

BACKGROUND INFORMATION FOR PRESENTERS

More on Making Observations

Note: This first section doubles as an optional handout to have staff read and discuss.

Being a careful and attentive observer of the natural world is a characteristic that is universally shared by scientists and naturalists. As Yogi Berra (not a scientist or a naturalist!) famously said, “You can observe a lot by watching.” Observations are the key to intimate understanding of nature. They elicit, first wonder, then curiosity that leads to our most interesting questions, and results in further exploration and investigation.

Making observations does not come naturally or easily to many people, especially those who spend hours each day looking at screens. We are more accustomed to walking through nature trying to see as many different things as possible. We keep walking until we see the next notable thing, and then move on again.

Inspiration from Todd Newberry

Marine Biologist Todd Newberry, whose ethics inspired much of the BEETLES project, says, “Naming and making lists of animals and plants is ‘Glance & Go’ nature watching. It might be a fun sport, but it’s not natural history or science.”

Students need help to develop the skills of observation, and skilled teachers can put them in position to be more successful. First and foremost, observers need to **slow down**. Most things in nature unfold slowly, and as Todd says, “There is almost never a reason not to be slow. Nature will not speed up just because you have arrived.” Most animals, from beetles to bobcats, are startled by the arrival of humans (especially a hiking group of 20 of them), and will do their best not to be seen. People have to slow down and be quiet enough for a long enough time to let these animals recover from the shock of our arrival. For most observations, it also helps to get down low. Many organisms are small and located under or behind rocks, leaves, logs, grass, etc. The most interesting observations are often made while on one’s knees, belly, or back. Observers need to be at eye level with what they are observing. When you’re standing up, you’re at the height of most large predators—and most animals believe their survival depends on not being seen by you. Finally, observers need to get in close. Todd says, “I read the seashore with the lower half of my bifocals.” In order to observe details of structure and behavior, an observer has got to get close enough to really look carefully. Getting close can mean physically close and using, for example, a hand lens, or it can mean getting virtually close by using binoculars, a spotting scope, or a telescope. These tools draw us out of our own world and into the world of the organism we are observing. They open up worlds to us that our own eyes cannot perceive.

Asking Questions and Curiosity

After getting into position, observers need to be armed with questions. Again, Todd Newberry tells us, “Without questions, natural history is a stand-off. You stare at nature and nature just stares back.” This can quickly lead to boredom, and you will hear students say, “I can’t find anything,” or “I need a new tide pool. Nothing is happening in mine.” Questions can overcome boredom, especially if you can get a quick answer back. It’s always easier and more interesting to be in a back-and-forth discussion than to be carrying the whole conversation oneself. So the trick is to find “interview” questions to which the organism itself can “answer” back. These are usually “what, where, and how many” questions, rarely “why and how” questions. The latter are usually unobservable and imponderable in the amount of time an observer has in the field.

Useful “interview” questions for students to ask: What are you doing? How many of you are there? How far apart are you? How far will you travel in five minutes? What else is around you? Are they the same things that are around others like you? Can I draw you? You will be surprised that while you are busy counting or measuring seemingly mundane details, other, unexpected and delightful observations will come to your attention. Many journalists

finish their interviews with, “Is there anything I haven’t asked you, anything that you’d like to tell me about yourself, anything you want to add?” Engaging with nature in this way builds students’ capacity for curiosity.

In *The Laws Guide to Nature Journaling*, John Muir Laws writes, “Curiosity has a critical role in learning. Curious investigation stimulates the reward center in your brain. It triggers the release of dopamine and activates the hippocampus, a brain region involved in forming new memories. As a result, a person in a state of heightened curiosity will learn more easily—and not only about what had caught their attention. Surprisingly, a person in an intense state of curiosity is also primed to absorb unrelated information that they were not innately curious about. Finally, curiosity makes it more likely that you will remember what you have learned (Gruber et al., 2014). Essentially, interest in one thing creates a curiosity vortex that sucks up unrelated material, making it easier to assimilate and remember.”

