

THE HERP PROJECT

Results of the Post-Survey of Science Attitudes, Interests, and Experiences SUMMER 2013

PREPARED FOR

The HERP Project
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EXECUTIVE SUMMARY

The HERP Project, Herpetology Education in Rural Places & Spaces, is an informal science education project based at the University of North Carolina Greensboro, led by Principal Investigators Catherine Matthews, Ann Somers and Heidi Carlone. Cooperating university partners include Elon University (PI Terry Tomasek) and the University of North Carolina Pembroke (PI Andy Ash). The HERP Project has several threads including residential summer science programs for high school students and teachers, called *Herpetological Research Experiences* or HREs. The purpose of HREs is to expose participants to ecological fieldwork by engaging in a variety of field science projects related to local reptile and amphibian species.

As part of the evaluation of students' experience at HRE's, students completed a survey at the end of the HRE experience that asked about the impact of their experience. Findings are noted below.

- **Analyses indicate that students enjoyed HREs greatly and that they impacted students' understanding of, and affinity for, science and what scientists do.** Pre-post comparisons of mean ratings indicate that Elon students' ratings changed the most in these areas, with more students seeing science as interesting and important and recognizing that they too could think like a scientist or be a good scientist. Rockfish students indicated the least change in ratings overall.
 - Overall, CCR students indicated a higher degree of increase in interest, confidence, and knowledge of science, although students at Elon indicated a greater increase in interest in participating in other science experiments.
 - Despite these positive findings, students across all HREs showed the smallest increase in terms of their desire to find a science-related job or career.
- **HRE students provided high ratings in response to questions about the degree to which participating in the HRE made them feel more confident, aware of strengths and weaknesses, and generally more aligned to science.**
 - CCR and Elon students' ratings indicate that they are more interested in taking care of the environment and believe that they have a good future ahead of them.
 - Elon students also rated high items about connection to living things / local environment and curiosity about nature.
 - Despite this, Elon students' mean rating for the item about being good at science or a related field was the lowest (3.60).
- When asked to indicate to what degree participating in the HRE made them feel like it is possible to do such things as be like a scientist or be seen as smart at science, **students' mean ratings were highest for the items about using what they know about science outside of school, contributing to science, and teaching others about amphibians and reptiles.**
 - Despite these ratings, students from Rockfish and Elon, in particular, rated low their ability to talk like a scientist and start a science hobby.
 - Elon students also rated low their ability to help friends get good grades in science and join a science-related club or group.

- **Ratings of interest and learning with respect to the various activities in which students participated were very high for Snakes, Aquatic Turtles, Stream Salamanders, Frogs of the Piedmont, as well as Ephemeral Pools (CCR) and the Lizards Project (Rockfish).**
 - CCR students seemed to both enjoy and learn more participating in Box Turtles with Dogs than students at the other two HREs.
 - Students who participated in night hikes seemed to enjoy it greatly although they rated it slightly lower in terms of learning, as was true for Herp Photography (Rockfish).
 - CASP was also well-received, especially at CCR.
 - Typical reasons why students rated some activities lower than others are included that activities involved too much lecture (and thus were "boring") or provided very little learning.
- **Most electives were rated quite high except for the Council of All Beings, Photo Journalist Project, and Student Documentaries (Rockfish).**
- **Ratings of HERPS instructors across four dimensions were very high, with all ratings above 4.50.**
- **Students' comments with respect to using Android devices to enter data were mixed, with some students really enjoying being able to enter data electronically and others finding it frustrating.** Students who are used to using hand-held technologies seemed to find the Android devices relatively easy to use.
- **Students across all HREs noted multiple positive aspects of their experiences.** Typical responses included being able to touch the amphibians and reptiles, being involved in hands-on learning activities, meeting new people with similar interests in science, and for some, overcoming their fear of herps.
- **When asked what they would change about the HRE, many students wanted the camp to be longer or thought it was great the way it is.** Some students chafed at the camp rules they had to follow, others wanted more time for electives such as swimming, a few students noted that other students appeared to be uninterested in herpetology, and some were not clear as to what their role and other adults' roles were.

Recommendations are as follows:

- Continue to provide hands-on opportunities where students engage in data collection and learning.
- Ensure that students are actively engaged when they can be.
- Review the purpose of involving local science teachers and what their role is.
- Review the application project and consider ways to ensure that only students who want to come are selected to attend.

PROJECT OVERVIEW

The HERP Project, Herpetology Education in Rural Places & Spaces, is an informal science education project based at the University of North Carolina Greensboro, led by Principal Investigators Catherine Matthews, Ann Somers and Heidi Carlone. Cooperating university partners include Elon University (Principal Investigator Terry Tomasek) and the University of North Carolina Pembroke (Principal Investigator Andy Ash). The HERP Project is funded by the National Science Foundation and was created to provide opportunities for the general public, high school students and middle and high school teachers to learn about and collect scientific data on common native species of reptiles and amphibians in local habitats. One component of The HERP Project are residential summer science programs for high school students and teachers, called *Herpetological Research Experiences* or HREs. HREs are designed to expose rising 9th through 12th graders to ecological fieldwork by engaging in a variety of field science projects related to local reptile and amphibian species. HREs are free to all participants thanks to funding from the National Science Foundation.

Three HREs were held in the summer of 2013, one each at Chestnut Ridge Camp and Retreat Center (CCR), Rockfish Camp and Retreat Center (Rockfish), and Elon University (Elon). Chestnut Ridge Camp and Retreat Center is located on a 365-acre tract of eastern deciduous forest at a North Carolina Environmental Education Center near Hillsborough, North Carolina. Since 2007, PIs we have spent one week each summer and six follow-up days later in the year collecting and sharing data on local populations of reptiles and amphibians. As part of this HRE, held June 9-14, students follow Boykin Spaniel dogs through woods and fields to find box turtles, wade through wetlands at night to catch and identify calling frogs, walk in puddles and small vernal pools to study local salamander species, check traps for new and recaptured aquatic turtles, examine snakes that cross their paths, and have a great time outdoors.

Rockfish Camp and Retreat Center is nestled on 486 acres in the Sandhills region of North Carolina, at the intersection of Hoke, Cumberland, and Robeson counties. Students at this HRE, held July 14-19, conduct herpetological fieldwork or project work in small groups, initiating new studies on box turtles, aquatic turtles, vernal pools, frogs, lizards, and snakes. Evenings feature instruction on outdoor photography and other topics connected to herpetological and outdoor education. Participants have the opportunity to study the snakes, frogs, lizards, turtles, and salamanders that live, breed, feed and move through mixed forests and wetlands.

The Elon HRE is conducted at Elon University near Burlington, North Carolina as part of the Elon Academy Program. This HRE is only available to Alamance County students who have been accepted into the Elon Academy. The Elon Academy accepts approximately 26 academically promising Alamance County students with a demonstrated financial need and/or no family history of college. Alamance County students apply for the Elon Academy program during their freshman year in high school. Students accepted into the Elon Academy program select from a variety of courses, taking 3 courses during a 4-week summer session. Students in the Elon Academy HRE learn how to identify common frogs, salamanders, lizards, turtles and snakes; spend time in the forest, stream, vernal pool, and lake engaged in science investigations, and engage in lab activities such as dissecting snakes.

Following the summer HRE, optional Saturday and/or weekend field trips are provided free of charge to HRE participants during the academic year and include trips to various areas such as the

mountains and ocean to further study herps. Additionally, students may attend herpetological meetings or other herp-related activities at museums and nature centers throughout the state.

EVALUATION

To better understand the impact of HREs on students, including their interest in science, use of Android apps to enter data collected on herps, and overall experiences, the PIs worked together with the evaluator to develop a post-survey that was provided to all HRE students. The post survey included both Likert-type or rating questions and open-ended questions. Responses were entered into Excel and analyzed using quantitative and qualitative methods. Results are provided below.

FINDINGS

Affinity for Science

As part of this survey, students were asked to indicate their level of agreement to multiple statements about science in general "thinking to before this week, and now, after participating in the HRE", using the scale of 1 = "Not at all" to 5 = "Very likely". Table 1 shows the mean retrospective pre ratings by HRE. Note that items in red are negatively worded so low agreement ratings are more desirable.

In general, Elon students indicated the least affinity to science and for scientists, possibly reflecting that the Elon Academy is not specifically science-oriented - even though some classes offered to students are in science, other classes are in humanities. CCR and Rockfish students show a similar affinity for science and scientists.

