Encouraging Neurodiversity in Conservation: Sensory Friendly Events for Neurodivergent Children

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Summary

There is a disparity of representation of neurodivergent individuals employed in fields they love, including conservation fields. My Community Leadership Challenge seeks to reduce this disparity by supporting the conservation science interests of local neurodivergent children and youth by forming connections with like-minded peers and building their confidence in pursuing their interests. I plan to achieve this by starting with Sensory-Friendly park programming.

Introduction

Community conservation goals are best achieved with a diversity of voices at the table. While this concept is becoming more and more prominent in today's society, there are many groups that have been - and still are - underrepresented in community decision making and the workforce in general. One of the most prominent groups that remains underrepresented in conservation careers are those that fall under the umbrella of "neurodivergent." Neurodivergent refers to an atypical pattern of thought or behavior due someone's developmental, intellectual, or cognitive abilities. This usually includes those on the autism spectrum, but this term is also used for those with ADHD, dyslexia, and other cognitive disorders. Someone who is not neurodivergent is referred to as "neurotypical," and I identify as such.

There is evidence to suggest that neurodivergent individuals - especially those who are autistic - have an elevated interest in Science, Technology, Engineering, and Math (STEM) topics compared to other groups (Baron-Cohen & Wheelwright, 1999; Jordan & Caldwell-Harris, 2012; Wei et al., 2013). At the same time, this group of people find themselves employed at much lower rates and/or later in their adult lives than their neurotypical peers (Roux et al., 2015; Pesce, 2019). This disparity indicates that it is disproportionately difficult for neurodivergent individuals to find employment in the interests that they love and to find avenues to contribute to improving their communities through their work. Fortunately, there are programs that have shown to be effective in combating the exclusion of neurodivergent children and youth from pursuing STEM dreams by allowing them to explore their interests with peers similar to them in setting that encourages conducting projects outside of the mold of neurotypical ways of thinking (Dunn et al., 2015; Martin et al., 2020). Through connecting neurodivergent youth and

children and youth around their common interests in conservation science and building their confidence in building their future careers, I hope to increase representation of neurodiversity in my local conservation organizations for the net benefit of all community members and our natural spaces.

Goals and Objectives

Through my Community Leadership Challenge, my primary goal is to increase the confidence of neurodivergent youth in my community in pursuing their interests in conservation careers through Sensory-Friendly park programs. “Sensory-Friendly” is becoming a common term used by informal education organizations and art venues to reflect experiences that reduce sensory stimuli that are shown to have disproportionately negative impacts on neurodivergent guests, especially those on the autism spectrum. By coming together with peers of similar interests and neurotypes, I hope to foster connections between program participants - as well as their caregivers - to build support networks that will last outside of the events that I lead. My objective is to reach at least 5 local families and see a change in their level of feelings of connectedness to nature and how often they want to visit the park before and after participating in the program. With repeated program offerings like this overtime, I aim to contribute to decreasing the employment disparity between neurotypical and neurodivergent community members in conservation fields.

Project Details

Approach: I conducted two Sensory-Friendly water lab programs this September for neurodivergent youth at Lake James State Park where I work as a Park Ranger, and hopefully more once the school year begins. These programs - called “Wonderful World of Water” - were repeat events of the same activities. They took place on Thursday, September 21 at 10am-11:30am and Saturday, September 23 2023 from 5:30pm-7pm in the Visitor Center classrooms of Lake James State Park in Nebo, NC. To promote the programs, I reached out to community members through neighborhood social media groups, in addition to posting flyers in the park’s campgrounds the week the programs were to take place. Also, my division was so excited about the new offering, they promoted the events on the state’s North Carolina State Parks and Recreation Facebook account (see Appendix I). To my disappointment, I did not

receive any attendees. I do not see my CLC as a complete failure because I still have the program curriculum I developed (see Appendix II) as well as the support of my employer to continue to pursue offering Sensory-Friendly programming.

Audience: The program was intended for children ages 6-10 years old who identify as neurodivergent in the greater Morganton, NC community who are interested in conservation science. As a secondary audience - and realistically, the audience to whom I promoted the program - I wanted to engage with their caregivers. The Thursday, September 21 session was intended as an option for homeschooled children while the Saturday, September 23 option was for anyone, especially campers, who may want to join but would benefit from doing so after the Visitor Center had closed to the public for the day.

