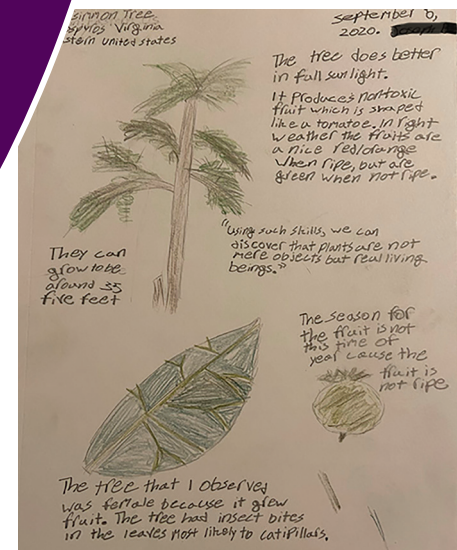


• JENNIFER BOLLICH

**ABSTRACT**

Many of today's adolescents have little to no connection to their environments or the native plants and animals that share their spaces. This is primarily due to a significant decrease in the amount of time children spend outdoors now, compared with children in the mid to late 20th century, compounded by a lack of natural history and outdoor experiences in schools. Nature journaling is an effective way for life science teachers to get adolescents outside and incorporate nature studies into their lessons. Students engaged in regular, sustained nature journaling could experience an increase in literacy and critical thinking skills, an increase in understanding and connections to their native landscapes, and a decline in anxiety and depression.

Keywords: Nature journaling, outdoor education, place-based education, nature studies, mindfulness, adolescents, NGSS

○ Introduction

Today's children spend very little time in nature and have little to no connection to their own natural environments despite research showing that outdoor experiences are necessary for healthy development (Louv, 2008). This trend correlates with the tendency of local governments to severely regulate and restrict the use of outdoor spaces by children (Louv, 2008). For example, during the mid-20th century, urban and suburban children could often search for adventure in abandoned properties, vacant lots, and drainage ditches (Moore, 1997). Risk management policies in most places, often forced by insurance companies, have ended these childhood freedoms out of fear of liability lawsuits (Community Associations Institute, 2012). Parents, too, have limited the amount of outdoor free play due to fear, tightly packed schedules, and many other real and imagined reasons (Moore, 1997). At school, insurance restrictions and the reduction of recess lengths (Moore, 1997) coalesce to keep kids indoors.

Sustained nature journaling can have positive educational, environmental, and psychological effects on adolescents.

Furthering this trend away from outdoor experiences, nature studies at the organismal level in American secondary classrooms have slowly been replaced with abstract science concepts at the microscopic and molecular levels, or at the larger population and ecological scales (NGSS Lead States, 2013). The Next Generation Science Standards (NGSS), adopted in some form by many states, are a powerful example of this trend. Of the 23 standards adopted by NGSS, 10 focus on the molecular, cellular, or organ system scale, and 11 focus on the population or ecological scale (NGSS Lead States, 2013). Only 2 standards, both dealing with natural selection and evolution, consider the organism level; however, the organism is a secondary focus in both instances (NGSS Lead States, 2013). This is despite the organism being the link between the microscopic and ecological levels of organization (Bartholomew, 1986). In addition, natural history at the organismal level provides contextual understandings of many of the other branches of biology (Bartholomew, 1986; Tewksbury et al., 2014), as well as being necessary for understanding food security and natural resource conservation (Tewksbury et al., 2014). How can students fully understand the role of a species in an ecological system, or the impact of a biochemical pathway on an organism's survival, if they do not understand the organism? They are looking at the parts without seeing the whole or looking at the group without seeing the individual. In either case, students are not getting the full picture of the species, how it works, and its role in the ecosystem (Bartholomew, 1986; Tewksbury et al., 2014). The study of natural history is invaluable in bridging these gaps.

There is hope, however, this trend is reversing. Natural history through nature study is creeping back into the classroom as slowly as it disappeared. A search in Google Scholar for peer-reviewed articles yielded a list of resources from the last three decades on the importance of nature studies, nature journaling, and place-based education for students. For example, the article "Nature Journaling: Enhancing Students' Connections to the Environment through Writing" discusses the importance of getting students outside

observing nature (Cormell & Ivey, 2012). Another article, “Use of the Outdoor Classroom and Nature-Study to Support Science and Literacy Learning: A Narrative Case Study of a Third Grade Classroom,” gives a concrete example of how one teacher used nature study and an outdoor classroom to improve student outcomes (Eick, 2017). Despite the research, teaching practices have not yet appreciably changed in most places.