Table 1. Pre Agreement Ratings (Retrospective) about Science and Scientists

	CCR	Rockfish	Elon
I think science is interesting.	4.00	4.24	3.71
Science is important to me.	3.79	4.21	3.29
I am good at science.	3.79	3.79	3.57
I think I could be a good scientist.	3.55	3.68	2.93
I think like a scientist.	3.72	3.78	2.64
Scientists have a chance to make a difference in the world.	4.45	4.41	4.07
Science helps people.	4.41	4.52	4.00
Scientists spend most of their time working alone.	2.31	2.28	2.71
Scientists don't have many other interests.	1.90	1.62	2.43
There are lots of jobs available in science.	3.72	4.07	3.64
Scientists' work is not influenced by their own opinions.	2.90	3.07	2.50
Scientists have to work hard.	4.30	4.24	4.00
Science is a highly respected career.	4.07	4.00	3.50
You have to be a genius to be a scientist.	2.00	2.29	2.86
Scientists have to go to school for many years.	3.52	3.25	3.93
Scientists do not have many friends.	1.75	1.71	2.29

Scientists spend most of their time working indoors or in labs.
 There is not a lot of room for creativity in science.

2.45	2.32	3.07
2.07	2.61	2.71

Post ratings again indicate affinity for science and scientists, with Elon students' ratings much more positive.

Table 2. Post Agreement Ratings about Science and Scientists

	CCR	Rockfish	Elon
I think science is interesting.	4.52	4.54	4.53
Science is important to me.	4.48	4.54	4.27
I am good at science.	4.24	4.29	4.13
I think I could be a good scientist.	4.17	4.07	3.67
I think like a scientist.	4.21	4.04	3.40
Scientists have a chance to make a difference in the world.	4.72	4.71	4.67
Science helps people.	4.66	4.86	4.53
Scientists spend most of their time working alone.	1.61	2.00	1.60
Scientists don't have many other interests.	1.55	1.50	1.53
There are lots of jobs available in science.	4.41	4.32	4.33
Scientists' work is not influenced by their own opinions.	3.28	2.82	2.80
Scientists have to work hard.	4.56	4.64	4.57
Science is a highly respected career.	4.38	4.50	4.27
You have to be a genius to be a scientist.	1.83	1.89	1.80
Scientists have to go to school for many years.	3.14	3.54	3.40
Scientists do not have many friends.	1.15	1.25	1.33
Scientists spend most of their time working indoors or in labs.	1.86	1.96	2.13
There is not a lot of room for creativity in science.	1.62	2.25	1.87

Pre-post comparisons of mean ratings indicate that Elon students ratings changed the most with students seeing science as interesting and important and recognizing that they too could think like a scientist or be a good scientist. Rockfish students indicated the least change in ratings overall.

Table 3. Differences in Retrospective Pre-Post Agreement Ratings about Science and Scientists

	CCR	Rockfish	Elon
I think science is interesting.	0.52	0.30	0.82
Science is important to me.	0.69	0.33	0.98
I am good at science.	0.45	0.50	0.56
I think I could be a good scientist.	0.62	0.39	0.74
I think like a scientist.	0.48	0.26	0.76

Scientists have a chance to make a difference in the world.

Science helps people.

Scientists spend most of their time working alone.

Scientists don't have many other interests.

There are lots of jobs available in science.

Scientists' work is not influenced by their own opinions.

Scientists have to work hard.

Science is a highly respected career.

You have to be a genius to be a scientist.

Scientists have to go to school for many years.

Scientists do not have many friends.

Scientists spend most of their time working indoors or in labs.

There is not a lot of room for creativity in science.

0.28	0.30	0.60
0.24	0.34	0.53
-0.70	-0.28	-1.11
-0.34	-0.12	-0.90
0.69	0.25	0.69
0.38	-0.25	0.30
0.26	0.40	0.57
0.31	0.50	0.77
-0.17	-0.40	-1.06
-0.38	0.29	-0.53
-0.60	-0.46	-0.95
-0.59	-0.36	-0.94
-0.45	-0.36	-0.85

Students were also asked to indicate on a scale of 1= "Not at all" to 5 = "To a great degree", to what degree participating in the HRE *increased* such things as their knowledge, confidence, and connection to science. Overall, CCR students indicated greater interest, confidence, and knowledge of science, although students at Elon indicated a greater increase in their interest in participating in other science experiments. Despite these positive findings, students across all HREs showed the least increase in terms of their desire to find a science-related job or career, where mean ratings ranged from 3.60 (Elon) to 4.03 (Rockfish).

Table 4. Degree of Increase in Science-Related Areas Based on Participation in HRE

	CCR	Rockfish	Elon
Knowledge of science?	4.45	4.24	4.07
Confidence in doing science?	4.41	4.29	4.07
Interest in science?	4.41	4.14	4.33
Interest in nature?	4.52	4.38	4.20
Ability to use scientific tools?	4.59	4.17	4.27
Interest in participating in other science experiences?	4.48	4.31	4.60
Understanding of threats that reptiles and amphibians face?	4.45	4.45	4.40
Connection to nature?	4.41	4.45	4.33
Empathy for animals?	4.34	4.41	4.47
Awareness of careers in science or related fields?	4.31	4.21	4.00
Connections to people in science or related fields?	4.59	4.14	4.20
Understanding of what people do in science-related jobs or careers?	4.55	4.24	4.13
Desire to find a science-related job/career?	3.97	4.03	3.60

Next, students indicated on a scale of 1= "Not at all" to 5 = "To a great degree", the degree to which participating in the HRE made them feel more confident, aware of their strengths and weaknesses, and generally more aligned to science. Across all HREs, students provided high ratings in response to these questions, with mean ratings ranging from 4.00 to 4.73. CCR and Elon students' ratings indicate that they are more interested in taking care of the environment and believe that they have a good future ahead of them. Elon students also rated high items about connection to living things / local environment and curiosity about nature. Despite this, Elon students' mean rating to the item about being good at science or a related field was the lowest (3.60).

Table 5. Degree to Which Participation in the HRE Made Students "Feel"

	CCR	Rockfish	Elon
Confident to try new things?	4.21	4.31	4.40
Like a science person?	4.28	4.28	4.07
More aware of your strengths and weaknesses?	4.38	4.41	4.27
Brave?	4.38	4.17	4.53
Interested in taking care of the environment?	4.62	4.45	4.73
That you have a good future ahead of you?	4.59	4.31	4.60
That you could be good at science or a related field?	4.38	4.21	4.00
Connected to living things in my local environment?	4.38	4.24	4.60
Curious about nature?	4.48	4.48	4.67
Successful?	4.48	4.52	4.60

Students were also asked to indicate on a scale of 1= "Not at all" to 5 = "To a great degree", to what degree did participating in the HRE make them feel like it is possible to do such things as be like a scientist or be seen as smart at science. Students mean ratings were highest for the items about using what they know about science outside of school, contributing to science, and teaching others about amphibians and reptiles. Despite these ratings, students from Rockfish and Elon, in particular, rated low their ability to talk like a scientist and start a science hobby. Elon students also rated low their ability to help friends get good grades in science and join a science-related club or group.

Table 6. Degree to Which Participation in the HRE Made Students Feel "They Could"

	CCR	Rockfish	Elon
Think like a scientist?	4.31	4.14	4.00
Talk like a scientist?	4.24	3.86	3.53
Teach others about reptiles and amphibians?	4.38	4.17	4.47
Be seen as smart in science?	4.31	4.24	3.93
Help your friends get good grades in science next year?	4.21	3.97	3.60
Use what you know about science outside of school?	4.66	4.43	4.67
Study science in college?	4.24	4.21	3.80
Contribute to science?	4.39	4.31	4.40

Think about joining a science-related club or group?

4.00 4.03 3.67

Start a science hobby?

4.07 3.69 3.57

Activity and Elective Ratings

Table 7 depicts students' ratings of interest and learning with respect to the various activities in which they participated. Ratings used a scale of 1 (Low) to 5 (High). Snakes, Aquatic Turtles, Frogs of the Piedmont, as well as Ephemeral Pools (CCR) and the Lizards Project (Rockfish) received high ratings in interest and learning. CCR students seemed to both enjoy and learn more participating in Box Turtles with Dogs than students at the other two HREs. Stream Salamanders was also rated high, especially among students at Elon. Students who participated in night hikes seemed to enjoy it greatly although they rated it slightly lower in terms of learning, as was true for Herp Photography (Rockfish). CASP was also well-received, especially at CCR.

Table 7. HRE Activities: Ratings of Interest and Learning

	CCR		Rockfish		Elon	
	Interest	Learning	Interest	Learning	Interest	Learning
Box Turtles with Dogs	4.44	4.30	4.00	3.79	3.93	3.80
Ephemeral Pools	4.37	4.33	NA	NA	NA	NA
Snakes Project	4.50	4.25	4.41	4.21	4.36	4.40
Aquatic Turtles	4.61	4.29	4.68	4.48	4.38	3.93
Stream Salamanders	4.00	3.89	4.25	4.10	4.54	3.46
Night Hike	4.07	3.61	3.90	3.62	NA	NA
CASP	3.96	4.08	3.56	3.70	NA	NA
Frogs of the Piedmont	4.08	4.32	3.90	4.25	4.21	4.07
Tree Pythons	3.71	3.44	NA	NA	NA	NA
Herp Photography	NA	NA	4.31	3.83	NA	NA
Lizards Project	NA	NA	4.68	4.34	NA	NA

Typical reasons why students rated some activities lower than others are included that activities involved too much lecture (and thus were "boring") or provided very little learning:

- CASP - I just didn't find simply listening entertaining. I would have rather searched for them. The night hike was fun but we pretty much just used it to get to know each other.
- Box Turtle with Dogs taught me nothing about turtles.
- The CASP was hard to listen to individual frogs and the Frogs of Piedmont was boring and just unexciting.
- Jeff Hall was long and boring. His presentation didn't catch my attention.
- Box turtles was a lot of walking but not much learning.
- Mr. Jeff Hall played so many sounds I could only remember little of them and the night walk did not teach me much.
- For box turtles with dogs we never found any box turtles, so we didn't have the opportunity to see a box turtle.

