Final Evaluation Report

Project TRUE (Teens Researching Urban Ecology)

Years 1 - 4

Prepared for

Wildlife Conservation Society and Fordham University

Prepared by

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July 2019

This report is intended primarily for internal use, to be used as scaffolding for meaning making discussions and as a record of the work completed on this project. Outline format was chosen to make the presentation more concise.

[1] *Suggested citation: PEER Associates, Becker-Klein, R., & Fox, T. (2019). Final Evaluation Report: Project TRUE. Downloaded from PEERassociates.net.*

Executive Summary

Project TRUE (Teens Research Urban Ecology) Years 1 - 4

Prepared by PEER Associates, primary authors: Rachel Becker-Klein, Theresa Fox

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Project TRUE is a youth development program for high school students in New York City, which is a collaborative program between the Wildlife Conservation Society (WCS) and Fordham University, funded by The National Science Foundation. This program uses a cohort of Fordham professors, graduate and undergraduate students along with WCS educators and administrators work together with high school students to design and conduct research projects that explore the ecological dynamics of the New York City ecosystem.

Findings

Program Implementation.

- Project TRUE **implementation fidelity remained high** with few logistical challenges.
- **Near-peer mentoring was perceived to work well.**
- The **mentoring training** was effective but not always seen as efficient.
- **Balancing the scientific rigor and student ownership** of research projects was a challenge.

Participant Experiences.

- High school students reported a deepened interest in STEM and urban ecology research.
- Project leaders gained experience as mentors and communicating about scientific research.
- **The greatest impact of Project TRUE may have been on the undergraduate mentors'**: mentoring, capacity to conduct urban ecology research, communication skills, and interest in STEM careers and in conservation.

Organizational Capacity Outcomes.

- The **collaboration between WCS and Fordham** continued to grow and develop.
- Both organizations clearly **valued the relationships**.

Scaling-Up/Sustainability.

- There are plans for **Project TRUE to continue** beyond this grant.
- PIs worked hard to identify the key components: near-peer mentoring, real-world but doable research project, and a collaborative relationship between educational institutions.

Lessons Learned

- ❖ Students need to play a key role in planning research projects.
- ❖ Pay attention to efficiency and effectiveness of professional development.
- ❖ Graduate students need more time on the project or they need a different role.
- ❖ Attempt to balance the amount of time it takes to set up research projects.
- ❖ Clarify communication styles and formats among the different tiers.

Final Evaluation Report

Project TRUE (Teens Research Urban Ecology) Years 1 - 4

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Description of Project TRUE

The primary goal of Project TRUE was to increase high school students' interest in pursuing science, technology, engineering, and mathematics (STEM) majors, by increasing their exposure to urban ecology research conducted with college mentors. Through a $2.6 million dollar, five-year, National Science Foundation (NSF) Grant (DRL: 1421019 & 1421017), Project TRUE established a research and education partnership between the Wildlife Conservation Society (WCS) and Fordham University (Fordham) to implement and evaluate the effectiveness of a tiered mentorship educational model. The model leveraged both formal (Fordham) and informal (WCS) educational practices and expertise.

Throughout the implementation of this four-year grant, each of three New York City zoos had a team comprised of: a Fordham professor acting as Principal Investigator (PI), one or more Fordham graduate students and one WCS zoo instructor (project leaders), an average of five Fordham undergraduates (mentors), and 18-20 high school students. Collectively, the cohort designed and conducted research projects that explored the ecological dynamics of the New York City ecosystem. In addition, WCS PIs and staff supported all sites and teams.

Why did we do this evaluation?

1. To collect continued data on program activities and participant and staff experiences at each of the three sites and across sites.
2. To inform program improvement (formative evaluation) and investigate program effectiveness (summative evaluation).

What were we trying to learn? (See Appendix A for Project TRUE Logic Model.)

1. ***Program Implementation.***
    a. In what ways does program implementation correspond or not with program design?
    b. What are the primary challenges to implementation and how have they been resolved?
2. ***Participant Experiences.*** To what extent do Project TRUE participants show changes in…
    a. … ability to communicate about research with public audiences?
    b. … knowledge of urban ecology and science process?
    c. … mentoring capacity?
3. ***Organizational Capacity Outcomes.***
    a. In what ways has the tiered mentorship model impacted Fordham and WCS?
4. ***Project Scale-Up.***
    a. What are the critical components of Project TRUE for future replication?
    b. What are the best practices and obstacles to implementing this project?

What data did we collect?

Table 1. Data Collected in Project TRUE (Year 1: 2015, Year 2: 2016, Year 3: 2017, Year 4: 2018)

Data Type	Description	Year	Sample size
PI Interviews	Conducted individually by phone (see Appendix B for all interview guides)	2015 2016 2017 2018	7 7 7 7
Project Leader Interviews	Conducted individually in person/by phone	2015 2016 2017 2018	9 6 6 6
Mentor Focus Groups	In-person focus groups at each site on the last day of summer work	2015 2016 2017 2018	17 15 15 15
Evaluator Observations	Evaluators visited each zoo site for fieldwork (July) and public presentations (August)	2x/summer each year	
Student Focus Groups	In-person focus groups at each site on the last day of summer work	All students present on last day each year	
Tracking Logs[2]	Completed on a weekly basis by mentors and project leaders	2015 2016 2017 2018	185 134 N/A N/A
Mentor Philosophy Statements	Written by mentors at the beginning of summer and revised at the end	Only done 2017 and 2018	
Poster Rubric Scores	Fordham PI, WCS PI, and evaluator scored each poster based on rubric developed (see Appendix C for rubric)	2015 2016 2017 2018	N/A 15 15 15

[2] After the first two years, WCS took over administration and analysis of tracking logs, as they were primarily used by WCS administrators to monitor implementation challenges during the summer.