Collaborators: I worked with my employer, Lake James State Park, to host the main events. I also collaborated with NC State Parks' website manager, Kris Anne Bonifacio.

Evaluation: For the Sensory-Friendly lab event, I had an optional pre-program and post-program survey available for participants to complete related to the participants prior feeling of connection to nature and how often they come to Lake James State Park. The questions I included were as follows:

- Pre-Program Survey:
    a. How often do you come to Lake James State Park? (On a scale of 1-5; 1=Almost Never; 2=A Few Times a Year; 3=Every 2-3 Months; 4=Every Month; 5=Almost Every Week).
    b. How connected do you feel to nature? (On a scale of 1-5; 1=Not At All; 2=A Bit; 3=Somewhat; 4=Mostly; 5=Extremely).
- Post-Program Survey:
    a. How likely are you to come back to Lake James State Park? (On a scale of 1-5; 1=Not At All Likely; 2=I'd Think About It; 3=Somewhat Likely; 4=Likely; 5=Extremely Likely).
    b. How connected do you feel to nature because of this program? (On a scale of 1-5; 1=Not At All; 2=A Bit; 3=Somewhat; 4=Mostly; 5=Extremely).

Had I received any attendees that participated in the survey, I would have measured my success by the number of participants that answered the post-program questions with a higher number than in the corresponding pre-program questions.

Leadership Reflection

As mentioned above, despite promotion efforts I did not receive any participants to either session of my offered program. Unlike some other parks in the NC State Park system, Lake James traditionally has a low community interest in ranger-led programming. I believe that this has largely been due to a lack of awareness of available programming in my community as well as minimal efforts to promote programs on the part of the park itself. This is something that I intend to change as I become more settled into my role and gain confidence in stepping up as a leader for education programs on my team. No matter what, I still have the curriculum for the program that I developed (see Appendix II) as well as approved funding for building a Sensory-Friendly toolkit that can be utilized in all programs. My Superintendent and the education coordinators in my division are very excited about this new avenue of programming that we can continue to refine and offer to advance our diversity, inclusion, and equity goals.

I believe that the main goals of leaders should be to support and uplift the people around them. Good leaders put themselves in a mentorship position for those they lead over maintaining power and authority. I believe that the command-and-control style of leadership is more likely to lead to power struggles that are counterproductive to achieving long-term success as a team or community, as opposed to the transformational leadership and systems-thinking approaches that seek to work collaboratively with teams to achieve change (Black et al., 2011). Leaders should strive to be partners with their teammates in achieving personal and collective growth that will have lasting impacts for their shared goals. This is the kind of leader that I strive to be.

Although I have been a leader in a management capacity in my former career, the leadership style that I have been growing into through my new role as a park ranger and through this CLC is very different than I am used to. I have become accustomed to being the manager in charge of a team and asking my teammates for their support and ideas in moving our goals forward. Now, I'm on the other side of decision making and find myself trying to lead from the

bottom-up. I'm the one putting forth my ideas and garnering support for moving in new directions - and I'm very grateful for a team that encourages me to do so. This experience has taught me much about what I need to do within my specific community to make change happen - be a positive presence, be patient but persistent, and don't give-up when things don't go according to plan.