What can educators do to bridge this gap in the curriculum? Nature journaling is one inexpensive, accessible, simple method to return nature study and natural history to the classroom. Sustained nature study through journaling is an effective way to get children back outdoors, making connections to organisms without sacrificing the intent or rigor of state and national standards. While nature journals can take many forms, for my purpose here I will define nature journaling as “the process of recording nature observations with sketches and descriptive text” (Laws & Lygren, 2020). Through a review of literature, I found that sustained nature journaling can have positive educational, environmental, and psychological effects

on adolescents age 13 to 18 compared with peers that don’t use nature journaling. There is also ample evidence of the benefits of elementary or early childhood journaling, but here I am focused on adolescents only.

The benefits of sustained nature journaling fall into three categories (see Table 1). The first category includes “educational effects” such as literacy skills, descriptive writing, figurative language, critical thinking, science literacy, and inquiry skills. Inquiry in this context is defined as the process of asking comparative questions from observations (Myers et al., 2009). Any effects that could be considered a change in cognitive learning, thinking, or study skills are in this group. The next category, “environmental effects,” includes changes in scientific or ecological knowledge and understanding, changes in attitudes toward environmental issues or local ecosystems, and reported changes in environmental behaviors. A third category, “psychological effects,” includes depression, anxiety, mindfulness, identity, and anything that could be classified as emotional.

Table 1. Effects on adolescents of sustained nature studies through journaling.

<p>Educational Effects of Nature Journaling</p> <ul style="list-style-type: none"> • Improves figurative language skills¹ • Develops students’ science identity¹ • Fosters curiosity¹ • Supports interdisciplinary learning¹ • Provides opportunity to do “real” science like famous scientists¹ • Builds a growth mindset¹ • Improves observation skills^{1,4,7} • Improves memory skills through drawing and writing³ • Requires and develops critical thinking¹ • Requires organization of thoughts and data¹ • Aligns with NGSS crosscutting concepts¹ • Improves student achievement across the curriculum¹ • Helps build new neural pathways¹ • Improves literacy skills¹ • Increases understanding of literary references² • Adjusts to individual learning styles⁷
<p>Environmental Effects of Nature Journaling</p> <ul style="list-style-type: none"> • Knowledge about local flora and fauna² • Enhanced nature connection^{1,8} • Increased likelihood that students will become adults who spend time outdoors¹ • Engagement in sustainable practices⁶ • Stronger sense of responsibility for their communities² • Increased empathy for the natural world⁵ • Understanding of the interplay between biotic and abiotic factors over time⁸ • Better understanding of the natural world⁹ • Increased knowledge of the environment⁹ • A nature connection the student has control over⁷
<p>Psychological Effects of Nature Journaling</p> <ul style="list-style-type: none"> • Reduces stress and anxiety¹ • Slows down the pace of life¹ • Enhances a sense of awe and wonder¹ • Builds an inclusive culture¹ • Increases mindfulness¹
<p>¹ Laws & Lygren, 2020; ² McMillan & Wilhelm, 2007; ³ Hammond, 2002; ⁴ Shipp, 2017; ⁵ Warkentin, 2011; ⁶ Korach & Myers, 2020; ⁷ Leslie, 1996; ⁸ Ripa, 2016; ⁹ Cormell et al, 2012</p>

○ Educational Effects

Journaling about nature increases students' use of language and literary skills through what are likely significant interactions—when in nature, students have a chance to see, hear, and feel experiences that are worth talking about and, more importantly, worth writing about. This idea significantly aligns with research related to “writing to learn.” By utilizing short nature journaling activities, students can learn to better organize their thoughts and observations in meaningful ways (Laws & Lygren, 2020) and form connections to previously learned ideas. They are given the opportunity to explore new ways of thinking by using expressive and creative language to describe their observations (Kiefer et al., 2000–2022). These processes help build new neural pathways in the brain, increasing neuroplasticity, or the ability to learn new things more easily (Laws & Lygren, 2020). This “writing to learn” can empower students by increasing critical thinking skills that may contribute to a growth mindset (Kiefer et al., 2000–2022; Laws & Lygren, 2020). These connections reach across the disciplines to make learning more cohesive and increase overall brain development to improve learning in multiple areas of the curriculum (Laws & Lygren, 2020).