What did we learn?

Program Implementation

1. ***Program Implementation: Tiered Mentoring Model.*** The tiered mentoring approach allowed many more high school students to participate in the program than would have been possible without project leaders and mentors (i.e., with only the PIs). Near-peer mentoring was valued by all of the tiers. The approach and framework for the tiered mentoring system was revisited and developed over time to minimize tensions and promote growth in research and mentoring capacity in each tier. Most challenges identified in the first two years of Project TRUE were addressed in subsequent program summers. However, managing the participation of PIs within the project teams remained a concern.

    a. In the early years of the project, there were concerns about mentoring relationships being too formal, directive, and prescriptive. In Year 2, there was some disagreement among the tiers about how friendly mentors should be with the high school students. Many mentors expressed the sentiment that they needed to be friends with their mentees to effectively mentor them. On the other hand, several project leaders felt it was more appropriate to set professional boundaries and limit the sharing of personal information. By the last year of Project TRUE, mentoring relationships were perceived to be less formal, increasingly useful, and more collaborative. Throughout the project, most high school students formed adoring bonds with their mentors.

> *"[This program] felt like camp, not mentoring. I had difficulty balancing being nice [to the high school students] with getting tasks completed, and balancing professionalism versus mentoring and friendship."*
>
> - *Mentor, Year 1*

> *"Some mentors were too close in age to the students and simply bonded as friends, not mentors. In other cases, the distance was too great in terms of personality and communication style."*
>
> - *Project Leader, Year 2*

> *"It was a lot less strict than [I would have thought]. It was a mentor-mentee type of relationship, but more friendly, more relaxed...it was like having a friend that could teach you new things."*
>
> - *High School Student, Year 3*

> *"[It was great for the high school students to have] someone closer in age, a current college student can relate to a current high school student in a lot of different ways that others would not be able to do. That's the main part of it. Having someone they can relate to and looking at this person and thinking this person is smart and they don't know everything, and maybe I'm smart but I don't know everything - seeing that in everyone else is helpful."*
>
> - *Project Leader, Year 4*

b. One area that remained a challenge of the project was the amount of time spent by Fordham PIs on the project, which was perceived to be too little by most tiers across time. Mentors and project leaders highly valued time spent with the PIs, but sometimes felt that feedback was not provided at the optimal time to be useful.

> *"Fordham generally viewed this project as an REU (research experience for undergraduates) program for high school students. In REU programs, the students are given mentorship for the first week or two of summer, and then they are let go and do work independently largely and come back and present."*
>
> *- PI, Year 1*

> *"This year, there were a lot more interactions between PIs and the other tiers. There is still room for tweaking, but it is definitely better than the first year."*
>
> *- PI, Year 2*

> "*I feel like with our more direct mentors we had a really great relationship and they were super helpful whenever we needed anything. But we only saw the PIs a few times, and that was hard. They weren't on the same page as us. It was harder because they didn't know what we were doing day-to-day. When we started doing our projects we ran into a lot of problems explaining or clarifying what we are doing. That's where a lot of complications happened."*
>
> *- Project Leader, Year 3*

> *"We really tried to involve the PIs to a greater extent as mentors, for undergraduates as well. I heard a bunch of times that so-and-so PI is really helpful, and it was great to have [the high school students] talking to us. Overall, the PIs were involved in more of the process and seen less as authoritarian figures and more as mentors and part of the team.... Still it was never quite enough. "*
>
> *- PI, Year 4*

2. ***Program Implementation*: *Mentor training and professional development (PD).*** Over the course of Project TRUE, the mentoring framework was developed and articulated more completely. Sometime in Year 2, PIs chose a particular mentoring framework and instituted a weekly PD day to formalize the mentoring process. Yet, despite this and other intentional programmatic changes to address concerns raised throughout the project, there remained a lack of agreement on the efficiency and effectiveness of the mentoring curriculum and the PD days.

   a. The mentoring curriculum was received with mixed reviews. Many people felt it was useful to have a vetted curriculum as a foundation. In some cases, the curriculum mitigated the discomfort between mentors and project leaders. At the same time, many participants did not feel that the PD days were as effective or efficient as they would have liked.

"I'd get rid of the June training and replace the entire month with lesson planning. I don't think I used anything that I learned about how to teach that month. My teaching style arose organically so those lessons were a waste of time."

- *Project Leader, Year 1*

"I wouldn't cut out the whole month because I did enjoy them, but I would stagger the lectures.

- *Project Leader, Year 1*

"The PD days were not very efficient, we needed more structure to these days."

- *Project Leader, Year 2*

"I liked a lot about those [PD] days-- new ideas on mentoring, but some of them came too late. One project leader mentioned something they had done with students, Draw a Scientist. We talked about it the last week. It would have been good to have more of those days before the program really gets going, especially for someone like me just figuring out my mentoring style."

- *Project Leader, Year 3*

"I think we had too much mentorship training, and it became too redundant...especially on Mondays, I thought 'Why are we doing this again?' We could have used extra time in the field."

- *Mentor, Year 4*

3. ***Program Implementation*: *Research Project***. There was a palpable tension between the quality of the research and ownership of the project by the high school students. Nonetheless, as the years went on, the quality of the research did continue to improve.

   a. Over the years, the balance between ownership and rigor shifted. There did seem to remain a difference of opinion around whether to privilege the quality of the research or the educational components of doing the research.