As is shown below, most electives were rated quite high on a scale of 1 (Low) to 5 (High), except for the Council of All Beings, Photo Journalist Project, and Student Documentaries (Rockfish).

Table 8. HRE Electives: Ratings of Interest

	CCR	Rockfish	Elon
Herp Dissection	4.60	4.24	4.43
Snake Skinning	4.82	4.62	4.50
Nature Jewelry	4.45	4.14	4.25
Evening Ephemeral Pool Field Trip	4.06	NA	NA
Drawing & Making Models	4.50	4.25	4.38
Lizard Lassoing	4.00	4.27	4.83
Costume & Mask Making	NA	3.89	NA
Council of All Beings	4.11	3.29	NA
Photo Journalist Project	4.20	3.13	4.17
Student Documentaries	4.31	3.00	4.00

Instructor Ratings

As part of the survey, students were asked to rate the Herps instructors across four dimensions:

- Ability to help them understand information presented;
- Ability to make what they learned interesting;
- Ability to make learning activities enjoyable; and
- Ability to answer questions.

All ratings were above 4.50 on a scale of 1 (Low) to 5 (High). As can be seen, Elon students rated their instructor quite high (4.80-4.93), possibly reflecting that they spent four weeks working with one major instructor.

Table 9. Instructor Ratings

	CCR	Rockfish	Elon
Ability to help you understand information presented	4.62	4.57	4.93
Ability to make what you learned interesting	4.72	4.56	4.80
Ability to make learning activities enjoyable	4.79	4.50	4.93
Ability to answer your questions	4.66	4.68	4.87

Use of Androids

Students were asked to comment on using the Android devices to record herpetological information. Comments were mixed, with some students really enjoying being able to enter data electronically and others finding it frustrating. Students who are used to using hand-held technologies seemed to find the Android devices relatively easy to use. Typical comments are noted below:

- The phones wouldn't work well and it made everything like writing data frustrating.
- It was pretty good except sometimes the app on the android would act up and exit out. That was annoying.
- My experience using the Android device was pretty much easier than using pen and paper. It was better and much easier considering I always use technology.
- I enjoyed being able to fill in data and learn how I should fill in data.
- I think it was helpful and fun in providing insight about newer technology and how it can be used for science.
- I've never used iPads, Androids, or any type of Smartphone. I didn't know how easy it is to use.
- It was more interesting using them than just paper and pencil.
- Filling in data electronically was very interesting because I got to experience something that scientists actually do once they capture an animal.
- I thought that was a neat way to process data. Something I can use outside of camp.
- It was complicated but once we got the hang of it was fun.
- It was better than writing on the paper.
- Androids were cool.
- I had never done data collection on something like that and it was pretty easy.
- It was frustrating. There were limitations to what you could put both for measurements and general info.

Best Aspects of HREs

Students across all HREs noted multiple positive aspects of their experiences. Typical responses when asked what they liked best included being able to touch the amphibians and reptiles, being involved in hands-on learning activities, meeting new people with similar interests in science, and for some, overcoming their fear of herps.

- I liked the fact that I learned in a fun way because instead of learning and sitting in a classroom we actually got outside and learned hands-on. I also really enjoyed all of the people that helped/participated with it.
- Meeting new people that enjoyed science just like me. And learning so much more about different species and learning how to mark them and check if it's a re-capture.
- I got to learn and see animals I had never seen before. It was great.
- I enjoyed very much being able to work with professionals that were able to teach me so much about what I love most.
- Being an SRA. Because everyone looked to me because of my age. They felt more comfortable.
- Overcoming my fears and meeting new people and doing new things.
- I love how although this is my 2nd year, they made this place still seem like a new adventure, giving me yet another insight about the world around me.
- Working with people with similar tastes. Normally in school and out of school it is difficult to find other teens with similar interests but here everyone had some common interests.
- The projects were pretty cool. I like that I wasn't as scared. This experience made me a lot more brave. And I tried things I would never have tried before.

- I really enjoyed how the counselors and staff tried to make a connection with me and how they made me feel like I fit in, in order for me to learn better and understand more information.
- I made a lot of new friends who like herps just like me and I will never forget this summer trip.
- I enjoyed getting over a really big fear of mine and finding a new favorite animal, the green anole!

Suggested Changes

When asked what they would change about the HRE, many students wanted the camp to be longer or thought it was great the way it is. Some students chafed at the camp rules they had to follow (such as never being alone or early bedtimes) and others wanted more time for electives such as swimming. A few students also noted that other students appeared to be uninterested in herpetology and that negatively impacted other students. In addition, one student wrote, "I think that it might be better if it had a little more focus on students. The teachers did do a good job, but a few times I was left with no role." whereas an SRA commented, "I would have given the SRAs a more definitive role." Typical comments are shown below:

- I would change the policy on going to bed so early because I would like time to talk with my friends and more social time between everyone.
- Nothing! It's great the way it is!
- I would change the acceptance policy and make it a more strict filtration process, maybe cut down the number of participants because many did not want to be there or were complaining often and it made it difficult for others to learn and have fun.
- I would still love it if we could have more days with this amazingsness. 7 days still didn't feel long enough.
- I would like another week because it was very enjoyable and that way we could learn more.
- The pre-test and test because it takes the fun and enjoyment out of the camp.
- Waking up as early because it is summer.
- I might make it longer, because I'm not ready to stop attending.
- I would not change a thing, because they made this week great.
- I would probably not change anything. I had an enjoyable time in the herpetology research experience.
- I think that it might be better if it had a little more focus on students. The teachers did do a good job, but a few times I was left with no role.
- The tests and long presentations cause it's boring but I appreciate it because I learned a lot.
- Give the children more elective time.
- Many kids here had no desire or interest. In the selection process, more sway should be given to passion and less to ethnicity.
- I would not change anything. Teachers, SRAs, counselor, and instructors were awesome! This is a great program!
- That the kids be more into what they're doing because when they aren't it hinders learning.
- Nothing - it was the most fun I've had in forever.
- I would say less notes but overall a great time.

- I would change nothing. I enjoyed it. This class helped me develop bravery. I would have never imagined myself holding a snake. This class made that image come true.

Additional Comments

Additional comments were generally a mix of students requesting to be allowed to come back next year as Student Research Assistants (SRAs), thanking everyone who supported their HRE experience, and suggesting that HREs run longer than 5 days.

- This is, without question, the most fun and interesting, and informative thing I have ever participated in. Thank you!!
- Dr. Matthews and everyone: Please let me come back for a third year! I love this place and all that it has to offer. Two years wasn't enough to fulfill my curiosity! Pretty pretty please!
- I was pleased at what was done with the SRAs. I felt like an important part of the group and could help teach but didn't have too much resting on my shoulders.
- I would like to say that this experience was one of a kind and I would like to say thank you.
- I had a ton of fun and hope to be able to come back as an SRA.
- I definitely want to return again as an SRA next year. It was a blast. :)
- I'm going to miss everyone.
- Herps should last longer than 5 days (10-15) maybe.
- You should make more programs like this because it is very fun and interesting.
- This is an excellent program and I will definitely come next year.
- Thank you for helping me overcome a piece of my fear of snakes and teaching me so much. You helped me keep and look forward to going into a field of science.
- I loved this class. I feel courageous.

SUMMARY AND DISCUSSION

Analyses indicate that students enjoyed HREs greatly and that they impacted students' understanding of, and affinity for, science and what scientists do, with more students seeing science as interesting and important and recognizing that they too could think like a scientist or be a good scientist. In response to questions about the degree to which participating in the HRE *increased* such things as their knowledge, confidence, and connection to science, CCR students indicated the greatest increases in interest, confidence, and knowledge of science, although students at Elon indicated a greater increase in interest to participate in other science experiments. Despite these positive findings, students across all HREs showed the least increase in terms of their desire to find a science-related job or career.

Across all HREs, students provided high ratings in response to questions about the degree to which participating in the HRE made them feel more confident, aware of their strengths and weaknesses, and generally more aligned to science. CCR and Elon students' ratings indicate that they are more interested in taking care of the environment and believe that they have a good future ahead of them. Elon students also rated high items about connection to living things / local environment and curiosity about nature. Despite this, Elon students' mean rating to the item about being good at science or a related field was the lowest (3.60).

