of honey bees and loggerhead shrikes back then, and I used to hunt for small voles and other critters impaled on hawthorn bushes by the shrikes in our area. But things do change, indeed!

Water now—at least a lot of it—comes in bottles, and shrikes and many bee species are in decline. Check out the stories in this issue about research underway on the status of both.

While we plied the waters of the New River in wooden boats and fished for channel catfish, a new generation of kayakers and canoeists now run the rapids at Peppers Ferry, and fishing for smallmouth bass and muskie on the New is the stuff of legends. The boating world has changed dramatically with the introduction of personal watercraft like jet skis and faster passenger boats, resulting in more interest and access to water-based recreation.

The Department is proud to offer boating education as part of the state mandate to provide for the safe enjoyment of Virginia's abundant public waterways. Boating gives friends time to connect, away from cell phones and other distractions, and if lucky, catch a glimpse of the amazing fish and other aquatic creatures in our midst.

I hope the articles on the Sandy River Reservoir bass fishery and the blue catfish study, revealing what Virginia Tech researchers found in the diets of this popular game fish, will whet your appetite. Whether using a boat to fish from or just take in the scenery, the season is in full swing!

In a few weeks, we will be well past the peak of many wildflowers, but there is still much to enjoy and discover. Inside, learn about the mafic fens of the Blue Ridge—a truly unique natural community. And before you jump fully into summer mode, take a moment to appreciate the incredible accomplishments of students (and coaches!) across Virginia who participated in the state National Archery in the Schools championship in March. Kudos to all the kids! And to the families and sponsors and administrators and DGIF staff (ably led by Karen Holson) who make it happen: thank you!

Be safe this season, and I hope to see you out there—on the water.

2018 NASP Scholarship Recipients

MISSION STATEMENT

Conserve and manage wildlife populations and habitat for the benefit of present and future generations. Connect people to Virginia's outdoors through boating, education, fishing, hunting, trapping, wildlife viewing and other wildlife-related activities. Protect people and property by promoting safe outdoor experiences and managing human-wildlife conflicts.

CONSERVE. CONNECT. PROTECT.

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www.dgif.virginia.gov

Experts in Virginia and elsewhere race to identify native bees and threats to their survival before entire species disappear from the landscape.

By Cristina Santiestevan

Around the turn of the century, the rusty patched bumble bee could be easily found throughout Virginia. Its fuzzy bottom—with a patch of rust-colored hairs that give the bee its name—was a familiar sight in the commonwealth's gardens and yards. "It was ubiquitous throughout a lot of the Mid-Atlantic and Midwest," says Chris Burkett, Wildlife Action Plan coordinator for the Department (DGIF). "Then, suddenly, it was really hard to find. It just wasn't there anymore."

The species' fall from too-common-to-notice to too-rare-to-find happened so quickly that biologists were left scrambling with an unexpected pair of questions: Was the bee not being seen because it wasn't being looked for? Or was it not being seen because it was actually not there?

The correct question proved to be the latter. Somehow, the rusty patched bumble bee had disappeared from nearly its entire known range. This vanishing act was so complete that the rusty patched bumble bee is now believed to exist on only one-tenth of one percent of its historic range. That distribution contraction of 99.9 percent occurred in just two decades. As a result, on March 21, 2017 the rusty patched bumble bee became the first bumble bee to earn a spot on the federal Endangered Species List. The species is listed as endangered, which means it is at very real risk of extinction.

The shock of seeing the once-common rusty patched bumble bee land on the federal listing startled and motivated individuals and organizations across the country, says Burkett. "A lot of these species—butterflies and moths and bumble bees and other species—people

"It looks like there are going to be at least 450 confirmed species of native bees known to occur in Virginia." —Ellison Orcutt, DCR

take them for granted. You just think you're always going to see them. So when the rusty patched bumble bee got listed as an endangered species, people were like, 'Oh. Crap. What happened? What has changed so dramatically with our landscape that this generalist, well-distributed species is now facing extinction?'"

Documenting Species. Documenting Decline.

Burkett's question—what happened?—is one that has been echoed by biologists, conservationists, and land managers throughout the state and across the country. What we know is almost certainly dwarfed by what we have yet to discover. We know the rusty patched bumble bee is vanishingly rare where it once was almost too common to note. We know that honey bees are also declining in number and health across the country, despite efforts to protect against Colony Collapse Disorder and other threats. And we know that many butterflies and moths are also declining at an alarming pace. But, we do not know enough. We especially do not know enough about our native bees.

