STRIDE

2017 ANNUAL REPORT

MESSAGE FROM STRIDE LEADERSHIP

The STRIDE faculty and project team are delighted to share with you this first annual report describing some of the exciting STRIDE events and accomplishments from the past year, and highlights the impacts and benefits of the training program.

We were tremendously excited to be awarded a five-year $3M National Science Foundation Research Traineeship (NRT) — Science Training and Research to Inform DEcisions (STRIDE). This innovative training program provides STEM graduate students with interdisciplinary skills enabling them to assist, create, and eventually lead in the translation of complex data-enabled research into informed decisions and sound policies. In addition to traditionally taught science skills such as data analytics and visualization the program includes strong components of policy and the skills of decision support, science communication, and translating scientific uncertainty. Multiple program elements prepare our students for leadership in their career whether it be in government, industry, or academia. Motivating examples include effectively communicating with New York state coastal communities about climate change data with intrinsic uncertainties, *and another example …*
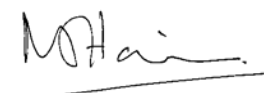
Our first project year was hectic and hard work, but it is very satisfying to reflect on progress we have made and to look forward to the second project year with our first full cohort of trainees. A crucial early step was recruiting our talented and energetic program coordinator, Dr. Jennifer McCauley whose PhD is in industrial and organizational psychology from Capella University. Her full-time attention has been transformative, and all STRIDE participants owe her a huge thank you! We must also recognize and deeply thank several of our faculty — Professors Heather Lynch, Christine O'Connell, Janet Nye, and Liliana Dávalos — for their dedication to the successful launch of STRIDE and giving so selflessly of their time and of themselves in so many ways, including mentoring students, teaching new courses, leading workshops, planning, and more. The original interdisciplinary team (Applied mathematics and Statistics, Biomedical Informatics, Computer Science, Ecology and Evolution, and the Schools of Journalism and Marine and Atmospheric Sciences). This has been extended to Computer and Electrical Engineering and Technology & Society.

The advanced graduate certificate, *C-STRIDE*, a major element of the program, received both internal approval at Stony Brook as well as at the State level, meaning that students can now OFFICIALLY register for the advanced graduate certificate. We are very grateful to the graduate school for their assistance in making this happen so efficiently.

During this first year, STRIDE awarded six Fellowships to trainees from Applied Math, Ecology and Evolution, and the School of Marine and Atmospheric Sciences. Joshua Comden, Tara Dolan, Lisa Herbert, Kylie Langlois, Kristjan Mets, and Lisa Prowant were of the first cohort of STRIDE Fellows, and we could not be prouder of the "strides" they have made in their science, as well as in their communication and visualization abilities. We would like to highlight one very special event held in the last year, which was the first annual STRIDE-Con and Visualization contest. This event, meant to highlight foundational topics intrinsic to STRIDE, such as communication, policy, and data visualization, was such a successful event and received very positive feedback.

An external internship is an important element of STRIDE training, and we thank our external partners, especially Brookhaven National Laboratory, the National Oceanic and Atmospheric Administration, and the Antarctic and Southern Ocean Coalition for enabling our trainees to intern with their organizations over the summer. We also give special thanks to the members of our Advisory Board for their very significant investment of time and effort as well as their very thoughtful and valuable insights and consideration of our plans and actions.

But we end by thanking our students for whom this program exists and whose success and accomplishments in turn bring us so much joy and satisfaction — thank you all for all your hard work and commitment.

Robert Harrison
IACS Director

VISION & MISSION

We have developed an innovative training program that will provide STEM graduate students with unique interdisciplinary skills to assist, create, and eventually lead in the translation of complex data-enabled research into informed decisions and sound policies. These include skills such as data analytics and visualization that science students are traditionally taught, but also the skills of decision support such as understanding the perspectives of various stakeholders, science communication, and translating scientific uncertainty, that are too often not explicitly taught. The end-to-end training program transcends traditional graduate education by integrating multiple disciplines and novel training elements that span spatial data, advanced visual data analytics, high-performance and data-centric computing, a domain discipline, communication including interpersonal skills and modern media, decision making, and relevant internships.

Vision:

Our vision is to grow this NSF funded training program into a scalable and sustainable model that will continue past the award period and to increase diversity of students and faculty within STEM.

