Science Interns: Increasing Students' Knowledge of NM Wildlife
Final Report

Project Objective

The goal of the Science Interns Project is to increase scientific understanding and leadership skills for thousands of New Mexico elementary school students. This grant from the Share with Wildlife program allowed the Asombro Institute for Science Education to (1) create a new science education module on New Mexico wildlife, (2) teach the hands-on lessons to 643 5th grade students (159 supported by the Share with Wildlife grant), and (3) empower these 5th graders to become Science Interns and share their new knowledge by teaching 1,122 younger students at their schools.

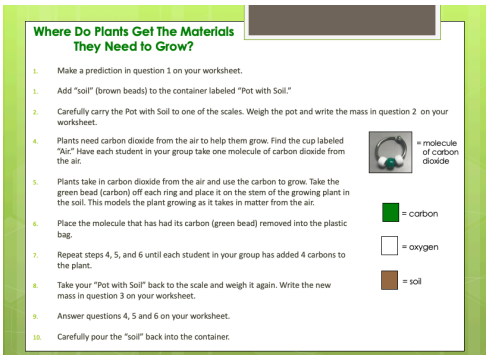
Project Activities

1) Development of a new Science Interns module on the Chihuahuan Desert Food Web and Species Conservation: In spring 2018, Asombro Institute for Science Education staff, with the assistance of local scientists, developed a new, four-lesson module for the Science Interns project. The module focuses on a Chihuahuan Desert food web that includes the gray vireo (*Vireo vicinior*), a SGCN found in Doña Ana County. Each interactive lesson aligns with one or more Next Generation Science Standard (NGSS) for 5th grade.

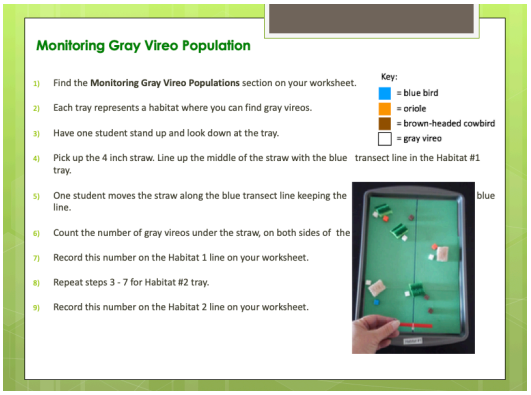
- Lesson 1: Playa Food Web (*NGSS 5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers and the environment*): To engage students at the beginning of the lesson, students are shown "mystery animals" (tadpole shrimp) to observe in small groups. They speculate about the biome where the animal lives and what type of animal it is. After a few minutes of careful observation, we complete a guided reading of One Day in the Desert, which tells the story of Mariana, a student in Las Cruces who goes on a field trip to the Chihuahuan Desert Nature Park. Students record information on desert plants and animals highlighted in the book, and on page 22, they "discover" that their mystery object is a tadpole shrimp that lives in playas in the Chihuahuan Desert. Students then work with Asombro staff to assemble a simple food web from the Chihuahuan Desert that includes the tadpole shrimp, the gray vireo, and 10 other species. The food web goes on a trifold board that remains in the 5th graders' classroom. They use this new knowledge to construct a more sophisticated definition of a food web as a way to depict the movement of matter among plants, animals, and decomposers.

- Lesson 2: A Closer Look at the Movement of Matter in a Food Web (*NGSS 5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water and 5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers and the environment*): This lesson focuses on two parts of the food web that are generally less well known to students: plants and decomposers. As a review, this lesson begins by engaging students in a physical game to track movement of matter and energy among the species they were introduced to in the first lesson. Each student gets one of four species cards (mesquite, grasshopper, gray vireo, bacteria), and

they use pom-poms to move the "matter" around the food web. Then, students work in small groups with a model of growing plants. They follow a task card (pictured at right) to understand that plants grow by taking in carbon from the air (not from the soil). Small groups are also rotated to the front of the room to work with an Asombro staff member to see photosynthesizing spinach taking in carbon dioxide (as measured with a CO_2 sensor and data logger). Finally, students focus on decomposers by examining slides of decomposers using slide viewers.



- Lesson 3: Gray Vireo Conservation *(NGSS 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment*): Each pair of students receives a gray vireo species card, which describes what the species eats and what eats it. They use this to create a simple food chain as a review of the concepts we covered in lessons 1 and 2. For the rest of the lesson, students pretend to be scientists working at the New Mexico Department of Game and Fish. Their first task is to learn about the natural history of the gray vireo using natural history pages Asombro staff put together based on information from the Status Report and Biological Review of the Gray Vireo in New Mexico (DeLong and Williams, 2006) and the Gray Vireo Recovery Plan (Pierce, 2007). Students' second task is to conduct a survey of gray vireo populations using a model we created with baking trays representing different habitats and beads representing gray vireos. Students are introduced to walking transects as a sampling method. Finally, students create a recovery plan. They are given 10 different strategies that might go into the plan (e.g., create a gray vireo recovery team to share information, create a plan to educate the public about gray vireos, bring some gray vireos to the Albuquerque Zoo to try to get them to reproduce). Each strategy has a different resource point score, roughly scaled to the cost and effort of each strategy. Students work in teams to decide which strategies to use given a limited number of total resource points. They discuss trade-offs and quickly recognize that there are not enough resources to implement all strategies. Students present their plan and then compare it to the actual Gray Vireo Recovery Plan.