To address this knowledge gap, staff with the Virginia Department of Conservation and Recreation's (DCR) Natural Heritage Program are working to compile a complete list of Virginia's known species of native bees. "There are some very simple questions that we haven't answered yet," says Chris Ludwig, chief biologist with DCR who is leading the Natural Heritage Program's biological inventory of Virginia's native bees.

"What is our fauna? Where do those species occur? And, which ones are rare? That's what we are trying to find out."

The effort began approximately four years ago, and Ludwig expects that it will be another five years or so before he and his team will have robust and reliable answers to these questions. In the meantime, he explains, things do not look good. "To give a prognosis, you could look at butterflies, which are much better known. You could look at honey bees. You could look at habitat from a macro scale. We know these are all not doing well. If you look at the larger trends, it's definitely not good. But as to how dire it is, we have a lot of questions to answer before we can get even close to answering *that* question."

To date, the project has focused its efforts on compiling a list of native bees known to exist—at present or at some point in the past—in the state of Virginia. "It looks like there are going to be at least 450 confirmed species of native bees known to occur in Virginia," says Ellison Orcutt, a field zoologist working on the project. "About half of that is based on bees we have collected—probably about 200 or 250 species—and the other portion of that is digging into the field work that others have done and also historic collections of bees that have been done in the state."

It's a tedious process that often involves extensive work sifting through databases and tracing the origins of bees collected by enthusiasts and experts, explains Orcutt. "There might be one bee that was collected by a visitor from Kansas who then took that bee back to their Kansas collection. I'm able to actually find that information."

This combination of field work and desk work has produced a list that Orcutt and Ludwig agree is still a rough draft. "Every year we collect several species that had not yet been collected in Virginia," says Orcutt. "So we're talking about wanting to know what species are rare in Virginia, but we still don't even know what species are actually *in* Virginia."

All of this work will ultimately go toward answering Burkett's question: What happened? "With the rate we are learning about these species and their status, I think in five years we will have a good sense of what our fauna is," says Ludwig. "And we will have a fairly good sense of which species are rare. And that would answer a lot of questions. And then we could start protecting areas for those rarest of species."

Food and Air. Forests and Fields.

When asked to explain the importance of bees and other native pollinators, Ludwig is succinct with his answer: "I like to eat. I like to live in a world that produces oxygen." It's an answer that borders on hyperbole, as Ludwig admits, but the line between possible and improbable here is quite thin.

The vast majority of our fruits and vegetables are pollinated by bees and other insects. Most often, this is where the discussion ends: We need bees to pollinate the flowers that produce the foods we like to eat and the seeds to plant the next year's crops. While this is reason enough to care about bees and their fellow pollinators, it is only a partial answer. In fact, it may not even be the most important answer.

"Many of our non-crop plants are also dependent on pollination," says Ludwig. "And the fact that we are losing our ability to have our wild plants pollinated is a much greater potential concern when you look at ecosystem impacts." Deprive native plants of their pollinators, and they lose their ability to reproduce. Whole ecosystems would shift in response, with impacts that could reach every animal within that habitat.

It's a dramatic scenario, but not an impossible one. If the rusty patched bumble bee can disappear from 99.9 percent of its range in just 20 years, what other declines have already begun? And if new species are still being discovered every year, what species might we lose entirely before we even identify them? Many plants rely on a suite of species to pollinate their flowers, but some are specialists. What if a plant loses its only effective pollinator? "These plants have their own sets of biologies that have evolved with these insects," explains Burkett. "If you start taking these insects out of the equation, then you have less healthy plants and in a lot of cases you have plants that can't even reproduce at all."

Protecting the Pollinators.

In 2015, Burkett and a team of experts completed their once-a-decade update of *Virginia's Wildlife Action Plan* (http://bewildvirginia.org/wildlife-action-plan). It's a significant undertaking that requires looking at, reviewing, and drawing conclusions about the conservation status of Virginia's many native wildlife species. "We ended up adding seven species of bumble bees to the Wildlife Action Plan this time around," says Burkett, who explains that these seven are the first bees to make Virginia's list of species of greatest conservation need. He expects more bees will be added with future revisions. "We don't have any other types of bees on the list yet. Primarily that's because we don't have a good handle on what is out there.