Mission:

To realize our vision, we will:

- Grow our faculty and students emphasizing excellence and diversity;
- Create lasting partnerships with affiliates and internship organizations

TABLE OF CONTENTS

$3M NSF GRANT WILL FUND PHD STUDENT TRAINING IN DATA ANALYTICS, VISUALIZATION AND SCIENCE COMMUNICATION

The Institute for Advanced Computational Science (IACS) has been awarded a five-year $3M National Science Foundation Research Traineeship (NRT) grant to support graduate students from the departments of Applied Mathematics and Statistics, Biomedical Informatics, Computer Science, Ecology and Evolution, and the schools of Journalism and Marine and Atmospheric Sciences. This unique and interdisciplinary grant is for Science Training & Research to Inform DEcisions (STRIDE). The award will prepare the next generation of scientists working with big data to support complex decision-making.

STRIDE is an innovative training program that will provide STEM graduate students with unique interdisciplinary skills to assist, create, and eventually lead the translation of complex data-enabled research into informed decisions and sound policies. These include skills traditionally taught to science students such as data analytics and visualization. The unique contribution of STRIDE is to also prepare scientists by building skills in decision support that are often not explicitly taught, such as understanding the perspectives of various stakeholders, science communication, and translating scientific uncertainty.

IACS Director Robert Harrison is the PI for this project: "Decision support and all of the skills it entails are essential for high impact science, and this need cuts across many disciplines. Our team is really excited about how this project will transform both our university and especially the careers and leadership opportunities for our students."

The training program encompasses spatial data, advanced visual data analytics, and high-performance and data-centric computing. Uniquely, the program also incorporates a domain discipline, science communication, including interpersonal skills and modern media (at the Alda Center for Communicating Science), as well as and decision-making. It also offers relevant internships at Department of Energy laboratories, IBM and NOAA.

The interdisciplinary nature of STRIDE is reflected in the faculty involved. The Co-PIs are: Liliana Davalos, associate professor, Ecology and Evolution; Arie Kaufman, distinguished professor and chair, Computer Science; Heather Lynch, associate professor, Ecology and Evolution; Janet Nye, assistant professor, School of Marine and Atmospheric Sciences; Christine O'Connell, associate director, Alan Alda Center for Communicating Science and assistant professor, School of Journalism; Joel Saltz, Cherith professor and founding chair, Biomedical Informatics; Erez Zadok, professor, Computer Science; and Minghua Zhang, professor, School of Marine and Atmospheric Sciences.

"We are thrilled to be part of this exciting collaboration and work with fellows to help them communicate complex data science to decision makers, especially on health and environmental issues where it is crucial that policy and management decisions be based on sound science," said Alda Center Associate Director Christine O'Connell.

The advanced graduate certificate, C-STRIDE, consists of three major components:

1.) a set of specially designed courses on decision support, spatial data analysis, visualization, and communication required of all students;

2.) training in a STEM domain discipline; and

3.) a set of non course-based program elements in which all students will participate.

Specially designed courses include Scientific Decision Support, Introduction to Modern Data Visual Analytics, and Scientific Communications to Decision Makers. Non course-based program elements include an internship opportunity, recruitment, skill development, professional development, and personal development. In addition to degrees in their domain-science disciplines, students will receive a Graduate Certificate from STRIDE after completing the program requirements.

Affiliated Departments:	Course Title
Applied Math and Statistics	JRN 503: Improvisation for Scientists – 1 credit
Biomedical Informatics	Policy or applied science elective – 3 credits
Computer Science	Statistics Course – 1 credit
Computer and Electrical Engineering	JRN 511: Scientific Communication for Decision Makers – 1 credit
Ecology and Evolution	MAR 534: Scientific Decision Support – 1 credit
Journalism	CSE 564: Visualization – 3 credits
Marine and Atmospheric Sciences	JRN 501: Distilling Your Message – 1 credit
Technology and Society	Seminar Electives, Environment or Energy – 2 credits
	Total Required Credits: 15

Joshua Comden is currently a PhD student at Stony Brook University in the Department of Applied Mathematics and Statistics studying the mathematics of decision making which is called Operations Research. He received his M.S. in Applied Mathematics and Statistics in 2015 from Stony Brook University and his B.E. in Chemical Engineering from University of Delaware in 2009. His research interests are in the design and analysis of demand response programs for the power grid, and continual learning algorithms. Specifically, his research is in figuring out how to use predictions of the future to make the best decision now which has many important applications in the smart grid, autonomous vehicles, and machine learning.

Tara Dolan is currently working towards a doctorate in Marine Science at Stony Brook University's School of Marine and Atmospheric Sciences. Under the mentorship of Drs. Anne McElroy and Michael Frisk, she is developing a restoration-prioritization framework to guide management of Long Island's Winter Flounder inshore fishery. Before it's precipitous decline, Winter Flounder supported vital commercial and recreational fisheries, bolstering the coastal region's economy and maritime heritage. Despite strict fishing quotas in recent years, Winter Flounder have not recovered. Blocking their resurgence is the limited number that survive their first summer spent in Long Island estuaries. Her future goals include leading a team working towards research-based solutions to marine resource management issues, while helping to guide the next generation of emerging scientists. Tara is passionate about working with leaders from multiple scientific and professional fields, as well as community groups to promote scientific literacy.