"*It is more important to have better research, because the grant is to give high school students exposure to actual research that is relatively impactful. It gives them the experience of actually being in a STEM field. If the grant was different, I might change my answer - have more ownership, and less detailed research."*

- *PI, Year 1*

"There seemed to be less ownership in the research projects this year. I think that an observational, rather than experimental approach is the way to go."

- *Project Leader, Year 2*

"I feel like the level of rigor of the research project and the personal involvement in research amongst mentors and high school students was the highest I've seen.... When we reviewed posters [from past years], they were confident [about their ability to do good research]."

- *PI, Year 3*

"I was happily surprised with the posters.... At times I was nervous about the quality of the research. [The zoo instructor] just wanted [us to work through the scientific process and come out with] some product, whether scientifically hard hitting or just something tangible. I wanted tangible AND scientifically accurate."

- *Project Leader, Year 4*

b. The research level of the projects was high, as was reflected in scores on the poster rubrics, which hovered around 30 (Proficient for all categories). See Appendix D in the Year 3 Project TRUE Evaluation Report to view scores poster scores among the different project teams and sites.

4. ***Program Implementation: Program organization*.** Project TRUE PIs paid attention to evaluation data and their own observations, and attempted to increase the quality of the program every year. By the end of the four years, there was a consensus that Project TRUE ran especially smoothly, although there were still a few minor challenges.

a. Regardless of some small "bumps in the road," PIs reported that the program was running smoothly by the last year.

"For this program, you need a coordinator to be successful... if you don't have someone whose only job is coordinating this, if you are at this scale."

- *PI, Year 1*

"Project organization is tricky and communication and organization were not strong enough. Having a program assistant was key this year. Still, most of the work is on one person's plate and this is not sustainable."

- *PI, Year 2*

"[The project manager] was really able to organize and prepare and execute the program this year. The program is running really well, and it is important to recognize all of the hard work people have put in to get it to this point."

- *PI, Year 3*

"This year went more smoothly -- we learned a lot from previous years that we could apply to make this year's program better. Still some bumps and issues, but in general, this year the lessons learned from the past paid off."

- *PI, Year 4*

b. By Year 4, the ongoing logistical challenges included:

i. *Ordering equipment*. Although less of an issue than in years past, there were still some complaints about the timing of getting equipment, and the lack of clarity for the ordering process.

ii. *Ram Vans (vans provided by Fordham)*. Ram Vans continued to be a challenge, including a couple of minor accidents. One mentor said, “One hour of Ram Van training isn’t enough...it was surprising there weren’t more accidents.”

iii. *Communication style*. Communication from the top down seemed to be inconsistent, such that some project leaders and mentors described their conversations with some administrators as unpleasant. A few of the graduate students said that they wanted to be kept in the loop about happenings at their site, even if they were not supposed to be there on that day.

Participant Experiences

5. ***Participant Experiences: Project Leaders*.** The zoo instructors and graduate students shared complementary skill sets that promoted development of their capacity to lead research and to be effective mentors.

a. *Research capacity*. Zoo instructors relied on graduate students to promote scientific rigor. Graduate students relied on zoo instructors for assistance in engaging students and communicating to the students in ways that helped to solidify learning concepts.

> *"I would say I learned a lot from our graduate student. [I did not have a] strong research background. I was only involved in research once, and never from start to finish. I learned quite a bit from the [graduate student] in regards to data analysis and data collection."*
>
> - *Project Leader, Year 1*

> *“I think it was really nice this summer; our group was extremely fortunate in our graduate student. [We had a] great team dynamic and we learned a lot from each other.“*
>
> - *Project Leader, Year 2*

> *“I feel like [the zoo instructor] naturally took charge of a lot of the classroom time, talking about this or that. I was happy to entrust that to [zoo instructor]. We talked a lot about how good we thought the dynamic of our entire team was. I especially feel that way about [our site]. The [zoo instructor] is the most competent person in this entire program, I felt lucky to be working [at this site].*
>
> - *Project Leader, Year 3*

"It was kind of special to have some of our TRUE mentor alumni move up into the graduate position. It felt like a program that could run smoothly for many years if we followed that model of internal promotions. The zoo instructors seemed especially prepared this year. [Coordinating the research] seemed to work out really well from my perspective."

- *PI, Year 4*

b. Mentoring Capacity. For graduate students, a major concern that made fulfilling their role on the project more challenging was having fewer hours on the project compared to the zoo instructors, mentors, and students. Graduate students frequently expressed feeling underutilized, removed, and/or confused about their role in the overall program.

"I think that when I started, I was thinking of myself as a mentor to the high school students more than was actualized. The tiered mentoring meant that the undergrads would be the primary mentors. Sometimes I was almost jealous, I wanted to be there more and to be more engaged with the students."

- *Project Leader, Year 1*

"The graduate students did not receive any formal training in mentoring, which is more typical in academia to 'learn on the job.' Still, the graduate students were more focused on being mentors [than we had originally thought]."

- *PI, Year 2*

"We did a better job setting it up that project leaders were co-mentors, and empowering them early on. In previous years, some project leaders were confused about who they were reporting to. That was more clear this year."

- *PI, Year 3*

"As a graduate student, it's less of a two way street. It's not as much of a direct interaction with the high school students, it's more of a trickle down so the undergraduates have the chance to be the mentor. I feel like less like a mentor, but that's ok, it just feels more removed."