Students' responses regarding the degree to which participating in the HRE made them feel like it is possible to do such things as be like a scientist or be seen as smart at science were highest for the questions about using what they know about science outside of school, contributing to science, and teaching others about amphibians and reptiles. Despite these ratings, students from Rockfish and Elon rated low their ability to talk like a scientist and start a science hobby. Elon students also rated low their ability to help friends get good grades in science and join a science-related club or group.

Ratings of interest and learning with respect to the various activities in which students participated were highest for Snakes, Aquatic Turtles, Frogs of the Piedmont, Stream Salamanders, Ephemeral Pools (CCR), and the Lizards Project (Rockfish). CCR students seemed to both enjoy and learn more participating in Box Turtles with Dogs than students at the other two HREs. Students who participated in the night hike seemed to enjoy it greatly although they rated it slightly lower in terms of learning, as was true for Herp Photography (Rockfish). CASP was also well-received, especially at CCR. Typical reasons why students rated some activities lower than others are included that activities involved too much lecture (and thus were "boring") or provided very little learning. Most electives were rated quite high except for the Council of All Beings, Photo Journalist Project, and Student Documentaries (Rockfish).

In terms of using Androids to enter data, some students enjoyed this opportunity whereas others found it frustrating. Comments seemed to correlate with the degree to which students are familiar with Androids as students who are used to using hand-held technologies seemed to find the Android devices very intuitive.

Students' ratings of Herps instructors across four dimensions (ability to help them understand information presented; ability to make what they learned interesting; ability to make learning activities enjoyable; and ability to answer questions) were very high, with all ratings above 4.50. Given this, it is not surprising that when asked what they would change about their HRE, many students wanted the camp to be longer or thought it was great the way it is. Additional comments again suggest that instructors did a fantastic job as comments were generally a mix of students requesting to be allowed to come back next year as Student Research Assistants (SRAs), thanking everyone who supported their HRE experience, and suggesting that HREs run longer than five days.

Students across all HREs noted multiple positive aspects of their experiences including being able to touch the amphibians and reptiles, being involved in hands-on learning activities, meeting new people with similar interests in science, and for some, overcoming their fear of herps. When asked what they would change about the HRE, many students wanted the camp to be longer or thought it was great the way it is. Some students chafed at the camp rules they had to follow (such as never being alone or early bedtimes) and others wanted more time for electives such as swimming. A few students also noted that other students appeared to be uninterested in herpetology and that had a negative impact on their own experiences and some wanted the roles of adults and SRAs versus students more clearly defined.

Recommendations

Based on these findings, as well as observations by the evaluator who attended HREs, the following are recommendations for next year:

- Continue to provide hands-on opportunities where students engage in data collection and learning. In addition, review activities where students are less involved to consider ways in which they can more actively participate.
- Ensure that students are actively engaged when they can be. A student at CCR, a SRA at Rockfish, and one of the adults leading HRE activities made comments suggesting that roles were not very clear. At both CCR and Rockfish there were almost as many adults involved in activities as students, which made it easy for students to just hang out if they wanted or may have made them less likely to participate if they were shy and someone else was already involved. It also seemed at times to put the SRA in competition with adults as to who was supporting activities and in many cases students were not clear as to whom they should be paying attention.
- In relation to the above recommendation, review the purpose of involving local science teachers and what their role is. Observations at HREs and discussions with students and other adults indicate that few of the local science teachers were actively involved with their groups or in activities.
- Review the application process and consider ways to ensure that only students who want to come are selected to attend. Three survey responses by students (one at CCR and two at Rockfish) were about students attending the HREs who were not interested in herpetology or science in general. At Rockfish the evaluator heard similar comments as well as that some students arrived with no idea what the HRE was about. Students with negative attitudes make it hard for other students to enjoy or show their enjoyment of the opportunities presented to them in HREs.

APPENDIX

1. Post-Survey of Science Attitudes, Interests, and Experiences: Camp Chestnut Ridge
2. Post-Survey of Science Attitudes, Interests, and Experiences: Rockfish
3. Post-Survey of Science Attitudes, Interests, and Experiences: Elon

Camp Chestnut Ridge

1. Please indicate your level of agreement to the following statements about science in general, thinking to before this week and now, after participating in the HRE. [Scale: 1 = Not at all, 5 = Very likely]

	Before participation in the HRE					Now					Gain
	n	Min.	Max.	Mean	sd	n	Min.	Max.	Mean	sd	
I think science is interesting.	29	2	5	4.00	1.00	29	3	5	4.52	0.74	0.52
Science is important to me.	29	1	5	3.79	1.29	29	1	5	4.48	0.95	0.69
I am good at science.	29	2	5	3.79	1.01	29	2	5	4.24	0.79	0.45
I think I could be a good scientist.	29	1	5	3.55	1.24	29	1	5	4.17	1.10	0.62
I think like a scientist.	29	1	5	3.72	1.22	29	1	5	4.21	1.01	0.48
Scientists have a chance to make a difference in the world.	29	1	5	4.45	1.09	29	1	5	4.72	0.80	0.28
Science helps people.	29	1	5	4.41	1.09	29	1	5	4.66	0.97	0.24
Scientists spend most of their time working alone.	29	1	5	2.31	1.34	28	1	5	1.61	1.03	-0.70
Scientists don't have many other interests.	29	1	5	1.90	1.37	29	1	5	1.55	1.09	-0.34
There are lots of jobs available in science.	29	2	5	3.72	1.00	29	2	5	4.41	0.87	0.69
Scientists' work is not influenced by their own opinions.	29	1	5	2.90	1.23	29	1	5	3.28	1.44	0.38
Scientists have to work hard.	27	2	5	4.30	0.82	27	2	5	4.56	0.70	0.26
Science is a highly respected career.	29	1	5	4.07	1.16	29	2	5	4.38	0.82	0.31
You have to be a genius to be a scientist.	29	1	5	2.00	1.20	29	1	5	1.83	1.17	-0.17
Scientists have to go to school for many years.	29	1	5	3.52	1.09	29	1	5	3.14	1.30	-0.38
Scientists do not have many friends.	28	1	5	1.75	1.17	27	1	2	1.15	0.36	-0.60
Scientists spend most of their time working indoors or in labs.	29	1	5	2.45	1.43	29	1	5	1.86	1.27	-0.59
There is not a lot of room for creativity in science.	29	1	5	2.07	1.46	29	1	5	1.62	1.12	-0.45

2. To what degree did participating in this herpetology research experience increase your: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Knowledge of science?	29	3	5	4.45	0.63
Confidence in doing science?	29	3	5	4.41	0.78
Interest in science?	29	1	5	4.41	0.98
Interest in nature	29	3	5	4.52	0.69
Ability to use scientific tools?	29	3	5	4.59	0.63
Interest in participating in other science experiences?	29	2	5	4.48	0.87
Understanding of threats that reptiles and amphibians face?	29	2	5	4.45	0.91
Connection to nature	29	2	5	4.41	0.82
Empathy for animals?	29	1	5	4.34	1.20
Awareness of careers in science or related fields?	29	2	5	4.31	0.93
Connections to people in science or related fields?	29	3	5	4.59	0.63
Understanding of what people do in science-related jobs or careers?	29	3	5	4.55	0.57
Desire to find a science-related job/career?	29	1	5	3.97	1.24

3. To what degree did participating in this herpetology research experience make you feel: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Confident to try new things?	29	1	5	4.21	1.05
Like a science person?	29	3	5	4.28	0.84
More aware of your strengths and weaknesses?	29	2	5	4.38	0.78
Brave?	29	1	5	4.38	0.90
Interested in taking care of the environment?	29	3	5	4.62	0.68
That you have a good future ahead of you?	29	1	5	4.59	0.91
That you could be good at science or a related field?	29	1	5	4.38	0.90
Connected to living things in my local environment?	29	3	5	4.38	0.73
Curious about nature?	29	2	5	4.48	0.87
Successful?	29	2	5	4.48	0.78

4. To what degree did participating in this herpetology research experience make you feel like it is possible for you to: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Think like a scientist?	29	2	5	4.31	0.89
Talk like a scientist?	29	2	5	4.24	0.83
Teach others about reptiles and amphibians?	29	3	5	4.38	0.68
Be seen as smart in science?	29	2	5	4.31	0.85
Help your friends get good grades in science next year?	29	2	5	4.21	0.86
Use what you know about science outside of school?	29	3	5	4.66	0.61
Study science in college?	29	1	5	4.24	1.15
Contribute to science?	28	3	5	4.39	0.74
Think about joining a science-related club or group?	29	1	5	4.00	1.34
Start a science hobby?	29	1	5	4.07	1.10