Observations and Awe

Sharing a sense of awe is a natural team builder. Studies have shown that people who experience awe in nature together are more primed for collaboration. If your program has a focus on team building, it may be interesting to think about how providing students with awe-inducing experiences through making observations can also play a role in creating a collaborative spirit. What a cool gift we can give students by teaching them how to access their own awe-inducing nature experiences in any green spot where they live—becoming intrigued by a tiny organism, or spending time in a sit spot. As one article put it, “... a state of awe, an emotion that, psychologists are coming to understand, can have profoundly positive effects on people...In its wake, people act more generously and ethically, think more critically when encountering persuasive stimuli, like arguments or advertisements, and often feel a deeper connection to others and the world in general. Awe prompts people to redirect concern away from the self and toward everything else. And about three-quarters of the time, it’s elicited by nature.” From the article, “The Science of Awe,” by Jake Abrahamson: http://greatergood.berkeley.edu/news_events/in_the_news_item/the_science_of_awe

Incorporating Writing

“I notice, I wonder, It reminds me of” can be offered as a writing prompt to students who are doing a solo sit or taking reflection time, helping students produce writing rich in detail and meaning. You can also encourage students to turn the process inward and write what they notice they are feeling, what they are wondering about, and what their experience reminds them of. For more information on how to help students generate creative, reflective writing from observation, see *Opening the World Through Nature Journaling*. Free download available from www.johnmuirlaws.com/cnps-curriculum.

Building Environmental Literacy and Connection with Nature

The NAAEE (North American Association for Environmental Education) defines environmental literacy (in part) as follows: “Those who are environmentally literate possess, to varying degrees: the knowledge and understanding of a wide range of environmental concepts, problems, and issues; a set of cognitive and affective dispositions; a set of cognitive skills and abilities; and the appropriate behavioral strategies to apply such knowledge and understanding in order to make sound and effective decisions in a range of environmental contexts. This definition treats the primary elements of environmental literacy—the cognitive (knowledge and skills), affective, and behavioral components—as both interactive and developmental in nature.”

Chawla defines environmental sensitivity as “a predisposition to take an interest in learning about the environment, feeling concern for it, and acting to conserve it, on the basis of formative experiences,” and continues, “Contact with natural areas has emerged as one of the most significant influences in all the studies reviewed, and free encounters with the natural world are becoming inaccessible to more and more young people in the urbanized world.”

Curiosity, other cognitive skills, environmental literacy, and a connection to nature are deepened through meaningful experiences in the outdoors. By bringing children outdoors for extended periods, residential outdoor science programs provide students with unsurpassed opportunities to develop observation skills and curiosity—both of

which components of environmental literacy and sensitivity. This is a signature benefit of these programs that simply cannot be replicated in a classroom. Helping learners become good observers is a fundamental part of that experience, and is a powerful and gratifying educational opportunity available to field instructors.

Observations and the Next Generation Science Standards

If you look at the Next Generation Science Standards Science & Engineering Practices, you might notice that “making observations” is not highlighted as one of the practices of science. Helen Quinn, chair of the National Research Council panel that wrote the Framework for K–12 Science Education on which the standards are based, said that the authors did indeed recognize making observations as a critical science practice, but decided that it was necessary for and implied through several other practices. So even though it’s not listed separately, it’s considered to be a foundation of other practices, and is an important component in the NGSS.

Background on Influential Leaders in Teaching Observation

Dr. Todd Newberry was a founding faculty member in biology at the University of California, Santa Cruz. He is a gifted and thoughtful educator, renowned for his inspirational teaching, as much as for his marine biology research. He has written many articles about teaching and observing, and a delightful book, *The Ardent Birder*, on his approach to helping learners explore the natural world by slowing down, looking closely, and asking good questions. Since his retirement in 1994, Newberry has continued to pursue his lifelong loves of birding and teaching.

Emilie Lygren is a naturalist, poet, author, and outdoor educator. She co-leads workshops with John Muir Laws on making observations, natural history, and field journaling. She is co-author of the curriculum, *Opening the World through Nature Journaling* and the book, *The Laws Guide to Nature Drawing and Journaling* (to be published in 2016). She is also a professional developer and curriculum specialist with the BEETLES project.