Nature journaling has also been shown to increase a student's understanding of figurative language (Laws & Lygren, 2020) and help students understand the natural imagery found in literature (McMillan & Wilhelm, 2007). For example, Shakespeare's *Hamlet* contains many passages referencing flower lore and gardening. In act 1, scene 2, we read, “Fie on 't, ah fie! 'Tis an unweeded garden that grows to seed. Things rank and gross in nature possess it merely.” Students who have never been exposed to a garden would have a hard time picturing Shakespeare's meaning. Another example can be found in *The Great Gatsby*. F. Scott Fitzgerald uses the seasons to symbolize moods, as in this line: “And so with the sunshine and the great bursts of leaves growing on the trees, just as things grow in fast movies, I had that familiar conviction that life was beginning over again with the summer.”

Writers such as Ralph Waldo Emerson and Henry David Thoreau used many metaphors connecting literature with nature stemming from the common outdoor experiences of the average person (Novak, 2014). Unfortunately, many adolescents today lack this understanding of nature and their local natural places. Much of the cultural language that, in the past, was shared between generations has now been lost (McMillan & Wilhelm, 2007). Increased mobility, technology, and the lack of outdoor experiences have led to a population far removed from connections to place and cultural landscape (Louv, 2008). By connecting adolescents to their local ecosystems through the process of nature journaling, there is hope that many of these trends can be reversed.

Additionally, nature journaling can help develop observation skills, as it requires concentrated attention to detail (Laws & Lygren, 2020; Shipp, 2017; Leslie, 1996). In my experience, students have suddenly noticed the tiniest flowers in the grass and other bits of nature that usually go overlooked. One class found a small toad in a hole on the edge of a sidewalk. Another group of students showed me worm castings in the soil where they eat lunch every day. The castings are always there but were a surprise to the teens. These anecdotes support the research that the close observation required to draw and write during the journaling process can increase attention and memory skills (Hammond, 2002).

It is important to consider the educational benefits of nature journaling as overall verbal and literacy skills in the United States have dropped. College-bound seniors exhibited an 8% drop in

mean SAT verbal scores between 1968 and 2014 (Modern Language Association, 2020). This coincides with drops in reading assessment scores, both nationally and internationally, as the United States now ranks 23 rd in the world in student reading (Modern Language Association, 2020).

○ Environmental Effects

Today's adolescents often feel apathy for their local ecosystems (Louv, 2008). Nature journaling allows students to become familiar with the plants and animals that live near them (McMillan & Wilhelm, 2007; Cormell et al., 2012), with the potential to increase their curiosity about these species (Laws & Lygren, 2020). Furthermore, focusing on the organism provides the context for the other more abstract concepts that are studied in life science (Bartholomew, 1986). The organism is the bridge between molecular and cellular processes, and ecological function and relationships (Bartholomew, 1986). Using journaling as an entry point into the study of natural history provides integration between various standards.

Journaling allows adolescents to see the interactions between the biotic and abiotic factors around them (Warkentin, 2011). Following nature journaling, students' knowledge of their natural environment increases, and they have an overall better understanding of the natural world (Cormell et al., 2012). Nature journaling as a form of place-based education can also encourage sustainable behavior in adolescents (Korach & Myers, 2020). That is, when people make connections to their local environments and know the plants and animals that live there, they are more likely to make conservation-friendly choices to help protect their local ecosystems. Becoming familiar with local landscapes fosters curiosity and helps students feel that they are doing “real” science (Laws & Lygren, 2020), giving meaning and importance to the act of nature journaling. Additionally, journaling increases empathy for the natural world (Warkentin, 2011) and gives adolescents a stronger sense of responsibility for their wild places (McMillan & Wilhelm, 2007).

Nature journaling is an effective tool for place-based learning but is certainly not the only tool. It is thought that children who spend time outdoors become adults who spend time outdoors (Laws & Lygren, 2020; Sobel, 1999). Many of the reported environmental effects of journaling can be found following other types of nature studies and experiential outdoor learning (Louv, 2008). However, the attention to detail necessary to draw the subject in journaling can intensify these environmental effects by requiring a focus that might otherwise be lost by other methods of nature study. A “contagious attitude of attentiveness” (Chawla, 2009) to nature is required for many of these reported outcomes to be actualized. Simply the act of sketching in the field can give adolescents a better appreciation for nature and increase pro-environmental behaviors and attitudes like respecting their local flora and fauna (Merkle et al., 2020).