- Lesson 4: Preparation to Teach**:** This lesson focuses on getting 5th grade Science Interns ready to teach younger students. Teachers put students into six teams; two teams prepare to teach each of the three mini-lessons, which are focused on (1) food webs, (2) playas, and (3) decomposers. All three mini-lessons cover concepts and use tools, materials, and species that students have already used in one of the first three lessons. Students make teaching plans (including goals) and clarify their understanding of the

science. In the last 15 minutes of class, each group has two minutes to get up in front of the 5th grade class and practice the beginning of their mini-lessons.

2) Scientific Reviews, Pilot Testing, and Revision of New Module: In summer and early fall semester of 2018, Asombro staff received feedback on the new module from 5th grade teachers and the NM Department of Game & Fish Conservation Education Coordinator (Kevin Holladay) and Share with Wildlife Coordinator (Virginia Seamster). We revised the module lessons based on suggestions and then pilot tested the full module in three 5th grade classes. Each lesson went through additional modifications based on these pilot tests.

3) Implementation of New Science Interns Module and Another Topic Module: During the 2018/19 school year, the new module was implemented with 27 classes of 5th graders (8 supported by this Share with Wildlife grant, 16 supported by a grant from a private foundation to the Asombro Institute, and 3 supported by a school):

School	District	Number of Classes	Number of 5th Graders
Columbia Elementary	Las Cruces	3	75
Hillrise Elementary	Las Cruces	4	97
J. Paul Taylor Academy	State Charter	1	23
Holy Cross School	Private	1	24
Mesilla Park Elementary *	Las Cruces	3	72
Monte Vista Elementary	Las Cruces	4	110
Riverside Elementary *	Gadsden	5	87
Sunrise Elementary	Las Cruces	6	155
TOTALS		**27 classes**	**643 students**

* Classes supported by the grant from Share with Wildlife

Each of the 27 classes of 5th graders participated in two, four-lesson units: an existing unit on matter and the new unit on the Chihuahuan desert food web and species conservation. At the end of each module, 5th grade Science Interns taught mini-lessons for each module to one or more classes of younger students at their school. A total of 1,122 younger students participated in lessons taught by Science Interns.

4) Formative and Summative Project Evaluation: Several formative and summative evaluation tools allowed us to assess achievement of three main project goals:

- Goal 1: Enhance science understanding, especially about New Mexico wildlife, for approximately 1,500 students (500 Science Interns and 1,000 younger students).
- Goal 2: Promote a sense of empowerment and responsibility to 500 5th grade students.
- Goal 3: Increase the amount of time 1,500 students engage in hands-on science activities.

Embedded evaluation in each lesson allowed Asombro staff members to assess student understanding of each project topic and adjust teaching as needed to meet student needs. For example, at the beginning of Lesson 2 of the Chihuahuan Desert Food Web and Species Conservation module, students participate in a physical game to track movement of matter and

energy around four species they were introduced to in Lesson 1. Their understanding of food webs is easy to gauge as they participate in and discuss this game; Asombro staff intervene to clarify any misperceptions before moving on to the next activity.

Asombro staff also gave anonymous teacher evaluation forms to each 5th grade teacher. Twenty forms were returned, and results show teachers' appreciation for and assessment of the lessons:

Assessment Item	**Average Score (0 = very strongly disagree to 10 = very strongly agree)**
My students increased their science content knowledge.	**9.8**
My students can better use scientific practices.	**9.8**
My students are more excited about science.	**10**
Asombro educator(s) interacted well with students.	**10**
I want to participate in future Asombro programs.	**10**

Teachers were asked, "How can Asombro improve our programs?" Responses included:

- "With only 3 centers, it creates big groups when my students are teaching other classes. Maybe one more center, so groups are smaller and everyone can see and participate better!"
- "Everything was great!"
- "They are great the way they are."
- "I love Asombro the way it is!"
- "I love everything about Asombro!"
- "I have no improvement ideas."
- "More time allowed to see some of these concepts in the outdoors."
- "I wish we could have presentations for all grade levels at least once a year."
- "Make it longer (more days)."
- "In my opinion, everything worked out fine."
- "Students really enjoyed the hands on science experiments. This is the best way for students to learn about science. Thank you."

Jessica Tarin, a 5th grade teacher at Columbia Elementary School in Las Cruces wrote a letter to Asombro expressing her enjoyment of the Science Interns program and especially the new module developed with support from the NM Department of Game and Fish. Her letter is attached to this report.

For More Information, Please Contact:

Dr. Stephanie Bestelmeyer, Executive Director
Asombro Institute for Science Education

January 16, 2019

To Whom It May Concern:

My name is Jessica Tarin and I am a 5th grade teacher at Columbia Elementary. I just wanted to write and say how much I enjoyed the Asombro program this year with my 5th graders. They were part of the intern program and really enjoyed teaching our 3rd graders. As someone who finds science a little difficult to teach at times, since it is not my strongest subject I found these lessons very informative and engaging at the same time.

There was one lesson in particular that I found very interesting that had to deal with NM Game and Fish. I have always taught the transference of matter though food webs, but I have never had the opportunity to connect it to a lesson where they would implement it into something that is connected to NM the way Asombro did. I was telling Ms. Rink my uncle is the Commissioner for AZ Game and Fish, so when I saw this lesson it gave me an opportunity to understand what Game and Fish really is and the issues they need to try and solve. Now I can carry a conversation with my Uncle about his job and understand what it details.

I don't mean to carry on, but I just don't see science programs like these very often so I wanted to write and say that this program is amazing I hope to continue working with Asombro in the future. Ms. Rink has been great with my class and they enjoy her so much they wanted her to come observe their teaching day to the 3rd graders. Thank you for working with Columbia this year and we are excited for our Field Trip there in February.

Sincerely,

Jessica Tarin