Sources

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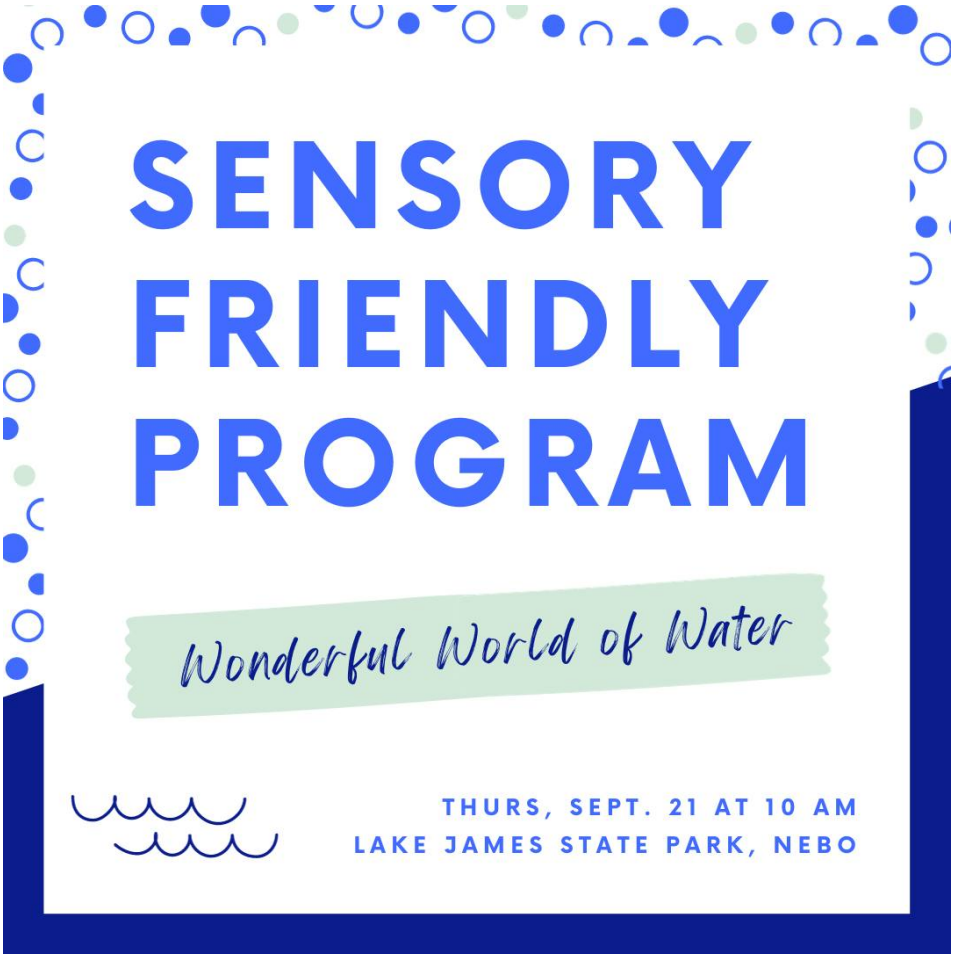
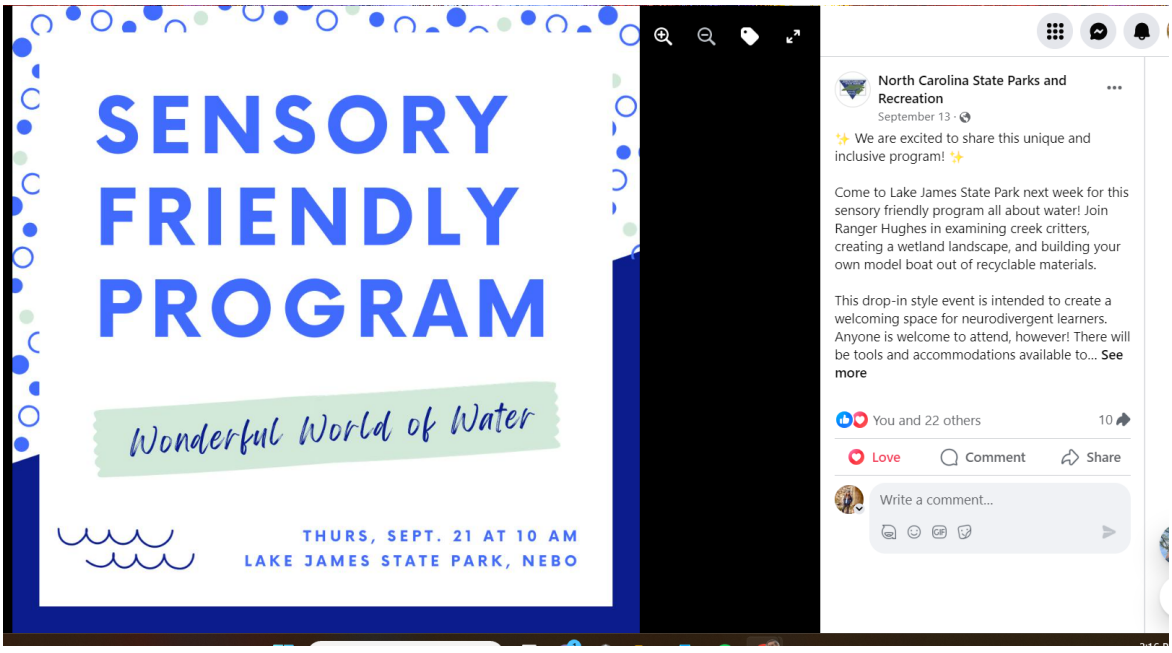
Appendix I - North Carolina State Park Facebook Promotion