- *Project Leader, Year 4*

6. ***Participant Experiences*: *Mentors*.** Mentors consistently described improvement in mentoring capacity, research capacity, communication skills, and varied interest in STEM.

a. Mentoring Capacity. Mentors universally agreed that their mentoring capacity improved.

"Learning when to take charge and when to step back is the most difficult thing to balance…. I learned much better how to give them enough information so they could question and conclude on their own."

- *Mentor, Year 1*

“I gained confidence and competence in connecting with the high school students and taught them how to do scientific research. I was proud of what they accomplished."

- *Mentor, Year 2*

“I am always nervous being able to connect but it was easy to build a relationship. I knew it was getting better when I was checking periodically on their progress and having open dialogue on everything we are doing so I could proactively address any problems.”

- *Mentor, Year 3*

"I love being a mentor. [Being a mentor] is one of my favorite things, [it is] so rewarding for both parties. These high school students make it really easy. My approach is to start with letting them know we are on an equal plane. I'm learning with them, so what that means is I make mistakes. I want to be as honest as possible, transparent and genuine. When things were not going right, letting them speak to me and taking their feedback - almost let them lead the way. I was overseeing but they were doing it."

- *Mentor, Year 4*

b. <u>*Research Capacity*</u>. Although mentors became much more familiar with research, many still described limited capacity to conduct research independently, either due to limited experience with research or urban ecology content or both.

“I hadn’t had much experience with research, I never had an [opportunity] to design a study. I definitely got a lot out of it, [including] writing up a poster. The graduate students were really helpful, without them I never would have gone through steps. I knew a little bit about ecology, I know a lot more now.”

- *Mentor, Year 1*

“I learned a lot about the research process. I learned how to think more scientifically, and also learned some specific content (like entomology, stratified random sampling, quadrats, etc.).”

- *Mentor, Year 2*

“It helped me gain focus. If no one is interested in a question, what's the point? When trying to work with students [so that they] can gain interest in science, [I] have to think about them, too [and] make it interesting to them. [Project TRUE] helped me so that now I’ll know to narrow it down, make it something reasonable to do.”

- *Mentor, Year 3*

"I am opened up to research in general, maybe I’ll get a PhD in some field."

- *Mentor, Year 4*

c. <u>Communication Skills</u>. Undergraduate students consistently described improving their own ability to communicate about scientific research either through public speaking or by developing methods to educate the high school students as part of the research process.

> *"I definitely [improved] public speaking and can get my point across to younger groups. In college, [there are] a lot of group projects, and not everyone is on the same level. I am better at working in groups now after this program."*
>
> - *Mentor, Year 1*

> *"[My comfort level with] public speaking is better. [I got a lot better at] speaking to a larger group about something I had to learn about in a week and appear to be a master of [that information]."*
>
> - *Mentor, Year 2*

> *"We all took examples on how [the zoo instructor] taught. [The project leader] provides space for them to explore and make observations before teaching. Inquiry based learning is not something that I had been exposed to."*
>
> - *Mentor, Year 3*

> *"I've gotten more confident...that level of communication in terms of being proud of what you are doing and being ready to explain it to others."*
>
> - *Mentor, Year 4*

d. <u>Interest in STEM/Conservation</u>. Project TRUE promoted interest in science and research in many of the undergraduates.

> *"I never thought about urban ecology on its own. I feel like the integrated learning portion combines social science and architecture. I never had that view before. now I [definitely] want to be an environmental science major."*
>
> - *Mentor, Year 1*

> *"It was fun getting out there and doing research even if the methods weren't the most complicated. My science experience and appreciation grew."*
>
> - *Mentor, Year 2*

> *"Now I want to do urban ecology. Cities are the most changing. Also the access to all of the urban greenspace. I didn't know what a green roof was [before TRUE]."*
>
> - *Mentor, Year 3*

> *"I spent the summer outside and getting my hands on some research, I love nature and don't get to do that in physics. [Project TRUE] is opening my eyes to other career paths."*
>
> - *Mentor, Year 4*

7. ***Participant Experiences*: *High School Students*.** Students described how Project TRUE gave them the opportunity to test and expand their STEM interests, while deepening their connection to place. They also described opportunities to expand social and scientific skills.

   a. <u>*STEM career interest*</u>. Many of the high school students who applied to participate in Project TRUE already had a science background. Some described expanding their interests to include ecology or focus on aspects of their current interest that incorporated some of what they learned over the summer.

> *"I was interested in various science subjects but not ecology.... Now its high on my list."*
>
> - *High School Student, Year 1*

> *"[My interest] did not really change, I always wanted to do engineering. But this experience got me into learning more about the environment and now I want to explore the connectivity [between the environment and engineering]."*
>
> - *High School Student, Year 2*

> *"I want to go into landscape architecture. Project TRUE reinforced my beliefs."*
>
> - *High School Student, Year 3*

> *"I come from a STEM school. [In Project TRUE, I realized that] there's a place for me somewhere in biology. This is also something I can pursue and not shy away from."*
>
> - *High School Student, Year 4*

   b. <u>*Comfort outdoors*</u>. High school students expressed increasing comfort being outside.