Lisa Herbert is a third-year PhD student studying marine geochemistry. She earned her B.A. in Environmental Earth Science in 2015 from Washington University in St. Louis. She began at Stony Brook University in the Master's program at the School of Marine and Atmospheric Sciences in August 2015, and transferred into the PhD program the following semester. Lisa's research investigates how glaciers on the Arctic island of Svalbard transport trace metals like iron, manganese, zinc, and copper into the Arctic ocean. These trace metals serve as nutrients for biological growth, and changes in their supply as ice melts may have an effect on the marine food chain in the Arctic. In addition to her research, she is passionate about communicating the science of climate change and Arctic warming to wide audiences through blogging, public speaking, and teaching. By communicating her research, she wants to help decision-makers and the public understand that changes in the Arctic can have immediate impacts on their lives, and that the progress of climate change can be slowed with appropriate action.

Kylie Langlois is currently in her fourth year of the PhD program in the School of Marine and Atmospheric Sciences (SoMAS) at Stony Brook University and has recently taken great strides with her research. Earlier this year, she successfully defended her dissertation proposal. In March, Kylie presented a portion of her dissertation work at a national meeting for the first time. Following the meeting, she received an email from a collaborator with notes on a manuscript depicting the same work. Her dissertation focuses on the microbial community involved in nitrogen removal of household wastewater. Specifically, household wastewater treated by on-site systems built under a homeowner's yard. The current half million on-site wastewater treatment systems on Long Island were not initially designed for nitrogen removal, leading to large concentrations of nitrogen entering the groundwater. From there, nitrogen can enter public and private drinking water wells and pose a threat to human health, especially small children. Nitrogen can also enter the surrounding coastal waters and lead to large blooms of algae stretching across some of the largest bays on Long Island. Not only are these blooms ugly, but they can be toxic to humans and/or cause fish and shellfish die-offs. One way to prevent all of this is to improve on-site treatment of household wastewater. Kylie has been working with the Center for Clean Water Technology to understand the structure and function of the microbial community of nitrogen removing biofilters (NRBs), a much-improved on-site wastewater treatment system. Kylie uses next-generation sequencing tools and cutting-edge bioinformatics to describe the microbial community and how it interacts with the NRB material. Hopefully, this work will inform decisions about NRB monitoring and future NRB designs.

Kristjan Mets is a Ph.D. candidate in the Ecology and Evolution department. Kristjan's research focuses on white-nose syndrome, an emerging fungal disease that has devastated North American bat populations. In particular, Kristjan is constructing population ecology models integrated with infectious disease models to determine how geography and human presence affect disease transmission. From this, he will project potential trajectories for the disease and identify bat populations that are more likely to spread the pathogen in currently uninfected areas. This work is done with the intention of informing management practices for white-nose syndrome as well as drawing applications for novel emerging diseases in general.