Appendix II - Program Curriculum

Wonderful World of Water (Sensory-Friendly)

Grades 2-5
1.5 hours lab

Adapted from Mercer Slough curricula in Fall 2023 (Jenny Hughes)

Class Description

Overview: In this stations-style lab, students get hands-on experience searching for and catching Aquatic Macroinvertebrates from the pond samples. Using a video microscope to look closer at each Macro, students record their observations for sharing just like real naturalists. Students also learn what wetlands are and why they are an important ecosystem to protect, and they will practice water engineering skills with stream tables and recyclable boat building.

Marketing: Join Ranger XXXX in the nature lab at the new Visitor Center to explore the wonderful world of water! Examine creek critters in a video microscope, create a wetland landscape, and build your own model boat out of recyclable materials. This will be a drop-in style, **sensory-friendly*** event – come at any time and stay as long as you like between XX-XX. All children must be accompanied by an adult. Best for 2^{nd}-5^{th} grade.

***Sensory-friendly** events are intended to create a welcoming space for neurodivergent (autistic, ADHD, etc.) learners. However, anyone is welcome to attend. There will be tools and accommodations available to reduce the impact of adverse light and sound. If you have specific suggestions for best supporting your learner, please reach out to XXXX.*

Classroom Setup

If running this as a drop-in style lab, have simple instructions on how to do each station, as well as a final product example so you don't have to try to be everywhere at once.

As a sensory-friendly session, artificial overhead light should be off if possible, utilizing natural light. If not possible, keep lights as dim as reasonable, or bring in floor lamps for more pleasant lighting. Have directional signage to direct families around to the back classroom entrance if they want to avoid walking through the exhibit space. Have a sensory toolkit available, including noise-dampening headphones, sunglasses, sand timers, fidgets, and magnifying glasses for participants to borrow. Also designate one area of the classroom as a quiet "take a break" zone. Cushions would be ideal in this area, if available.

The stream tables and boat building station should be set up just outside the classroom doors to avoid ruining the classroom carpets. Be sure to have a note about rinsing sandy hands in buckets rather than the sink to avoid stubborn clogs.

North Carolina Science Standards

- LS.1.1 Understand the basic needs of a variety of plants and animals in different ecosystems.
- ESS.1.2 Understand the physical properties of Earth materials.
- LS.2.1 Understand animal life cycles.
- LS.4.1 Understand the effects of environmental changes, adaptations, and behaviors that enable organisms to survive in changing habitats.
- ESS.4.3 Understand changes caused by human impact on the environment.
- LS.5.2 Understand the interdependence of plants and animals within their ecosystem.

Lab: Adaptation Artistry

5-10 minutes

North Carolina Science Standards:

- LS.2.1 Understand animal life cycles.
- LS.4.1 Understand the effects of environmental changes, adaptations, and behaviors that enable organisms to survive in changing habitats.
- LS.5.2 Understand the interdependence of plants and animals within their ecosystem.

Learning Objectives:

- Adaptations are features of a creature that help it survive in its habitat.

Materials:

- Felt shapes (variety of colors and sizes)
- Felt board (optional)
- Instruction sheet

Process:

- Provide students a pile of different felt shapes.
- With these shapes, they need to make a creature, it can be real, or made up.
- They need to figure out how this creature: moves, eats, and protects itself.
- Have students/groups share their creations after they are done.
    - Explain to whole group
    - Explain to partner
    - Explain to adult
    - Etc.

Lab: Aquatic Explorations

20-30 mins

NC Science Standards:

- LS.1.1 Understand the basic needs of a variety of plants and animals in different ecosystems.
- LS.2.1 Understand animal life cycles.
- LS.4.1 Understand the effects of environmental changes, adaptations, and behaviors that enable organisms to survive in changing habitats.
- LS.5.2 Understand the interdependence of plants and animals within their ecosystem.

Learning Objectives:

- Students will see real macroinvertebrate organisms from the park water habitats and be able to identify them.