John Muir Laws is a trained wildlife biologist, a naturalist, educator, author, artist, and “field journaling evangelist.” His many publications include the books, *The Laws Guide to the Sierra Nevada*, *The Laws Guide to Nature Drawing and Journaling* (to be published in 2016) and the curriculum—*Opening the World Through Nature Journaling*. He teaches many workshops on ways to improve observations, memory and curiosity, conservation biology, natural history, scientific illustration, and field sketching—all while having fun and falling more deeply in love with the world (Johnmuirlaws.com).

Jon Young was inspired by his childhood mentor, tracker, and author Tom Brown, Jr., and has pioneered blending Indigenous mentoring techniques from around the world with the tools of modern field ecology. Under Jon Young’s guidance, Wilderness Awareness School reaches students all around the world with its programs that help people reconnect with their native environments. With Ellen Haas and Evan McGown, he is co-author of the curriculum *Coyote’s Guide to Connecting with Nature for Kids of All Ages and Their Mentors*, and is also the author of *What the Robin Knows*. He teaches at a wide variety of programs in California and around the U.S. (<http://jonyoung.org/>).

Joseph Bharat Cornell is a nature educator in the United States. He wrote the highly influential book *Sharing Nature with Children* in the early 1970s to promote outdoor learning, and since then has published: *Sharing the Joy of Nature: Nature Activities for All Ages*; *Sharing Nature With Children II*; *John Muir: My Life With Nature*; *Sharing Nature Pocket Guide*; *With Beauty Before Me: An Inspirational Guide for Nature Walks*; *Listening to Nature: How to Deepen Your Awareness of Nature*; *Journey to the Heart of Nature: A Guided Exploration*; *Ocean Animals Clue Game*; *Rainforest Animals Clue Game*; *Listening to Nature: How to Deepen Your Awareness of Nature*; *The Sky and Earth Touched Me: Sharing Nature® Wellness Exercises*, and *Sharing Nature: Nature Awareness Activities for All Ages*. Cornell founded the “Sharing Nature Foundation” in 1979 to help his work in promoting nature education. (<http://www.sharingnature.com/index.php>).

“Solar Steve” Van Zandt is a naturalist, director of a residential outdoor science school, credentialed teacher, singer-songwriter, and longtime environmental educator. He is a founder and active member of the beloved Banana Slug String Band which records and performs children’s music about science, nature, and the environment. He has

mentored interns at the San Mateo Outdoor Education program for many years, and leads workshops on “Keeping the Magic Alive” at California environmental education conferences.

Tom Brown Jr. is a naturalist, tracker, survivalist, and author. He grew up in New Jersey and was taught the skills of tracking, wilderness survival, and awareness by his adopted grandfather—a Lipan Apache—until he was 17. He became a professional tracker, and for decades has taught these skills through his “Tom Brown Jr.’s Tracker School” (<https://www.trackerschool.com/>). He’s the author of many books, including *The Tracker*, *The Search*, *Field Guide to Living With the Earth*, and others.

Connections to other BEETLES Sessions

This session, in particular, introduces many foundational ideas that are further elaborated on in other BEETLES sessions. Here’s a brief outline on how to connect this session to other BEETLES professional learning sessions.

Diving into how people learn: *Making Observations* works well as an early exposure to student-centered instruction. It provides practical, easy to use tools instructors can use right away, and it begins dialogue about pedagogical issues without getting too deep into theory. *Constructing Understanding* goes more deeply into conceptual frameworks and how we learn. *Teaching & Learning* provides a practical “learning cycle” model for structuring learning experiences based on what is known from research about teaching and learning.

Diving into observations and explanations: *Field Journaling with Students* gives practical activities to use with students to encourage them to make better observations through journaling. *Evidence & Explanations* takes observations and questions, then delves into making explanations from evidence.

Diving into questions and exploration: The *Questioning Strategies* session delves into the different impacts on students and learning caused by different kinds of questions, and what kinds of questions encourage or discourage exploration and thinking.