> *"[My favorite thing] was being in the field."*
>
> - *High School Student, Year 1*

> *"I'm not lying, my favorite part was getting stuck in the mud. I thought it was so much fun, getting dirty and being a part of nature. We really don't get the chance to do that being from New York City - it was something different that we never tried before. It was a really good team building activity."*
>
> - *High School Student, Year 2*

> *"[My favorite thing was] being in the river, because I love water, so being around the river [was great]. A couple of times I would just jump in when I was really hot. I jumped in 3 or 4 times. No regrets."*
>
> - *High School Student, Year 3*

> *"I did just learn I'm an outdoorswoman."*
>
> - *High School Student, Year 4*

c. *Teamwork and public speaking*. High school students showed improvements in teamwork and public speaking. They enjoyed collaborating on research projects and learned teamwork. Through participation in the poster symposium and public displays, students gained experience speaking to the public in a new way. Although not all were comfortable doing so, they were excited to discuss what they learned.

> *"When they were talking about teamwork, I was going to say something… in our different groups, we just kind of clicked, but it worked out that we were efficient. My group, we naturally divided up our roles, helped each other out with roles. More of a natural feeling."*
>
> - *High School Student, Year 1*

> *"Learning how to present and making the poster [was my favorite experience]. Usually in school, [learning is] not as detailed, it doesn't have the same aspects as we had to learn [this summer]. I was nervous to speak in the poster symposium, but my mentors and friends supported me. I gotta speak up loud."*
>
> - *High School Student, Year 2*

> *"The high schools students learned research skills as well as how to work as a team. They learned how to net fish, use a densiometer, jobs that are out there for them."*
>
> - *Project Leader, Year 3*

> *"Getting to know my group and doing teamwork, we really got to know each other well."*
>
> - *High School Student, Year 4*

d. *Connection to place.* High school students often described developing a deeper connection to their natural surroundings, accompanied by a desire to engage in conservation.

> *"I had a better understanding but didn't know what happened in New York City. [Project TRUE] opened my eyes to know what steps I can take to better my world."*
>
> - *High School Student, Year 1*

> *"Before all I knew is that I plugged in interests into the computer and it told me ecology is a good field to go into. I didn't know fruits that could come out – how I could contribute to this world and make an impact through ecology. Experiencing what I did here, something I would have to do more of to really understand."*
>
> - *High School Student, Year 2*

> *"I learned about how humans are impacting the environment: we are eating predators of purple marsh crabs, and they are getting out of control."*
>
> - *High School Student, Year 3*

"[Project TRUE] is an accumulation of research to gain knowledge about the environment and have a broader understanding of what we can to preserve it and protect it and prevent further damage."

- *High School Student, Year 4*

Organizational Capacity Outcomes

8. ***Organizational Capacity*:** Project TRUE started off with a strong relationship between a formal educational institution (Fordham) and an informal one (WCS), and that relationship strengthened over time and helped each organization achieve their missions.

   a. *Collaboration*. Project TRUE was based on an existing partnership between Fordham and WCS. Throughout the four years of the project, this relationship strengthened and collaborations expanded beyond those originally established.

   "A strong partnership with a university that wants to take this on is essential. You need to have a high level of science, and having that connection to the university is key."

   - *PI, Year 1*

   "The relationship between informal and formal institutions is essential. You need to have a big enough school to have a critical mass of undergraduates and graduate students, and you need a partnership between informal and formal."

   - *PI, Year 2*

   "Fordham, as a university, strongly wants Project TRUE to succeed. We view our relationship with WCS as critical and TRUE is a key component of that and a feather in the cap of the University."

   - *PI, Year 3*

   "One of the greatest strengths of this program is the collaboration between WCS and Fordham."

   - *PI, Year 4*

   b. *Project TRUE fit organizational missions of both WCS and Fordham*. Project TRUE helped both organizations achieve part of their organizational missions in several ways, including:

      i. Expanding the organizational reach to serve more underrepresented teens throughout New York City.

      ii. Raising the profile and visibility of the educational department within WCS.

iii. Increasing the engagement of the local community for Fordham.

"Project TRUE helped Fordham to expand training opportunities, moving beyond traditional lab bench experiences. One of the main advantages of this project is that it brings to Fordham a new approach and gets students out into the community. As a department, we are really excited about it.

- PI, Year 1

"Project TRUE aligns with WCS goals, especially the 'discover and inspire' tenets...empowering people in terms of their STEM career trajectory is a huge element for WCS education."

- PI, Year 2

"The administration at both Fordham and WCS have always thought of Project TRUE as a strong program. This year with those media pieces [the article and the filming], I think that [Project TRUE] is crystallizing to be seen as a stable program at each of the institutions."

- PI, Year 3

"[Project TRUE] actually fits Fordham's mission really well. I know that several people within our PR department really like it, as do administrators, because it involves our relationship to New York City, which is part of the stated mission."

- PI, Year 4

9. ***Project Scale-Up: Sustainability*.** Project TRUE PIs sought out ways to continue the program after the end of the NSF grant, and continue to seek strategies to get the word out about the success and feasibility of doing projects such as this at other institutions.

   a. WCS has secured funding to continue Project TRUE in a reduced form. Specifically, Project TRUE continues with the following modifications:

      i. *One Site*. The most likely site will be the Bronx Zoo, with the proximity to Fordham University as an advantage. The Bronx Zoo site has been one of the most consistent Project TRUE sites throughout the past four years, and access to the geography and resources that exist at this site can benefit the program.

      ii. *American Museum of Natural History (AMNH) program*. Project TRUE will collaborate with an established AMNH program, the Science Research Mentoring Program (SRMP).

   b. In addition, Project TRUE PIs are currently working on dissemination of the curriculum and project findings. Past and planned dissemination efforts noted in the annual report to NSF included:

i. The Journal of Urban Ecology published a paper authored by the co-PIs describing how the key components of Project TRUE contributed to engaging underrepresented minorities in STEM careers.

ii. PIs presented at conferences (Annual Meeting of the Ecological Society of America, August 2018; Association of Zoos and Aquariums Diversity Summit, April 2019; American Evaluation Association, 2018; NSF AISL PI Meeting, 2019).

iii. PIs submitted a 3-minute video to the NSF-funded STEM for All 2019 Video Showcase in May 2019, which was viewed almost 1,400 times and received a Presenters' Choice award.

iv. PIs are planning to lead conference workshops to disseminate the mentor training curriculum. PIs will lead mentoring workshops at the Ecological Society of America and Association of Zoos and Aquariums 2019 meetings. These workshops will present the near-peer relational mentoring model used in Project TRUE and will focus on helping science educators to build mentoring training and support into their programs.