5. Please indicate on a scale of 1 (I learned very little) to 5 (I learned very much) how much you learned by participating in the following activities. [Scale: 1 = I learned nothing at all, 5 = I learned very much]

	n	Min.	Max.	Mean	sd
Box Turtles with Dogs	27	3	5	4.30	0.82
Ephemeral (vernal or temporary) Pools - CCR	27	1	5	4.33	1.07
Snakes Project	28	1	5	4.25	1.11
Aquatic Turtles	28	1	5	4.29	1.08
Stream Salamanders	27	1	5	3.89	1.19
Night Hike (first night)	28	1	5	3.61	1.37
CASP	25	1	5	4.08	1.00
Frogs of the Piedmont (Jeff Hall)	28	1	5	4.32	1.02
CCR - Tree Pythons	18	1	5	3.44	1.34
Rockfish - Herp Photography	12	1	5	2.92	1.73
Rockfish - Lizards Project	12	1	5	2.83	1.53

6. Please indicate on a scale of 1 (Very uninteresting) to 5 (Very interesting) how interesting you found participating in the following activities. [Scale: 1= Very uninteresting, 5 = Very interesting]

	n	Min.	Max.	Mean	sd
Box Turtles with Dogs	27	2	5	4.44	0.75
Ephemeral (vernal or temporary) Pools - CCR	27	1	5	4.37	1.11
Snakes Project	28	1	5	4.50	1.00
Aquatic Turtles	28	1	5	4.61	0.92
Stream Salamanders	27	1	5	4.00	1.18
Night Hike, First Night	27	1	5	4.07	1.07
CASP	27	1	5	3.96	1.09
Frogs of the Piedmont (Jeff Hall)	26	1	5	4.08	1.13
CCR - Tree Pythons	17	1	5	3.71	1.31
Rockfish - Herp Photography	11	1	5	2.91	1.70
Rockfish - Lizards Project	11	1	5	3.09	1.58

7. For any activities you rated as a 1 or 2 (relatively uninteresting), please provide an explanation for that rating:

- The night hike because we didn't know each other yet, so we didn't talk much.
- I loved all the activities. Most of them on there I didn't do because of being an SRA, but still loved it.
- I didn't learn these things.
- I wasn't at Rockfish, so I don't really know what happened.
- Snakes - we didn't really find anything - was alright - not too bad.
- SRAs didn't do those.
- CASP - I just didn't find simply listening entertaining. I would have rather searched for them. The night hike was fun but we pretty much just used it to get to know each other. Every other 1 or 2 I don't remember doing.
- Night hike because I did not go on it because it was optional.
- The stream salamanders - we didn't catch anything and they talked a lot.
- We didn't do a lot of actual doing. I guess there was a lot of talking.
- I didn't have any that I rated badly.
- I didn't find the ephemeral pools that interesting because I have done things similar. I didn't like photography that much.
- Because there was a lot of talking and I like to do things hands-on.

8. Please tell us about your experience filling in data using the iPads and Android devices.

- The phones wouldn't work well and it made everything like writing data frustrating.
- It was pretty good except sometimes the app on the android would act up and exit out. That was annoying.
- My experience using the Android device was pretty much easier than using pen and paper. It was better and much easier considering I always use technology.
- I enjoyed being able to fill in data and learn how I should fill in data.

- I think it was helpful and fun in providing insight about newer technology and how it can be used for science.
- Does not apply - SRA.
- I think the students did great with the data collection, photos.
- It was easier and more efficient than writing it on paper.
- They were convenient and better than writing it down.
- My experience is that the androids take pretty good pictures although they are slow.
- Was best experience just punching in data, no water getting wet destroying data, don't have to carry - just put around your neck.
- SRAs didn't do those. The documentary was fun and enjoyable. I loved it!!!
- I got to use the Androids many times and used it for filling in data like weight, length, species, etc.
- I've never used iPads, Androids, or any type of Smartphone. I didn't know how easy it is to use.
- More interesting for students.
- It was more interesting using them than just paper and pencil.
- I did not collect or enter data.
- I found it tedious to use the Androids. It was glitch and often crashed.
- It was the only thing not fun besides the heat, waking up early, and taking this test.
- Filling in data electronically was very interesting because I got to experience something that scientists actually do once they capture an animal.
- Filling in the data was much simpler than writing, but they did not work so well in the rain.
- My experience in filling in data on the iPads and Android devices made it interesting while still having an electronic to do work.
- I learned to put in the data whenever we found a turtle in the lake and salamanders or microbes.
- It was confusing.
- It's very straightforward and easy.
- It was useful and more convenient to use them. They are more durable than paper as well.
- I didn't like it, because the app had problems.
- It was interesting but I didn't like it in particular and I was afraid I was going to break something.
- It was pretty great. Seemed like it made things easier.

9. Please rate your enjoyment on a scale of 1 (low) to 5 (high) regarding the HERP Activity Electives in which you participated. [Scale: 1 = Low enjoyment, 5 = High enjoyment]

	n	Min.	Max.	Mean	sd
Herp Dissection	20	3	5	4.60	0.68
Snake Skinning	11	4	5	4.82	0.40
Nature jewelry	11	3	5	4.45	0.82
Evening Ephemeral Pool Field Trip –only at CCR	18	1	5	4.06	1.11
Drawing & Making Models	4	4	5	4.50	0.58
Lizard Lassoing – only at CCR	4	3	5	4.00	1.15
Costume & Mask Making	Not applicable				
Council of All Beings	28	1	5	4.11	1.20
Photo Journalist Project	15	2	5	4.20	1.01
Student Documentaries	13	3	5	4.31	0.75

10. Please rate on a scale of 1 (Poor) to 5 (Excellent) the HERPS instructors': [Scale: 1= Poor, 5 = Excellent]

	n	Min.	Max.	Mean	sd
Ability to help you understand information presented	29	3	5	4.62	0.62
Ability to make what you learned interesting	29	3	5	4.72	0.59
Ability to make learning activities enjoyable	29	3	5	4.79	0.49
Ability to answer your questions	29	2	5	4.66	0.72

11. What did you like best about this herpetology research experience and why?

- Being able to touch the amphibians and reptiles.
- I liked the fact that I learned in a fun way because instead of learning and sitting in a classroom we actually got outside and learned hands-on. I also really enjoyed all of the people that helped/participated with it.
- Meeting new people-le that enjoyed science just like me. And learning so much more about different species and learning how to mark them and check if it's a re-capture.
- I got to learn and see animals I had never seen before. It was great.
- I enjoyed very much being able to work with professionals that were able to teach me so much about what I love most.
- Being an SRA. Because everyone looked to me because of my age. They felt more comfortable.

- Everything!!!
- Getting to hold the animals.
- Overcoming my fears and meeting new people and doing new things.
- I love how although this is my 2nd year, they made this place still seem like a new adventure, giving me yet another insight about the world around me.
- Learning about species - first time experience with theme.
- SRAs felt a lot more involved because we were teaching.
- I liked learning about amphibians and reptiles, and how they are more afraid of us than us afraid of them. I liked being able to pick up something that I would have run from before I came to this camp.
- The snakes because we got to hold a big boa constrictor. For the electives, I liked swimming in the lake and canoeing/kayaking.
- Searching for box turtles with dogs because I'd rather do activities with an animal I can connect with and have fun with.
- I liked snakes because I would not usually pick one up but now I would.
- Working with people with similar tastes. Normally in school and out of school it is difficult to find other teens with similar interests but here everyone had some common interests.
- Catching snakes and the ephemeral pool. The snakes because I enjoy it and the ephemeral pool because it is new.
- Holding snakes because they aren't as bad as I thought.
- I liked most actually experiencing examples of how herpetologists study in the field, and learning more about herpetological field work.
- I liked that we got to see the animals in habitat and around other animals. I liked this because they showed their true nature and their interaction.
- Seeing things from my own eyes, not just a book.
- I liked being outdoors and exploring because personally I love being outside doing hands-on activities.
- Dissecting the snake because I never did that before.
- I liked studying the different wildlife because I love all animals.
- I liked how it opened new categories of science for me and showed me more about them.
- I don't know. Everything? It was all good. I liked the turtles a lot, though! I loved the snakes too. They were fantastic. I love snakes.
- I liked the aquatic turtles and snakes the same.
- The box turtles and ephemeral pools because it was hands-on.

12. What would you change about this herpetology research experience and why?

- Some of the rules because I feel like a little kid. And that we could keep some of the amphibians we found.
- I would maybe do some more activities because some of the work was a little tedious. Like aquatic turtles was SUPER FUN! But we had to collect a lot of the same details for all the turtles so it was a little tedious.
- I would change the policy on going to bed so early because I would like time to talk with my friends and more social time between everyone.
- Nothing! It's great the way it is!
- I would change the acceptance policy and make it a more strict filtration process, maybe cut down the number of participants because many did not want to be there or were complaining often and it made it difficult for others to learn and have fun.
- I would make it longer. 3rd year participants!!!
- Nothing really, just to allow the students to listen to music at night.
- Less ticks!!!