○ Psychological Effects

Psychologically, adolescents are shown to experience a reduction in stress and anxiety with regular nature journaling (Laws & Lygren, 2020). There has been a significant increase in adolescent depressive symptoms since 2012, after several decades of relatively stable rates (Keyes et al., 2019). It is expected that these increases will continue for many years as a result of the COVID-19 pandemic, as research

has shown a relationship between social isolation, loneliness, and depression and anxiety in teens (Loades et al., 2020). Educators and adults should take notice of nature journaling's promising effects. Spending time outdoors in journaling activities allows adolescents to slow down and "experience awe and wonder" (Laws & Lygren, 2020). As many schools are increasing the use of virtual and blended learning, nature journaling is a great way to get students outside, away from their computers, breathing fresh air, and connecting with nature. While journaling in general, especially gratitude journaling, has been shown to reduce anxiety and depression in teens (Robertson, 2022), the focused attention required of nature journaling may multiply these effects as well as increase mindfulness and help students build a more inclusive culture (Laws & Lygren, 2020). Considering the potential for a reduction in stress and anxiety levels, we could all benefit from a little nature journaling time as we continue dealing with the psychological fallout from social distancing.

Additionally, many adolescents today suffer from "ecophobia," or a fear of their environment and a sense of powerlessness to change things (Sobel, 1999). The cause of this is often a lack of outdoor experiences and exposure to nature (Sobel, 1999). Journaling activities teach adolescents about their local plant and animal species (McMillan & Wilhelm, 2007) and nurture a connection to their natural environment (Laws & Lygren, 2020; Ripa, 2016). It puts the child in control of their natural experiences, returning to them a sense of power (Leslie, 1996). Again, it is unclear whether all these outcomes are the direct result of nature journaling itself or whether they come from the act of spending time outside in nature. However, there is evidence that the concentrated focus required of nature journaling enhances these outcomes even if it doesn't directly cause them (Laws & Lygren, 2020).

○ Implementation

There are many ways that nature journaling can be used within a high school life science or environmental science classroom to actualize the benefits discussed in this article. My recommendation is to start simply. At the beginning of the new school year, basic nature journaling supplies are included in my grade level supply lists. These include a simple composition book, pencils, and colored pencils. I give my students the option to use a small sketch pad or to merely place paper in a folder. The idea is to give students a place to keep their journal entries together without the cost being burdensome.

I find it important to stress to students that they will not be judged on their artistic abilities, but I insist that each journal entry include a drawing. The art of focusing on a subject to sketch is extremely important for achieving many of nature journaling's benefits for students (Laws & Lygren, 2020; Shipp, 2017; Leslie, 1996; Hammond, 2002). For my first lesson, I walk students into the schoolyard and ask them to space themselves apart and to spend 15 minutes in observation completely silent. Students are instructed to then sketch whatever natural subject catches their attention.

For the writing prompt, students must follow the prescription recommended by John Laws (Laws & Lygren, 2020): "I notice..."; "I wonder..."; "It reminds me of..." Additionally, they are encouraged to include the date, time, and a brief note about the weather, as well as sign the page (see Figure 1). Once these tasks are completed, they are free to write or draw anything they would like to include. I find many of my students will make additional drawings and observations, or even take leaves or flowers from the plants

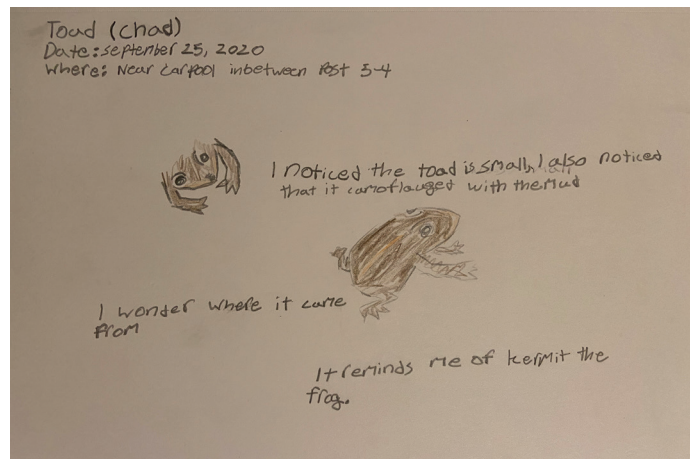


Figure 1. Sample student journal entry.

they draw and press or tape them into their journals. They do this spontaneously, and I am always pleasantly surprised when I examine their entries later. After journaling, a few students are given the opportunity to share if they would like.