What does it mean?

This section is organized by the evaluation categories that were described in the "What were we trying to learn?" section of this report.

Program Implementation.

Throughout the four years, Project TRUE **implementation fidelity remained high** (that is, the program was implemented as intended); recruitment went well, retention was strong, and implementation went as anticipated for the most part. Logistical challenges were few, although transportation and communication across sites and tiers were consistently cited as areas for improvement.

Near-peer mentoring was perceived to work well, as high school students felt close to and supported by their mentors, and mentors felt valued and supported by the project leaders. The mentoring training at the beginning of the summer as well as the **ongoing professional development days throughout the summer were never seen as efficient** by all participants, but did have the intended effect of preparing undergraduates to step into their role as mentors when the high school students came on board. For the research projects, there was still some question of finding the right balance between scientific rigor and student ownership of projects. This tension proved to be an ongoing challenge for Project TRUE.

Participant Experiences.

Overall, high school students reported a deepened interest in, appreciation for, and understanding of STEM and urban ecology research. Project leaders gained valuable experience as mentors and grew in their capacity to communicate about scientific research. **There was a consensus that the greatest impact of Project TRUE may have been on the undergraduate mentors.** Not only did they show improvements in mentoring and capacity to conduct urban ecology research, but they may have also expanded their communication skills, as well as their interest in STEM careers and in conservation more generally which could be seen as unanticipated, but positive, consequences of Project TRUE.

Organizational Capacity Outcomes.

Project TRUE was founded on a **collaboration between WCS and Fordham**, and this collaboration continued to grow and develop over the course of this program. Both organizations clearly valued the relationships, and this led to success for the program in terms of educational quality and the quality of the research.

Scaling-Up/Sustainability.

There are plans for **Project TRUE to continue beyond this grant**. PIs worked hard to identify the **key components of the program** in order to let other institutions know about it if they are interested in replication. Key components include: near-peer mentoring, real-world but doable research project, and a collaborative relationship between formal and informal educational institutions.

Lessons Learned

Throughout the four years of implementation, Project TRUE PIs were extremely open to feedback and reflecting with evaluators on how the program was implemented and the impact it had. PIs used evaluation data and their own reflections to make substantial changes to the program over the years. Since program recommendations were provided each year, this report seems to be an opportune time to reflect on lessons learned rather than specific recommendations for tweaking the program.

- *Students need to play a key role in planning research projects*. Although there was tension surrounding the rigor versus ownership of the research project, it was clear that increasing student ownership of projects also increased their buy-in into the program.

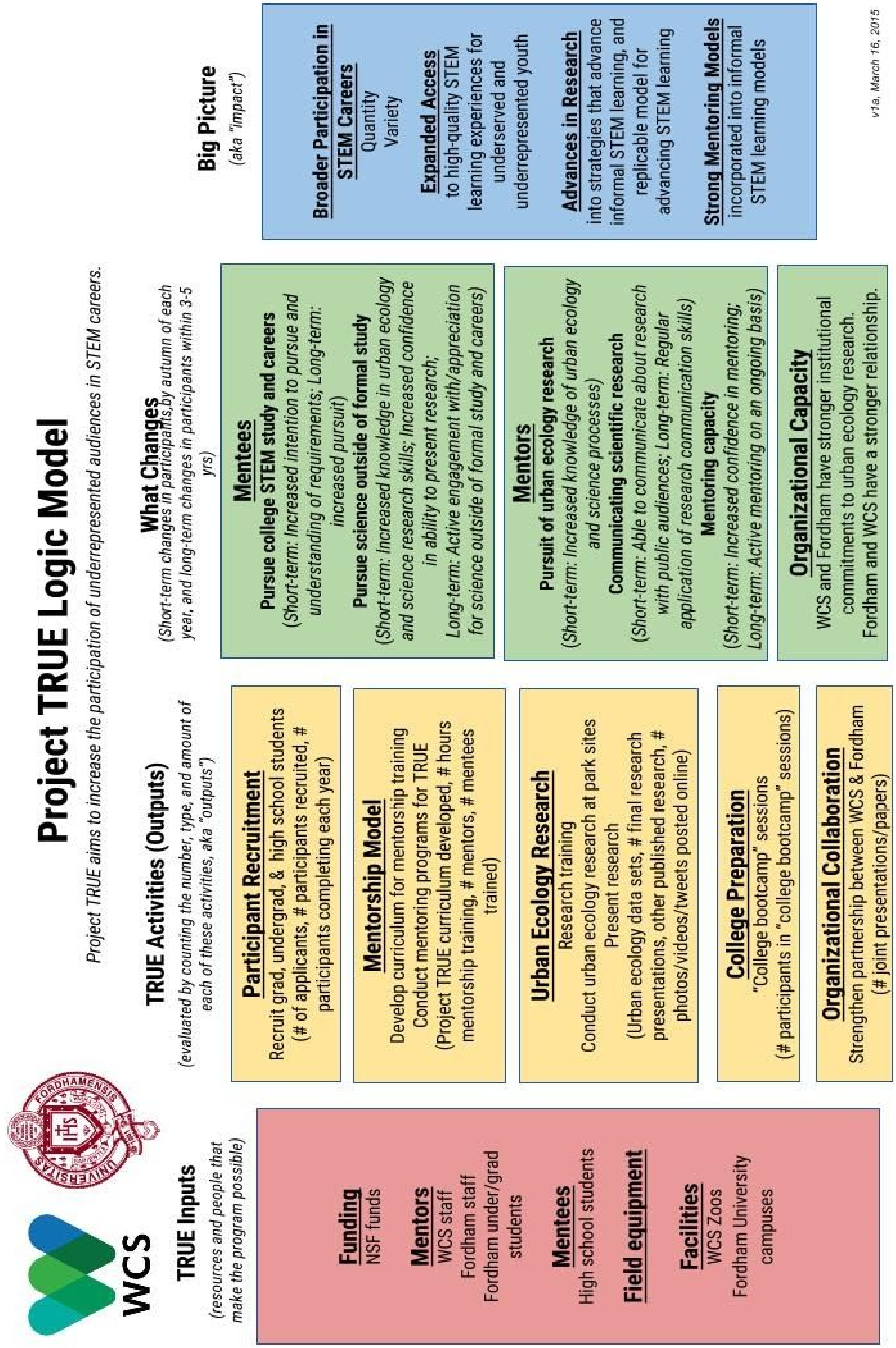
- *Pay attention to efficiency and effectiveness of professional development.* Professional development for the mentors was necessary to the success of the program, and was also sometimes perceived to be tedious and inefficient.