Lisa Prowant is a PhD candidate in the Department of Ecology and Evolution at Stony Brook University. She is interested in improving conservation practices to mitigate the effects of climate change on biodiversity. Her dissertation research focuses on incorporating biotic interactions into species distribution and population dynamic models using the Eastern box turtle, their predators, and disease as a case study. This research will improve the current understanding of box turtle trophic interactions and their population fluctuations and trends. It will also improve future conservation planning by predicting the effects of various conservation actions on box turtle populations.
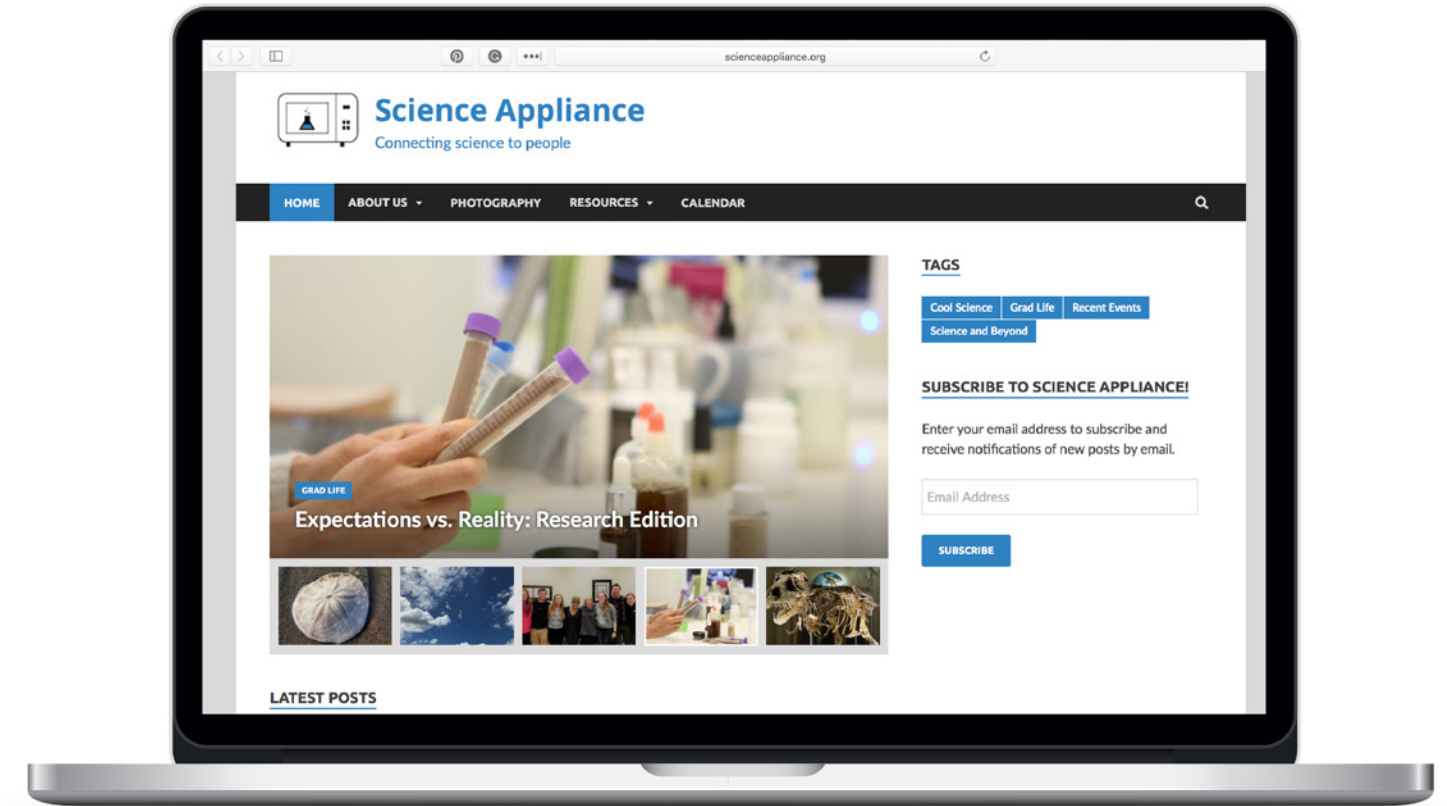
THE SCIENCE APPLIANCE

The Science Appliance is the brainchild of STRIDE Fellow, Lisa Herbert and is administrated in partnership with several graduate students from the School of Marine and Atmospheric science and is moderated by faculty member, Christine O'Connell, PhD.

This blog is a platform for Stony Brook graduate students to share stories of science and graduate school. The blog promotes science that is positive, inclusive, and accessible to all. Through the sharing of stories, the goal is to bring academia out of "the ivory tower" while promoting interest in graduate school and diversity in STEM, and inspire curiosity in science.

STRIDE FELLOWS TRANSLATE RESEARCH INTO POLICY

Understanding the complexities of high-impact science is tough
Communicating those complexities to policy-makers is even tougher.

At Stony Brook, STRIDE (Science Training and Research to Inform Decisions) aims to meet that challenge by providing STEM graduate students with the interdisciplinary skills they need to communicate their findings and make positive change.

Funded by a five-year, $3 million National Science Foundation grant and implemented by the Institute for Advanced Computational Science (IACS), STRIDE prepares the next generation of scientists to translate complex data-enabled research into informed decisions and sound policies.

Heather Lynch, associate professor of ecology and evolution at Stony Brook, was on the faculty team that wrote the original proposal for STRIDE, a three-year, three-proposal process.

"While we are a year into STRIDE, these training programs take far longer to bear fruit," said Lynch. "I have high expectations for how STRIDE will benefit students. I just don't have any hard and fast statistics to define programmatic success yet."

The graduate students participating in STRIDE, however, all say they are already benefiting greatly from the program, which offers a scientific-writing week-long workshop, a mentoring workshop, monthly brown bag lectures, a "Many Paths to Science" panel and a conference, titled STRIDE-Con.