I recommend weekly journaling, if possible, especially during seasonal changes. If this is not feasible due to scheduling or bad weather, once or twice monthly is sufficient. I find my students eagerly await journaling and the opportunity to share their finds. Often, I spend these class periods looking up the names of organisms I am unable to identify, or in student-initiated conversations. It would be helpful to have a few local field guides on hand for curious students. The more boisterous often wander away from the group and cherish the quiet time outdoors the most. It has been my experience that students are often calmer and more focused in the classroom for several days after nature journaling classes.

Appendix A, provided in the Supplemental Material available with the online version of this article, lists some suggested nature journaling activities as a starting point for implementation, as well as a sample student journal entry. These lesson ideas are geared specifically toward secondary life science teachers but are easily adapted to other disciplines or grade levels. There are a myriad of other activities, plans, and resources available to teachers who would like to explore using nature journaling in the classroom. Appendix B in the Supplemental Material gives a list of some of these additional resources.

○ Conclusion

Nature journaling is an effective way to ensure students are exposed to nature in a meaningful way. As not all nature experiences are equal, the quality of time spent outdoors in nature is very important when weighing potential benefits. Nature journaling requires focused attention to the subjects being studied. To draw a subject and record observations, time must be spent observing and engaging multiple senses. These aspects of nature journaling make it a meaningful, quality tool to enhance nature education, either incorporated into other nature studies or as a stand-alone activity. This focus on the organism, in turn, provides context for more-abstract life science concepts, and it provides a bridge to integrate the hierarchical levels of biological organization most focused on in school.

For children to develop strong ecological values that will last into adulthood, they must spend a large amount of time outdoors

experiencing nature, ideally under the mentorship of an adult who values the natural world (Chawla, 2009). As an adult who values the natural world and native plants and animals, I recognize these findings as consistent with my own childhood experiences. While only anecdotal, these findings validate my time spent exploring the woods and fields as a child, and the hours I spent walking and talking with my grandfather, a true naturalist with a strong connection to the land. While many of these effects may be replicated with other types of nature activities, nature journaling is an effective, inexpensive, and easily accessible tool to get adolescents outside interacting with their natural spaces and becoming familiar with their local plants and animals. Further, the educational benefits clearly associated with nature journaling provide a pathway to convincing administrators and curriculum writers to return nature education to the classroom, engaging adolescents across the country.

I am passionate about connecting students with their native landscapes and teaching them about the plants and animals that share their spaces. I envision a classroom of the future where students spend as much time outside as in and where they treat the creatures they encounter—snakes, spiders, birds, insects, and plants—with respect. I want a classroom of students interested and curious about their own home places and making conscious choices to protect these ecosystems for the future. Incorporating nature journaling into my classroom is one step toward reaching my goal of teaching my students and other community members to live in harmony with all the native creatures that share our habitats. If we have any hope of saving our environment, our children need to fall in love with nature.

References

- Bartholomew, G. A. (1986). The role of natural history in contemporary biology. *BioScience*, 36(5), 324–329.
- Chawla, L. (2009). Growing up green: Becoming an agent of care for the natural world. *Journal of Developmental Processes*, 4(1), 6–23.
- Community Associations Institute. (2012). *Risk management and insurance for community associations*. <https://www.caionline.org/Advocacy/PublicPolicies/Pages/Community-Association-Risk-Management-and-Insurance.aspx>
- Cormell, J., & Ivey, T. (2012). Nature journaling: Enhancing students' connections to the environment through writing. *Science Scope*, 35(5), 38.
- Eick, C. J. (2017). Use of the outdoor classroom and nature-study to support science and literacy learning: A narrative case study of a third-grade classroom. *Journal of Science Teacher Education*, 23, 7.
- Hammond, W. F. (2002). The creative journal: A power tool for learning. *Green Teacher*, 69, 34–38.
- Keyes, K. M., Gary, D., O'Malley, P. M., Hamilton, A., & Schulenberg, J. (2019). Recent increases in depressive symptoms among US adolescents: Trends from 1991 to 2018. *Social Psychiatry and Psychiatric Epidemiology*, 54(8), 987–996. <https://doi.org/10.1007/s00127-019-01697-8>
- Kiefer, K., Palmquist, M., Carbone, N., Cox, M., & Melzer, D. (2000–2022). *What is writing to learn? An introduction to writing across the curriculum*. WAC Clearinghouse. <https://wac.colostate.edu/resources/wac/intro>
- Korach, J., Herrera, P., & Myers, C. (2020). Linking locally valued plants and places for conservation: Community Baboon Sanctuary, Belize. *Global Ecology and Conservation*, 23, E01065.