- I would still love it if we could have more days with this amazingness. 7 days still didn't feel long enough.
- I really liked this camp. Actually this is my first time doing experience with turtles, snakes, salamanders, and different types of frog sounds. It was very fun with new animals and friends.
- Nothing! It was epic!
- I would like another week because it was very enjoyable and that way we could learn more.
- Nothing at all.
- The pre-test and test because it takes the fun and enjoyment out of the camp.
- Nothing. I thought it was fun.
- I would enjoy it if it could be longer or if more time could be given to each station.
- I would leave out the camp activities and take more off campus field trips to less documented areas.
- Waking up as early because it is summer.
- I might make it longer, because I'm not ready to stop attending.
- I would not change a thing, because they made this week great.
- I would probably not change anything. I had an enjoyable time in the herpetology research experience.
- I would make it longer because I enjoyed myself so much.
- That maybe we can bring snacks/drinks cause we get hungry and the drinks are nasty.
- I would get more benches around so legs won't be as tired.
- I think that it might be better if it had a little more focus on students. The teachers did do a good job, but a few times I was left with no role.
- Nothing, but maybe a little more free time would be great. And an earlier bedtime! I usually go to bed at eight, so I was tired all week. Could we do more snakes, too?
- There's not much you can change without taking the identity of the project away. A lot of it would not be the same without.
- Nothing except for going out in the rain a lot and being wet (not when swimming though).

13. If there is anything else that you would like to add, please do so here.

- I really enjoyed the camp - it was fun - thank you for having me.
- Hopefully I can come back next year as an SRA :)
- This is, without question, the most fun and interesting, and informative thing I have ever participated in. Thank you!!
- I really had a fun experience and would like to come back and bring my friends. Definitely a fun time, if I had to do it again I would.
- Dr. Matthews and everyone: Please let me come back for a third year! I love this place and all that it has to offer. Two years wasn't enough to fulfill my curiosity! Pretty pretty please!
- I just wanted to say with make a bigger crane where all boxes live and would be near Morris Center, and Falcon, but it was still fun.
- Fix Crane lodge - it is old, infested with ants, and the power didn't come back. Upgrade it. It sucks in my opinion. Crane Lodge in enough to not want to make me come back.
- None.
- I was pleased at what was done with the SRAs. I felt like an important part of the group and could help teach but didn't have too much resting on my shoulders.
- Overall it was a good experience.
- I would suggest that the SRA position be opened to rising college freshmen also.
- I hope to come back next year.
- I would love to continue in this program although I am a rising senior and graduating next year. The experience was great and a once in a lifetime chance. Thank you.

- I loved it! Can I come again? I'd love it. I love this week. But like I said, we need an earlier bed time.
- Nothing!

Rockfish

1. Please indicate your level of agreement to the following statements about science in general, thinking to before this week and now, after participating in the HRE. [Scale: 1 = Not at all, 5 = Very likely]

	Before participation in the HRE					Now					Gain
	n	Min.	Max.	Mean	sd	n	Min.	Max.	Mean	sd	
I think science is interesting.	29	1	5	4.24	1.12	28	2	5	4.54	0.84	0.30
Science is important to me.	29	1	5	4.21	1.15	28	2	5	4.54	0.84	0.33
I am good at science.	29	1	5	3.79	1.11	28	3	5	4.29	0.71	0.50
I think I could be a good scientist.	28	1	5	3.68	1.31	28	1	5	4.07	1.25	0.39
I think like a scientist.	27	1	5	3.78	1.19	28	1	5	4.04	1.14	0.26
Scientists have a chance to make a difference in the world.	29	1	5	4.41	1.02	28	1	5	4.71	0.81	0.30
Science helps people.	29	3	5	4.52	0.74	28	4	5	4.86	0.36	0.34
Scientists spend most of their time working alone.	29	1	5	2.28	1.00	28	1	4	2.00	1.09	-0.28
Scientists don't have many other interests.	29	1	5	1.62	1.05	28	1	4	1.50	0.96	-0.12
There are lots of jobs available in science.	29	1	5	4.07	1.03	28	3	5	4.32	0.90	0.25
Scientists' work is not influenced by their own opinions.	29	1	5	3.07	1.25	28	1	5	2.82	1.33	-0.25
Scientists have to work hard.	29	1	5	4.24	1.02	28	3	5	4.64	0.68	0.40
Science is a highly respected career.	29	1	5	4.00	1.10	28	3	5	4.50	0.64	0.50
You have to be a genius to be a scientist.	28	1	5	2.29	1.18	28	1	5	1.89	1.03	-0.40
Scientists have to go to school for many years.	28	1	5	3.25	1.04	28	1	5	3.54	0.96	0.29
Scientists do not have many friends.	28	1	5	1.71	1.30	28	1	4	1.25	0.70	-0.46
Scientists spend most of their time working indoors or in labs.	28	1	5	2.32	1.36	28	1	5	1.96	1.23	-0.36
There is not a lot of room for creativity in science.	28	1	5	2.61	1.37	28	1	5	2.25	1.32	-0.36

2. To what degree did participating in this herpetology research experience increase your: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Knowledge of science?	29	2	5	4.24	0.95
Confidence in doing science?	28	1	5	4.29	0.98
Interest in science?	29	1	5	4.14	1.16
Interest in nature	29	1	5	4.38	1.08
Ability to use scientific tools?	29	2	5	4.17	0.85
Interest in participating in other science experiences?	29	1	5	4.31	1.00
Understanding of threats that reptiles and amphibians face?	29	2	5	4.45	0.87
Connection to nature	29	2	5	4.45	0.78
Empathy for animals?	29	2	5	4.41	0.95
Awareness of careers in science or related fields?	29	2	5	4.21	1.01
Connections to people in science or related fields?	28	2	5	4.14	1.08
Understanding of what people do in science-related jobs or careers?	29	3	5	4.24	0.83
Desire to find a science-related job/career?	29	1	5	4.03	1.15

3. To what degree did participating in this herpetology research experience make you feel: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Confident to try new things?	29	2	5	4.31	0.85
Like a science person?	29	1	5	4.28	1.07
More aware of your strengths and weaknesses?	29	3	5	4.41	0.73
Brave?	29	1	5	4.17	1.07
Interested in taking care of the environment?	29	3	5	4.45	0.83
That you have a good future ahead of you?	29	3	5	4.31	0.85
That you could be good at science or a related field?	29	2	5	4.21	0.94
Connected to living things in my local environment?	29	1	5	4.24	1.06
Curious about nature?	29	3	5	4.48	0.63
Successful?	29	3	5	4.52	0.63

4. To what degree did participating in this herpetology research experience make you feel like it is possible for you to: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Think like a scientist?	29	1	5	4.14	1.03
Talk like a scientist?	29	1	5	3.86	1.25
Teach others about reptiles and amphibians?	29	1	5	4.17	1.00
Be seen as smart in science?	29	2	5	4.24	0.91
Help your friends get good grades in science next year?	29	2	5	3.97	1.02
Use what you know about science outside of school?	28	2	5	4.43	0.88
Study science in college?	28	1	5	4.21	1.07
Contribute to science?	29	3	5	4.31	0.85
Think about joining a science-related club or group?	29	2	5	4.03	1.12
Start a science hobby?	29	1	5	3.69	1.28

5. Please indicate on a scale of 1 (I learned very little) to 5 (I learned very much) how much you learned by participating in the following activities. [Scale: 1 = I learned nothing at all, 5 = I learned very much]

	n	Min.	Max.	Mean	sd
Box Turtles with Dogs	29	1	5	3.79	1.15
Ephemeral (vernal or temporary) Pools - CCR			Not applicable		
Snakes Project	29	1	5	4.21	1.05
Aquatic Turtles	29	1	5	4.48	0.95
Stream Salamanders	29	1	5	4.10	1.14
Night Hike (first night)	29	1	5	3.62	1.15
CASP	27	1	5	3.70	1.07
Frogs of the Piedmont (Jeff Hall)	28	1	5	4.25	0.97
CCR - Tree Pythons			Not applicable		
Rockfish - Herp Photography	29	1	5	3.83	1.23
Rockfish - Lizards Project	29	1	5	4.34	0.97

6. Please indicate on a scale of 1 (Very uninteresting) to 5 (Very interesting) how interesting you found participating in the following activities. [Scale: 1= Very uninteresting, 5 = Very interesting]

	n	Min.	Max.	Mean	sd
Box Turtles with Dogs	28	1	5	4.00	1.22
Ephemeral (vernal or temporary) Pools - CCR	Not applicable				
Snakes Project	29	1	5	4.41	1.02
Aquatic Turtles	28	3	5	4.68	0.61
Stream Salamanders	28	1	5	4.25	1.00
Night Hike, First Night	29	1	5	3.90	1.14
CASP	27	2	5	3.56	1.12
Frogs of the Piedmont (Jeff Hall)	29	1	5	3.90	1.29
CCR - Tree Pythons	Not applicable				
Rockfish - Herp Photography	29	1	5	4.31	1.14
Rockfish - Lizards Project	28	3	5	4.68	0.67

7. For any activities you rated as a 1 or 2 (relatively uninteresting), please provide an explanation for that rating:

- Box Turtle with Dogs taught me nothing about turtles.
- The CASP was hard to listen to individual frogs and the Frogs of Piedmont was boring and just unexciting.
- I like science a lot more now but I don't know if I would go into a career or look into it more but I am thinking strongly about it because I did enjoy myself.
- They talked a lot and it became boring.
- Jeff Hall was long and boring. His presentation didn't catch my attention. Box turtles was a lot of walking but not much learning.
- Because the animals really didn't catch my attention. And studying them wasn't interesting.
- I didn't really like doing them.
- Mr. Jeff Hall played so many sounds I could only remember little of them and the night walk did not teach me much.