Materials:

- Aquatic searching kits (spoons, bug boxes, petri dishes, etc.)
- Macro Bins
- ID Sheets
- Magnifying Glasses
- Naturalist notes worksheet
- Pre-collected water samples and creek critters

Process:

- Begin by giving an overview of the three parts of this exercise. (It is recommended to write these three stages up on the board so students can follow along and will know which step they are on)
    - Explore
    - Observe
    - Share
- Tell them they will have time to explore their own bin for any organisms that they find.
- They will need to catch the organisms and save them in their containers to observe and share them later.
- After exploring, they will be able to observe their organism. They can use magnifying glasses or microscopes, or they can watch the ranger use the video microscope in the next activity.
    - While students are making observations, see which organisms they are most excited about at their table. Share some fun facts about the organism, or help them find it in an ID guide to learn more on their own.
- After observing their organisms, they will then get to have a bug convention. Choose one person at your table to go around and see other tables and what organisms they found! Make sure that two people are at your table to show off what you found!
- Make sure to rotate so everyone gets a chance to go around and see what was caught.

Lab: Bug TV

5-15 minutes

NC Science Standards:

- LS.1.1 Understand the basic needs of a variety of plants and animals in different ecosystems.
- LS.2.1 Understand animal life cycles.
- LS.4.1 Understand the effects of environmental changes, adaptations, and behaviors that enable organisms to survive in changing habitats.
- LS.5.2 Understand the interdependence of plants and animals within their ecosystem.

Learning Objectives:

- Students will be able to see invertebrates up close for better identification.

Materials:

- Collected invertebrates.
- Video Microscope
- Naturalist notes worksheets
- Coloring tools
- Invertebrate info cards

Process:

- **Set up**
  - When it is time for Bug TV, bring out the video microscope and tablet.
- **Explore!**
  - One by one, show the bugs on the screen. Ask folks if they learned anything cool they want to share about this organism. It could be from observing or from the bug convention!

Lab: Stream Tables

15-30 minutes

NC Science Standards:

- ESS.4.3 Understand changes caused by human impact on the environment.
- LS.5.2 Understand the interdependence of plants and animals within their ecosystem.

Learning Objectives:

- Students will practice the engineering design process of design-test-redesign
- Students will be able to observe the process of erosion and ways to prevent it in a model

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Materials:

- Laminated design example sheets (4)
- Design Outline Sheets on Rite in the Rain paper
- Colored pencils, or grey pencils
- Stakeholders/Challenges
- Stream Beds (2)
- Water Buckets (2)
- Hand Washing Buckets (1)
- Bin of building materials (2 – various water-safe modeling materials and/or nature finds)
- Watering Can (2)
- Water pumps (2 – if available)

Process:

1. **Research**
    - As engineers, the first step for you to do is your research and design.
    - Talk about how wetland soils are like sponges. Look at photos of streambeds that have been engineered. Ask prompting questions that will get students thinking about ways/reasons to incorporate these solutions into their designs.
2. **Design**
    - Now give them time to design their streambeds.

- Ask questions of their streambeds like:
    - What engineering methods are you implementing?
    - Are you considering erosion?
    - What will happen if it rains?
    - Are you using the natural landscape or changing the natural landscape?
    - After they are done designing their streambeds, they can test their streambeds

3. Educators may want to introduce Stakeholders/Challenges at this point in the process.
4. Have them go over to the streambeds and begin building their models according to their design.
5. Give them enough time to fully model their design, but be watchful as sometimes if given too much time, they can turn it into a destructive challenge.
6. After they have all had enough time to design their models, it is time to test. Turn the

water on (or use a watering can) and have them observe what happened.
7. Add in rainwater with your watering can to increase failures.
8. Have them record observations of their designs, places that failed. We want to watch their models fail, because failure shows us where we need to improve!
9. After they have found failures, let them research solutions and re-design their models.
10. Go through this process one last time so everyone has had at least two chances to design their models.
11. Some educators may want to test before presentations, or test after presentations, it is up to you.

Lab: Float Your Boat

10-20 minutes

NC Science Standards:

- ESS.1.2 Understand the physical properties of Earth materials.

Learning Objectives:

- Students experiment with designs for buoyant vessels.

Materials:

- Junk bin (recyclable materials)
- Tape, scotch (1)
- Tape, duct (1)
- Scissors, child (4)
- Water bins (2)
- Rocks, varying sizes (10)

Process:

1. **Set up activity** – have a bin of various recyclables (junk bin) available for building materials. Have buckets of water set up on tarps in an accessible but well monitored place in the room, or out on the back patio of the classroom.
2. **Build a buoyant vessel** – Challenge the campers to build a vessel that will float while carrying a rock using the recyclables.
3. **Test** – As the campers finish their vessels, allow them to take turns testing their vessels in the buckets of water, one person at a bucket at a time. Make sure the campers are sharing rocks for testing – they can keep the vessel they build, but the rocks are not ours to keep and will be returned to nature.
4. **Debrief** – Ask the students what worked well in their designs and what could be improved.