- *Graduate students need more time on the project or they need a different role*. PIs agreed early on that the project should have set aside enough funding for a full-time graduate assistantship.

- *Attempt to balance the amount of time it takes to set up research projects*. Depending on the research project activities, there could be quite an imbalance in the amount of time for preparation. For instance, some projects required commuting to far-reaching sites, and others needed preparation the day before data collection (i.e., prepping traps). Attempting to anticipate and account for the time it should take to set up projects could help in choosing which projects to conduct.

- *Clarify communication styles and formats among the different tiers.* Communication remained a challenge throughout the four years, but was seen as important by all. Agreement about communication formats (i.e. Google Drive or other online platform), frequency of email communication, and expected amount of time for replying to requests would all help to ease communication issues.

Appendix A. Project TRUE Logic Model



Appendix B. Interview/Focus Group Guides

Project TRUE Program Staff
Interview Guide

Intro:

- I am an external evaluator with PEER Associates
- Main purpose for today: provide an opportunity for critical formative feedback, NOT evaluating you
- Please be as honest and open as possible
- Request permission to record, take notes
- Questions or concerns?

Name:
Date/Time:
Duration of Interview:

1. In what ways was Project TRUE **successful**, especially in relation to your institution's priorities?

2. Please describe any **challenges** you have noticed in implementing Project TRUE, particularly for your institution.

3. What could have made Project TRUE **more successful** at your institution?

4. What factors would increase the likelihood of Project TRUE being **successfully replicated** at other institutions?

5. What factors might **inhibit the success** of Project TRUE at other sites/institutions?

6. Is there anything else you would like to tell me about Project TRUE?

Project TRUE Mentor - Grad Student/Zoo Instructor Interview Guide

Intro:

- I am an external evaluator with PEER Associates
- Main purpose for today: provide an opportunity for critical formative feedback, NOT evaluating you
- Your responses are confidential in that names are never used, only quotes, so please be as honest and open as possible Request permission to record, take notes Questions or concerns?

Name:
Date/Time:
Duration of Interview:

1. Please describe what attracted you to participate in Project TRUE? What were you looking for out of this program?

2. Describe your experiences and impressions with the tiered mentoring approach to this project and project management.

3. In what ways has Project TRUE impacted **your communication skills**? This could be about communicating scientific information (with mentees, mentors, public), or the way you communicate with people while working on a project with them (collaboration and teamwork).

4. How has your comfort level and confidence in **mentoring** others changed over the course of this program? What are you feeling most and least successful about in terms of your mentoring experience?

5. What are you feeling most and least successful about in terms of your experience **being mentored**?

6. Tell us some stories/examples of how the **undergraduate students were impacted** by participating in Project TRUE. Examples of their growth and personal development. In what ways did the UGS improve as urban ecology researchers? What were some **challenges** that the undergraduates faced during Project True?

7. Tell us some stories/examples of how the **high school students were impacted** by participating in Project TRUE.

8. If you were in charge of redesigning the program for next year, what **changes** would you make?

9. Is there anything else you would like to tell me about Project TRUE?

Project TRUE Mentor - Undergrad Interview Guide

Intro:

- I am an external evaluator with PEER Associates
- Main purpose for today: provide an opportunity for critical formative feedback, NOT evaluating you
- Your responses are confidential in that names are never used, only quotes, so please be as honest and open as possible Request permission to record, take notes Questions or concerns?

Name:
Date/Time:
Duration of Interview:

1. Please describe what attracted you to participate in Project TRUE? What were you looking for out of this program?

2. Describe your experiences and impressions with the tiered mentoring approach to this project and project management. What are you feeling most and least successful about in terms of your experience **being mentored**?