8. Please tell us about your experience filling in data using the iPads and Android devices.

- It was useful.
- It was better for the aquatic turtles but with the frogs, it was confusing and unappealing.
- It was pretty cool how we entered the information in the devices.
- My experience with the androids was very cool. The app was very interesting.
- It was very helpful.
- It made me feel like I really was contributing to science and the study of things around me.
- I learned that you had to check lots of things before you can file an animal.
- It was fun because it made me feel like I was actually doing something.

- It was useful in recording data, but took away from the outdoor sense.
- I liked being able to put in data using an electronic thing such as the androids.
- I think they work well.
- It was okay for me because I like technology I guess.
- It was hard to use.
- It was very easy to input data and it made me feel like I was actually a scientist.
- The application was excellent, easy, and user friendly. The only thing that was unsatisfactory was the inability to re-record.
- It was fairly easy since all we use is technology now anyways.
- I thought that was a neat way to process data. Something I can use outside of camp.
- The android malfunctioned.
- Whoever came up with the idea was wonderful! What a great way to maintain data.
- Never used them as an SRA.
- Amazing. It was so much fun.
- It was complicated but once we got the hang of it was fun.
- I only used them once but it was easy.
- It was better than writing on the paper.
- Androids were cool.
- I had never done data collection on something like that and it was pretty easy.
- I liked it but it wasn't really exciting.

9. Please rate your enjoyment on a scale of 1 (low) to 5 (high) regarding the HERP Activity Electives in which you participated. [Scale: 1 = Low enjoyment, 5 = High enjoyment]

	n	Min.	Max.	Mean	sd
Herp Dissection	17	1	5	4.24	1.25
Snake Skinning	13	2	5	4.62	1.74
Nature jewelry	7	2	5	4.14	1.21
Evening Ephemeral Pool Field Trip –only at CCR	Not applicable				
Drawing & Making Models	4	3	5	4.25	0.96
Lizard Lassoing – only at CCR	11	3	5	4.27	0.79
Costume & Mask Making	9	1	5	3.89	1.54
Council of All Beings	28	1	5	3.29	1.44
Photo Journalist Project	16	1	5	3.13	1.82
Student Documentaries	12	1	5	3.00	1.54

10. Please rate on a scale of 1 (Poor) to 5 (Excellent) the HERPS instructors': [Scale: 1= Poor, 5 = Excellent]

	n	Min.	Max.	Mean	sd
Ability to help you understand information presented	28	3	5	4.57	0.57
Ability to make what you learned interesting	27	2	5	4.56	0.75
Ability to make learning activities enjoyable	28	3	5	4.50	0.64
Ability to answer your questions	28	2	5	4.68	0.67

11. What did you like best about this herpetology research experience and why?

- The reptiles and amphibians because I love learning about them.
- I highly enjoyed the close relationships with the lizards and aquatic turtles.
- The projects were pretty cool. I like that I wasn't as scared. This experience made me a lot more brave. And I tried things I would never have tried before.
- I really enjoyed how the counselors and staff tried to make a connection with me and how they made me feel like I fit in in order for me to learn better and understand more information.
- Learning a lot about herpetology.
- I liked the hands-on experience because I've never done it before.
- It was hands-on and you got to touch each animal.
- It was very hands-on.
- I liked catching frogs with my friend at night because I love frogs.
- I greatly enjoyed the tactile experience of handling animals. Being outside all the time was fun as well.
- I liked best learning about the snakes, because I like snakes.
- Be able to teach people and share things and ideas with them.
- I made a lot of new friends who like herps just like me and I will never forget this summer trip.
- I like the snakes the best because it was interesting.
- I loved how we spent most of the time outside catching reptiles and amphibians and learning about them because it was not boring like a school class.
- Aquatic turtles because we got to go into the lake and set traps.
- I loved getting to work with aquatic turtles all this week. I learned a new thing each day.
- The dissection.
- I liked the snake dissection because I liked finding the internal organs.
- Being surrounded by like-minded people who shared my interests.
- Being an SRA and helping campers figure out what they are looking at.
- Learning more about a science I was weak at.
- Turtles - I am a hands-on learner.
- The snakes, because I got to hold snakes!
- Learning so much so I can help people.
- It informed me and helped me face my fears.
- Lizards - they are adorable.
- I liked how hands-on the HRE was because that doesn't really happen in school.
- I loved meeting so many people.

12. What would you change about this herpetology research experience and why?

- I wouldn't change it.

- I would not have as many or as long presentations. I did not like nor understand the council of all beings.
- The tests and long presentations cause it's boring but I appreciate it because I learned a lot.
- I wouldn't change a thing because it was so great.
- More camp activities.
- Give the children more elective time.
- Nothing. It's perfect just the way it is. The Council of All Beings vastly improved and I was very satisfied.
- Many kids here had no desire or interest. In the selection process, more sway should be given to passion and less to ethnicity.
- I would change the council of all beings to not doing it. I would do this because I didn't like it and I heard many others say the same thing.
- Nothing.
- More active and less talking.
- I would just do lizards, snakes, and turtles every day because they are the best.
- Nothing.
- I would not change anything. Teachers, SRAs, counselor, and instructors were awesome! This is a great program!
- That the kids be more into what they're doing because when they aren't it hinders learning.
- Nothing.
- I would have given the SRAs a more definitive role.
- Nothing; the hands-on activities were amazing!
- The SRA project for filming. Felt irrelevant to the HRE.
- A place or location with less mosquitoes! They hurt!
- The learning style - they did mostly adjust and we couldn't keep schedule.
- Instead of all the other activities we should have just gone to the Ark like two or three times.
- Nothing because it's fun.
- Nope.
- More inside activities and less boring needless information.
- I would change the weather because the heat and humidity sometimes made it hard to enjoy the activities.
- More snakes.

13. If there is anything else that you would like to add, please do so here.

- More excitement, but overall I had an awesome time here at HERPS.
- I really like science but I don't see myself with a career in science. I don't know - that's something to think about.
- I would like to say that this experience was one of a kind and I would like to say thank you.
- I had a ton of fun and hope to be able to come back as an SRA.
- I definitely want to return again as an SRA next year. It was a blast. :)
- I'm going to miss everyone.
- Herps should last longer than 5 days (10-15) maybe.
- You should make more programs like this because it is very fun and interesting.
- This is an excellent program and I will definitely come next year.
- Good experience to learn about science.
- You should have younger teachers so we can relate more.
- The HRE is wonderful and I am going to recommend it to all of my science-interested friends.

Elon

1. Please indicate your level of agreement to the following statements about science in general, thinking to before this week and now, after participating in the HRE. [Scale: 1 = Not at all, 5 = Very likely]

	Before participation in the HRE					Now					Gain
	n	Min.	Max.	Mean	sd	n	Min.	Max.	Mean	sd	
I think science is interesting.	14	2	5	3.71	1.07	15	3	5	4.53	0.74	0.82
Science is important to me.	14	2	5	3.29	1.07	15	3	5	4.27	0.80	0.98
I am good at science.	14	2	5	3.57	0.85	15	3	5	4.13	0.83	0.56
I think I could be a good scientist.	14	1	5	2.93	1.27	15	1	5	3.67	1.40	0.74
I think like a scientist.	14	1	5	2.64	1.15	15	1	5	3.40	1.40	0.76
Scientists have a chance to make a difference in the world.	14	2	5	4.07	1.21	15	3	5	4.67	0.72	0.60
Science helps people.	14	2	5	4.00	1.18	15	3	5	4.53	0.64	0.53
Scientists spend most of their time working alone.	14	1	5	2.71	1.27	15	1	4	1.60	0.83	-1.11
Scientists don't have many other interests.	14	1	5	2.43	1.40	15	1	5	1.53	1.25	-0.90
There are lots of jobs available in science.	14	2	5	3.64	1.01	15	3	5	4.33	0.82	0.69
Scientists' work is not influenced by their own opinions.	14	1	4	2.50	0.76	15	1	4	2.80	0.77	0.30
Scientists have to work hard.	13	2	5	4.00	1.00	14	4	5	4.57	0.51	0.57
Science is a highly respected career.	14	1	5	3.50	1.34	15	2	5	4.27	0.96	0.77
You have to be a genius to be a scientist.	14	1	5	2.86	1.61	15	1	4	1.80	0.94	-1.06
Scientists have to go to school for many years.	14	1	5	3.93	1.27	15	2	5	3.40	0.99	-0.53
Scientists do not have many friends.	14	1	5	2.29	1.54	15	1	3	1.33	0.62	-0.95
Scientists spend most of their time working indoors or in labs.	14	1	5	3.07	1.07	15	1	4	2.13	1.06	-0.94
There is not a lot of room for creativity in science.	14	1	5	2.71	1.33	15	1	5	1.87	1.19	-0.85