GALLERY OF CASUALTIES

Listed in the 2015 Wildlife Action Plan

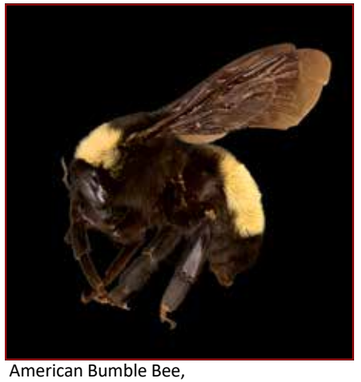
Variable Cuckoo Bumble Bee, *Bombus variabilis,* a parasitic bee

Rusty patched Bumble Bee, *Bombus affinis,* recently discovered at Sky Meadows Park

Yellow-banded Bumble Bee, *Bombus terricola*

Yellow Bumble Bee, *Bombus fervidus*

Southern Plains Bumble Bee, *Bombus fraternus*



American Bumble Bee, *Bombus pensylvanicus*

All of the bumble bee images in this story were provided courtesy of the USGS Bee Inventory and Monitoring Lab. Using a high-powered macro lens, a focusing rail, and special image stacking software, multiple images were combined into one that reveals great depth-of-field and detail.

Previous page: A museum specimen of the Ashton Cuckoo bumble bee may represent all that is left of this now rare species. The Ashton Cuckoo, ironically, parasitizes the Rusty Patched bumble bee which is now federally endangered.

But I suspect a lot of the issues that are impacting these seven bumble bees are trickling down to other bee families as well."

The list of threats facing native bees and other pollinators is extensive. Pesticides and herbicides, disease, invasive species, and climate change are all likely impacting the health of our native pollinators to some extent. But habitat loss and degradation often sit at the top of any species' list of threats. And while we still have much to learn about Virginia's native bees, Burkett and Ludwig and Orcutt all agree that habitat loss and degradation is almost certain to play a significant role with most—if not all—of our rarest species.

Once Ludwig and his team have a comprehensive list of bees found in Virginia, they will begin assessing threats and taking concrete action to save species. "We want to know what the rarest species are because we also have a natural areas program," says Ludwig. "So when we get areas of importance for biodiversity protection, we will actually go out and try to protect it. So that's the last piece of the puzzle. That's really why we exist; to inventory and then protect biodiversity."

In the meantime, Ludwig and his team are already looking for opportunities to make a difference for those species they know to be at risk in the state. "If we find a rusty patched bumble bee population within Virginia, we would instantly apply whatever tools we have to effect positive conservation for that species," says Ludwig. "We already know it is incredibly rare. It's down to a handful of populations outside the main part of its range. We would do our best to protect it."

Plant a Flower. Save a Bee.

Many of the world's most dire conservation issues are global in scale or distant in impact. But native bees exist on the scale of our yards and gardens. Anyone with the space to plant a few wildflowers can make a difference for local pollinators.

"I've been messing around in my own yard, trying to plant natives and ornamentals and vegetables that I know will attract pollinators," says Burkett. "It's really amazing the diversity of bees that show up with a new patch of black-eyed Susan or a new patch of sunflower. For the first year ever at this house, I had squash bees show up in my garden to pollinate pumpkins this past summer. For a lot of these species, it's just a matter of giving them that opportunity. Give them the habitat they require, and they can probably take care of themselves."