3. In what ways has Project TRUE impacted **your communication skills**? This could be about communicating scientific information (with mentees, mentors, public), or the way you communicate with people while working on a project with them (collaboration and teamwork).

4. How has your comfort level and confidence in **mentoring** others changed over the course of this program? What are you feeling most and least successful about in terms of your mentoring experience?

5. Tell us some stories/examples of how the **high school students were impacted** by participating in Project TRUE.

6. If you were in charge of redesigning the program for next year, what **changes** would you make?

7. Is there anything else you would like to tell me about Project TRUE?

Project TRUE High School Student Focus Group Guide

Introduction:

We'd like to hear about your experiences in this project. There are no right or wrong answers to any of these questions. Please be as open and honest as you can be.

1. What are the most useful things you learned this summer?
2. How do you feel your understanding of urban ecology concepts has changed?
3. What, if any changes have you had in your interest in STEM/urban ecology careers?
4. Please tell me about your favorite thing you did this summer.
5. Highlight the most challenging part of your experience this summer.

Thanks for your time and thoughts about this, everyone!

Appendix C. Poster Rubric

	Excellent (4 pts)	Proficient (3 pts)	Developing (2 pts)	Needs Attention (1 pt)	Points	Comments
Background	Includes highly relevant background information that provides an excellent foundation for the research question and how researchers arrived at their hypothesis.	Includes adequate background information that provides a foundation for the research question and how researchers arrived at their hypothesis.	Includes some background information, but does not suffiently provide a foundation for the research question or clearly explain how researchers arrived at their hypothesis.	Includes little to no background information; provides little to no foundation for the research question and little to no explanation of how researchers arrived at their hypothesis.		
Research Question	Includes a well–written research question.	Includes an adequate research question.	Includes a research question, but contains minor errors or is not well articulated.	Research question is unclear or missing.		
Hypothesis	Includes a well–written hypothesis that relates to the research question.	Includes an adequate hypothesis that relates to the research question.	Includes a hypothesis but contains minor errors, does not relate to the research question, or is not well articulated.	Hypothesis is unclear or missing.		
Methods	Provides a thorough description of how data were collected and analyzed.	Provides an adequate description of how data were collected and analyzed.	Provides a description of how data were collected and analyzed, but the description is unclear or confusing.	Inadequate or no description of how data were collected and analyzed.		
Results	Results directly address the hypothesis, are clearly explained in a comprehensive level of detail, and are well organized.	Results are adequately explained, with no major organizational problems.	Results are not clearly explained; level of detail and/or organization are insufficient.	Results not addressed or so poorly described and/or organized that they are not comprehensible.		
Conclusion	Interpretation of results is thoughtful and insightful, is informed by results, and makes clear reference to the presented background information.	Interpretation of results is adequate, but not always informed by results; makes some reference to the presented background information.	Interpretation of results is lacking in insight and not clearly informed by results; attempts to reference presented background information, but does not do so clearly.	Interpretation of results is incorrect and/or not at all informed by results; makes no reference to presented background information.		
Content	Content is sufficient and arranged so that the viewer can understand content without narration.	Content is sufficient and arranged so that the viewer can understand content, but some narration would be useful.	Additional content would be helpful; viewer would need some narration to understand content.	Additional content required; viewer would require narration to understand content.		
Design	Poster draws the reader in by being highly visually appealing.	Poster is visually appealing.	Poster is visually acceptable, though somewhat cluttered or disorganized.	Poster is not visually appealing and is very cluttered or highly disorganized.		
Readability and Text	Poster is highly readable from a distance with optimal font styles and font sizes; amount of text is appropriate.	Poster is readable from a distance with adequate font styles and font sizes; slightly too much or too little text.	Poster is difficult to read from a distance as font styles and font sizes could be improved; too much or too little text.	Poster cannot be read from a distance as font styles and sizes are not appropriate; far too much or too little text.		
Graphics	Figures, tables, and other graphics are highly engaging and enhance the text.	Figures, tables, and other graphics are adequately engaging.	Figures, tables, and other graphics are not particularly engaging.	Figures, tables, and other graphics do not enhance the text.		
				TOTAL:	0	

Appendix D. Scores from Rubrics on Posters

Table 1. Average Scores from Poster Rubrics from Year 4

Site	Mean (SD)
BRONX ZOO	
Orth	35.7 (.6)
Medrano	33.0 (.5)
Kuka	33.5 (.6)
Yassin	30.8 (.6)
Matalka	30.3 (.6)
BZ Average	**32.7 (.6)**
CENTRAL PARK ZOO	
Sese	36.0 (.5)
Kelly	33.0 (.4)
Thomas	35.0 (.5)
Weklar	34.2 (.6)
Mendoca	37.2 (.5)
CPZ Average	**35.1 (.5)**
PROSPECT PARK ZOO	
Patterson	29.5 (.6)
Bhikham	33.7 (.5)
Heilman	29.0 (.6)
Carsello	33.7 (.6)
Dantono	30.7 (.6)
PPZ Average	**31.3 (.6)**

NOTE: Mean=average score; SD=standard deviation

Table 2. Average Scores for Sites for Years 3 and 4*

Site	Mean (SD)	
	Year 3	**Year 4**
Bronx Zoo	29.4 (.7)	32.7 (.6)
Central Park Zoo	32.7 (.4)	35.1 (.5)
Prospect Park Zoo	21 (.5)	31.3 (.6)

* Poster rubrics were not administered in Year 1, and Year 2, the rubric was quite different, so only Years 3 and 4 are compared in this table.