2. To what degree did participating in this herpetology research experience increase your: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Knowledge of science?	15	3	5	4.07	0.88
Confidence in doing science?	15	3	5	4.07	0.80
Interest in science?	15	2	5	4.33	0.98
Interest in nature	15	3	5	4.20	0.77
Ability to use scientific tools?	15	2	5	4.27	0.88
Interest in participating in other science experiences?	15	3	5	4.60	0.74
Understanding of threats that reptiles and amphibians face?	15	3	5	4.40	0.74
Connection to nature	15	3	5	4.33	0.72
Empathy for animals?	15	3	5	4.47	0.83
Awareness of careers in science or related fields?	15	3	5	4.00	0.85
Connections to people in science or related fields?	15	3	5	4.20	0.77
Understanding of what people do in science-related jobs or careers?	15	3	5	4.13	0.74
Desire to find a science-related job/career?	15	2	5	3.60	1.12

3. To what degree did participating in this herpetology research experience make you feel: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Confident to try new things?	15	3	5	4.40	0.74
Like a science person?	15	2	5	4.07	1.10
More aware of your strengths and weaknesses?	15	3	5	4.27	0.80
Brave?	15	2	5	4.53	0.83
Interested in taking care of the environment?	15	3	5	4.73	0.59
That you have a good future ahead of you?	15	2	5	4.60	0.91
That you could be good at science or a related field?	15	3	5	4.00	0.85
Connected to living things in my local environment?	15	4	5	4.60	0.51
Curious about nature?	15	4	5	4.67	0.49
Successful?	15	3	5	4.60	0.74

4. To what degree did participating in this herpetology research experience make you feel like it is possible for you to: [Scale: 1 = Not at all, 5 = To a great degree]

	n	Min.	Max.	Mean	sd
Think like a scientist?	15	2	5	4.00	0.85
Talk like a scientist?	15	2	5	3.53	0.99
Teach others about reptiles and amphibians?	15	3	5	4.47	0.83
Be seen as smart in science?	15	2	5	3.93	1.22
Help your friends get good grades in science next year?	15	1	5	3.60	1.30
Use what you know about science outside of school?	15	3	5	4.67	0.62
Study science in college?	15	2	5	3.80	1.21
Contribute to science?	15	3	5	4.40	0.74
Think about joining a science-related club or group?	15	2	5	3.67	1.11
Start a science hobby?	14	2	5	3.57	1.40

5. Please indicate on a scale of 1 (I learned very little) to 5 (I learned very much) how much you learned by participating in the following activities. [Scale: 1 = I learned nothing at all, 5 = I learned very much]

	n	Min.	Max.	Mean	sd
Box Turtles with Dogs	15	2	5	3.80	0.94
Ephemeral (vernal or temporary) Pools - CCR				Not applicable	
Snakes Project	15	1	5	4.40	1.18
Aquatic Turtles	14	2	5	3.93	1.14
Stream Salamanders	13	1	5	3.46	1.39
Night Hike (first night)				Not applicable	
CASP	10	1	5	2.90	1.45
Frogs of the Piedmont (Jeff Hall)	14	3	5	4.07	0.92
CCR - Tree Pythons				Not applicable	
Rockfish - Herp Photography				Not applicable	
Rockfish - Lizards Project				Not applicable	

6. Please indicate on a scale of 1 (Very uninteresting) to 5 (Very interesting) how interesting you found participating in the following activities. [Scale: 1= Very uninteresting, 5 = Very interesting]

	n	Min.	Max.	Mean	sd
Box Turtles with Dogs	15	2	5	3.93	1.10
Ephemeral (vernal or temporary) Pools - CCR			Not applicable		
Snakes Project	14	1	5	4.36	1.28
Aquatic Turtles	13	3	5	4.38	0.77
Stream Salamanders	13	3	5	4.54	0.78
Night Hike, First Night			Not applicable		
CASP			Not applicable		
Frogs of the Piedmont (Jeff Hall)	14	3	5	4.21	0.89
CCR - Tree Pythons			Not applicable		
Rockfish - Herp Photography			Not applicable		
Rockfish - Lizards Project			Not applicable		

7. For any activities you rated as a 1 or 2 (relatively uninteresting), please provide an explanation for that rating:

- We didn't find any turtles in city park.
- I don't like snakes.
- For box turtles with dogs we never found any box turtles, so we didn't have the opportunity to see a box turtle.

8. Please tell us about your experience filling in data using the iPads and Android devices.

- It was simple because I am good with technology.
- Frustrating until I understood.
- I loved how they connected our generation to science by using technology.
- This was the first time for me ever doing it.
- It was cool because it was a very simple way to collect data.
- It was easier than I thought.
- This was a good way to stay organized and easier than having to write down with pencil and paper.
- We recorded that data about salamanders in the android.
- It made it simple and helped me understand what we were doing.
- Filling in the data was confusing.
- It was frustrating. There were limitations to what you could put both for measurements and general info.
- Partner did it, but what I saw looked pretty easy and fun.
- I felt that it was a straightforward and organized way to collect/record data.
- It was a good way to stay organized.
- It was very useful, however there was a glitch with adding data about salamanders.

9. Please rate your enjoyment on a scale of 1 (low) to 5 (high) regarding the HERP Activity Electives in which you participated. [Scale: 1 = Low enjoyment, 5 = High enjoyment]

	n	Min.	Max.	Mean	sd
Herp Dissection	14	2	5	4.43	1.02
Snake Skinning	12	2	5	4.50	1.17
Nature jewelry	8	3	5	4.25	1.04
Evening Ephemeral Pool Field Trip –only at CCR	Not applicable				
Drawing & Making Models	8	3	5	4.38	0.74
Lizard Lassoing – only at CCR	12	3	5	4.83	0.58
Costume & Mask Making	5	1	5	3.40	1.67
Council of All Beings	5	1	5	3.40	1.67
Photo Journalist Project	12	3	5	4.17	0.72
Student Documentaries	8	3	5	4.00	0.93

10. Please rate on a scale of 1 (Poor) to 5 (Excellent) the HERPS instructors': [Scale: 1= Poor, 5 = Excellent]

	n	Min.	Max.	Mean	sd
Ability to help you understand information presented	15	4	5	4.93	0.26
Ability to make what you learned interesting	15	4	5	4.80	0.41
Ability to make learning activities enjoyable	15	4	5	4.93	0.26
Ability to answer your questions	15	4	5	4.87	0.35

11. What did you like best about this herpetology research experience and why?

- I enjoyed getting over a really big fear of mine and finding a new favorite animal, the green anole!
- Learning and overcoming fears.
- The snakes, because they are my favorite animal now.
- Messing with animals, because it was new for me doing that.
- I liked dissecting the snake because I've never did anything like that before so it was very cool.
- It was very hands-on. I learn better that way.
- I loved the hands-on experience and being able to learn in an enjoyable way.
- I liked that I got to touch turtles and hold snakes.
- The hands-on activities and info we recorded because it was so new to me.
- I like reptiles. Reptiles are just cool.

- It was really fun on top of being informative.
- Getting to hold animals and not be afraid of them.
- The hands-on experience since we don't have classes like this at school.
- It was hands-on every day, and because I am a hands-on learner.
- I liked being able to do my own thing because it was very fun.

12. What would you change about this herpetology research experience and why?

- I would add more field trips out to different areas.
- More time devoted to student documentaries.
- Nothing - it was the most fun I've had in forever.
- I would say less notes but overall a great time.
- Nothing!
- Longer periods so we can have more time to search for HERPS.
- Extending the length of the program so that we could learn about more reptiles and amphibians.
- I would change nothing. I enjoyed it. This class helped me develop bravery. I would have never imagined myself holding a snake. This class made that image come true.
- I would change the number of field trips because they are awesome, and I would like to do more.
- Nothing - it's great the way it is!
- I would make it longer, because I want to hold more herps! And learn about them, of course.
- Nothing (more time).
- I wouldn't change anything. I just wish we had more time so we could cover material longer.
- I wouldn't change anything because I really liked it and it was a very amazing opportunity that most students don't get to do.
- Start earlier on the documentary.

13. If there is anything else that you would like to add, please do so here.

- Thank you for helping me overcome a piece of my fear of snakes and teaching me so much. You helped me keep and look forward to going into a field of science.
- I love this class!!
- I loved this class. I feel courageous.
- This was amazing. Also, the photo voice project is really cool.