- Laws, J. M., & Lygren, E. (2020). *How to Teach Nature Journaling*. Heyday Books.
- Leslie, C. W. (1996). Teaching nature journaling and observation. In C. W. Leslie, J. Tallmadge, & T. Wessels (Authors), *Into the Field: A Guide to Locally Focused Teaching* (pp. 35–57). Orion Society.
- Loades, M. E., Chatburn, E., Higson-Sweeney, N., Reynolds, S., Shafran, R., Brigden, A., Linney, C., McManus, M. N., Borwick, C., & Crawley, E. (2020). Rapid systematic review: The impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *Journal of the American Academy of Child and Adolescent Psychiatry*, 59, 11.
- Louv, R. (2008). *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder* (updated and expanded). Algonquin Books.
- McMillan, S., & Wilhelm, J. (2007). Students' stories: Adolescents constructing multiple literacies through nature journaling. *Journal of Adolescent and Adult Literacy*, 50(5), 370–377.
- Merkle, G. B., Barber, B. R., & Carling, M. D. (2020). Drawn to natural history: Enhancing field courses with drawing and field journal instruction. *Natural Sciences Education*, 49. <https://doi.org/10.1002/nse.2.20019>
- Modern Language Association. (2020). *Language and literacy in the US: Going in the wrong direction*. (Infographic). <https://www.mla.org/content/download/52219/1812312/Infographic-Language-and-Literacy-3.pdf>
- Moore, R. C. (1997). The need for nature: A childhood right. *Social Justice*, 24(3), 203–220.
- Myers, C., Myers, L. B., & Hudson, R. (2009). Science is not a spectator sport: Three principles from 15 years of Project Dragonfly. In R. Yager (Ed.), *Inquiry: The Key to Exemplary Science* (pp. 29–40). NSTA Press.
- NGSS Lead States. (2013). *Next Generation Science Standards: For states, by states. High school life sciences*. <https://www.nextgenscience.org/sites/default/files/HS%20LS%20topics%20combined%206.13.13.pdf>
- Novak, R. (2014). Reading in and through nature: An outdoor pedagogy for reading literature. *Language Arts Journal of Michigan*, 29(2), 11.
- Ripa, A. (2016). *Providing adolescents with outdoor experiences to deepen nature connection and enhance writing in science*. Capstone Research Projects. 2. <https://digitalcommons.usm.maine.edu/teacher-education-capstones/2>
- Robertson, M. (2022). *Journaling as a social-emotional teaching practice to promote mental health*. Honors College at ScholarWorks@BGSU. <https://scholarworks.bgsu.edu/honorsprojects/803>
- Shipp, D. (2017). Observation-focused nature journaling. *Green Teacher*. <https://greenteacher.com/observation-focused-nature-journaling/>
- Sobel, D. (1999). *Beyond Ecophobia: Reclaiming the Heart in Nature Education* (2nd ed.). Orion Society.
- Tewksbury, J. J., Anderson, J. G., Bakker, J. D., Billo, T. J., Dunwiddie, P. W., Groom, M. J., Hampton, S. E., Herman, S. G., Levey, D. J., Machnicki, N. J., Del Rio, C. M., Power, M. E., Rowell, K., Salomon, A. K., Stacey, L., Trombulak, S. C., & Wheeler, T. A. (2014). Natural history's place in science and society. *BioScience*, 64(4), 300–310.
- Warkentin, T. (2011). Cultivating urban naturalists: Teaching experiential, place-based learning through nature journaling in Central Park. *Journal of Geography*, 110(6), 227–238.

JENNIFER BOLLICH is a high school biology and environmental science teacher at STEM Magnet Academy of Pointe Coupee in Pointe Coupee Parish, LA. She received her master of arts in teaching in biological sciences with a focus on conservation through Project Dragonfly, a graduate program of Miami University, Oxford, OH, in December 2022. She can be reached through email at jennifer.bollich@pcpsb.net or jennbollich@gmail.com.