Background:

- *Buoyancy* (also known as the *buoyant force*) is the force exerted on an object that is wholly or partly immersed in a fluid.
    - As a vector it must be stated with both magnitude and direction.
        - Buoyancy acts upward for the kind of situations encountered in everyday experience.
    - As with other forces, the SI unit of buoyancy is the newton [N].
- Buoyancy is caused by differences in pressure acting on opposite sides of an object immersed in a static fluid.
    - A typical situation:
        1. The pressure on the bottom of an object is greater than the top (since pressure increases with depth).

2. The force on the bottom pushes up and the force on the top pushes down (since force is normal to the surface).
3. The direction of the net force due to the fluid is upward.

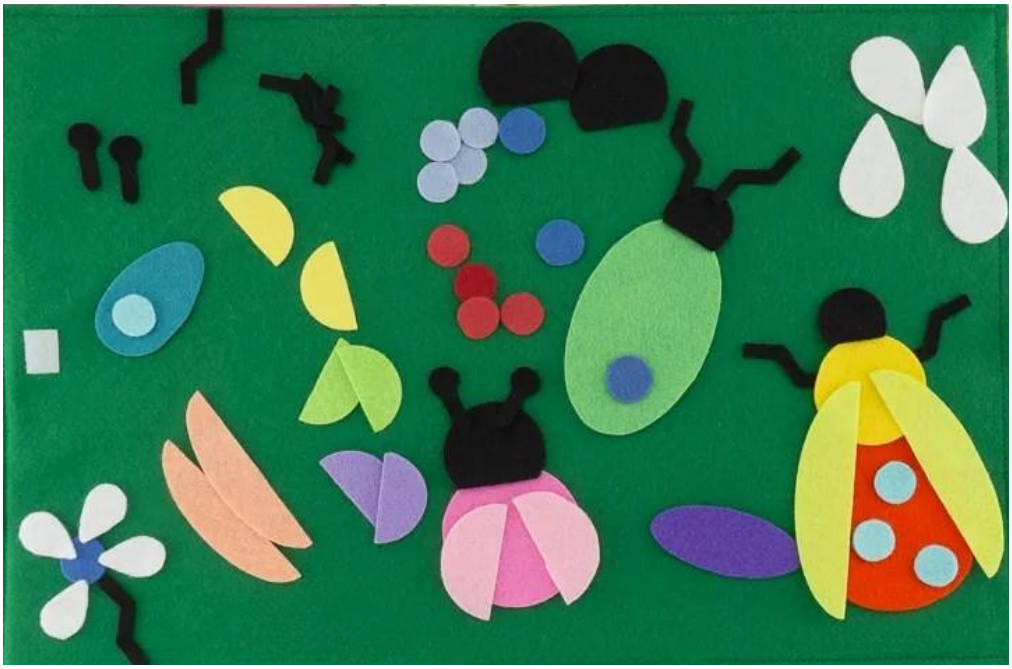
Source: https://physics.info/buoyancy/summary.shtml

Curriculum Appendix
Station Instruction Sheets and Wayfinding Signs

Create a Critter

Use the felt shapes to make up your own animal, insect, or plant. Think about:

- How does it move?
- How does it eat?
- How does it protect itself?



Creek Critters Search

Search for macroinvertebrates from Paddy's Creek using the "scientific scoopers!" have a ranger help you use the video microscope.

These spoons are for science – NOT FOR EATING

Naturalist Observations

Draw your creature here

I observe that…

This reminds me of…

I wonder…

Design a Stream

- Think about how you want the water to flow, and plan how you will build your town.
- Keeping the sand in the tray, carve out a stream shape and place your town around it.
- Slowly, pour water at the top of your stream. How does the sand move? Is your town safe? How can you make it better?
- Now try a new design!

Float your Boat

- Use the materials to create your own boat.
- Place it in the water. Does it float?
- See how many rocks you can place in your boat without it sinking.
- Can you change your boat design so it carries more rocks?