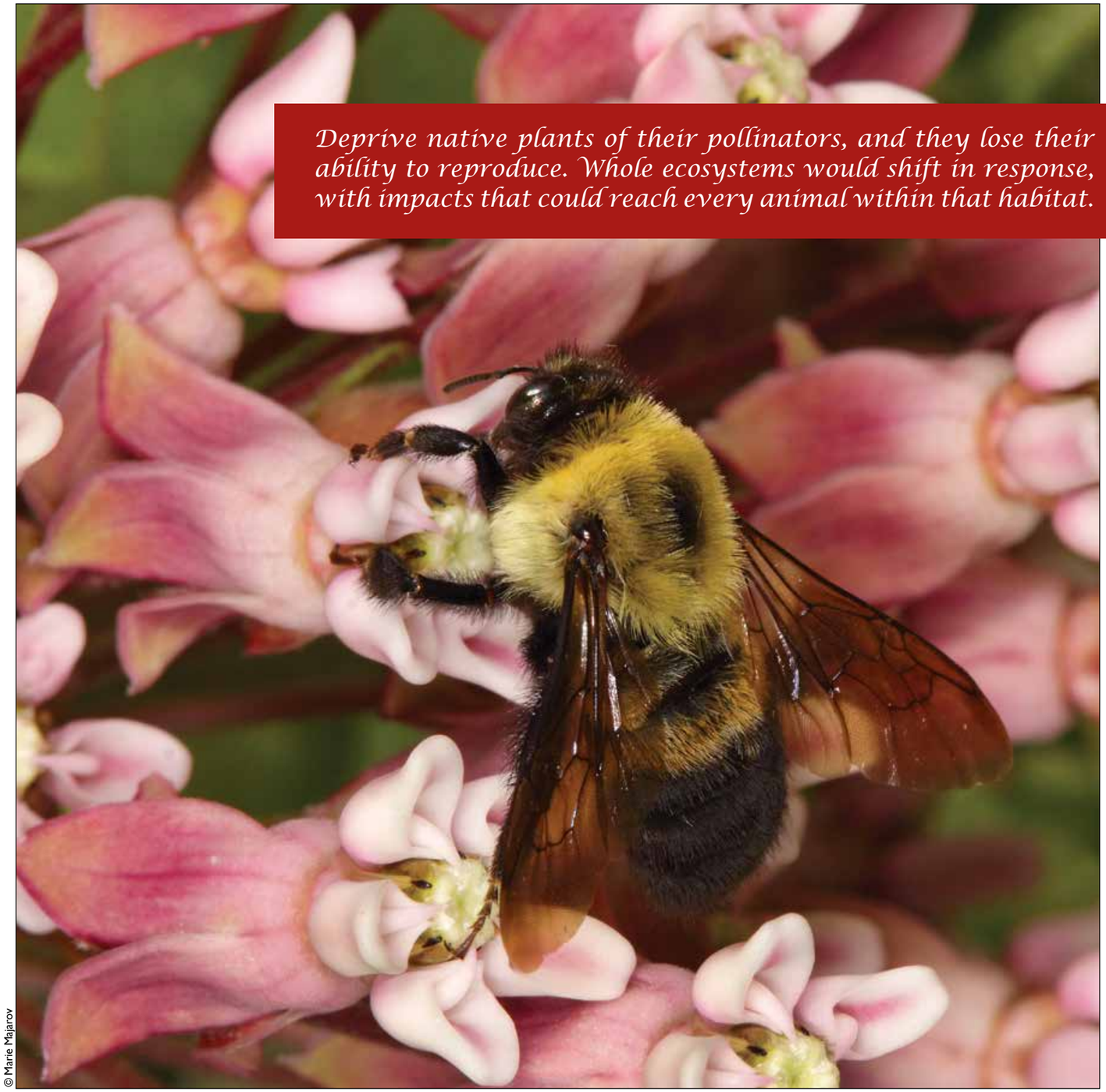
Burkett is an avid and experienced gardener, but he explains that anyone with interest and a bit of outdoor space can make a difference. To start, he suggests doing some online research, then visiting your local garden center for advice in seeking out pollinator-friendly plants. Native plants are often the most beneficial, but even some well-loved ornamental species can be a boon for native bees and other pollinators. Inspect the plants and notice which ones are drawing bees and butterflies; that's what you want to purchase. "There are lots of things you can do, even in a suburban yard," says Burkett.

It's simple really, says Orcutt. "We don't have to make this more complicated than it is. Bees need a place to live."

Cristina Santiestevan writes about wildlife and the environment from her home in Virginia's Blue Ridge Mountains.

NATIONAL POLLINATOR WEEK

How can you help our pollinators? First, reduce or eliminate pesticide use! Create pollinator-friendly habitat with native plants that supply them with nectar, pollen, and homes. For more information on what to plant in your area check out: http://pollinator.org/guides



Deprive native plants of their pollinators, and they lose their ability to reproduce. Whole ecosystems would shift in response, with impacts that could reach every animal within that habitat.

Planting natives like this milkweed offers bumble bees a much needed food source.