Joshua Comden, an applied mathematics and statistic major on the operations research track, is currently in his fifth year of the PhD program. He said that he found out about STRIDE through an email sent to all the graduate students in his department.

"I read the description and found it interesting but first thought I wouldn't have time for that," Comden said. "But a few days later my advisor, Professor Zhenhua Liu, told me he thought I would be the perfect candidate. So I applied and won a fellowship for one year."

Comden added that the biggest skill he has acquired from STRIDE is considering what his audience wants when he gives presentations. "I've shifted my internal focus from me to what they need," he said.

"I've participated in all of the STRIDE events since August," Comden said. "But my favorite was STRIDE-Con, where we had a famous presenter named Scott Berinato [a senior editor at Harvard Business Review] talk about the art of making good charts."

Tara Dolan, a third-year PhD student in Marine Sciences, said that she has participated in a wide array of the programs offered and that the mentoring workshop was her favorite. "I got to bond with the other STRIDE fellows and faculty, practice important skillsets in communication and problem-solving and get into some lively discussions about diversity and inclusivity, which are both important to me," she said.

Lisa Herbert, a third-year PhD student at the School of Marine & Atmospheric Sciences (SoMAS), said that she has acquired a clearer picture of her professional future through her STRIDE fellowship.

"I have heard many honest discussions about the pros and cons of academia, industry, consulting, communication and other ways of being a scientist. In one seminar I learned that consulting can be done during or after an academic career rather than as a separate career," Herbert said.

"I have learned how to explain my work to non-scientists and how scientists play a role in policy-making, which I think is really important when dealing with the current administration." Herbert, who is studying the biogeochemistry of iron and other trace metals that serve as nutrients for biological growth in the Arctic Ocean, is involved in understanding and communicating how melting land ice could impact that region's chemical and biological make-up.

Perhaps the student who has benefited the most so far from STRIDE is Xin Zhou, an international student in the US on an F1 visa. While he is ineligible for a fellowship, he has become a STRIDE trainee.

Zhou said he loves the fact that he has access to many mentors, each with a completely different perspective, within the multidisciplinary program.

A sixth-year PhD student in SoMAS, Zhou is researching extreme weather patterns such as those exhibited in his hometown in Yunnan Province in southeastern China.

Zhou has picked up skills in speaking, video-making, blogging and social media and has also completed a STRIDE summer internship at Brookhaven National Laboratory.

Taking a one-day visualization course, which he won through a STRIDE contest, has helped him to witness firsthand the gap between scientific research and policy.

"It seems that many people, including policymakers, are still denying climate change," he said. "But as scientists we must ask ourselves if we have communicated climate science well enough in the first place. The skills I learned as a result of STRIDE will help me to present the facts to different audiences more effectively."

Edward Tufte, a noted statistician and professor emeritus of political science, statistics, and computer science at Yale University, taught the course Zhou took.

STRIDE participants receive, upon completion of the program, an advanced graduate certificate. Jennifer McCauley, program coordinator for the training grant, said that "the skills they acquire should set them apart from their peers in their ability to communicate science more effectively."

Although the STRIDE program is theoretically designed to be finished in two years, the participants can "take as long as they need to," said McCauley.

"I would have loved to have had these kinds of experiences as a graduate student," said Professor Lynch. "I particularly appreciate the brown bag lunches because we've had wonderful speakers from across the campus and across the country," she said. "I want to reiterate that the events are open to everyone on campus and that they should drop by and take advantage of them."

> "the skills they acquire should set them apart from their peers in their ability to communicate science more effectively."
>
> **Jennifer McCauley, PhD**
> **STRIDE Program Coordinator**

MENTORING IN **STRIDE**

One of the key components of the STRIDE program is its interdisciplinary mentorship model. Every STRIDE trainee will have access to a STRIDE mentor outside of their home department, providing each trainee with two levels of faculty mentorship in addition to peer mentorship by STRIDE trainees farther along in the program. In an effort to develop strong mentor/mentee relationships, the STRIDE program has initiated the workshop, *Mentoring in STRIDE*.

Mentoring in STRIDE is a modified version of the Center for Inclusive Education's *Excellence in Mentoring*, which is an abridged version of the Howard Hughes Medical Institute's *Entering Mentoring*, which aims to teach faculty how to be a good mentor. In this 3-hour workshop, trainees and mentors work together in a highly interactive way, reflecting on what traits and qualities make up a good mentor. Going further than its predecessor, *Mentoring in STRIDE* also seeks to teach trainees what it means to be a good mentee, as the mentoring relationship is reciprocal. In addition, the workshop explores the importance of diversity in STEM and what it means to be inclusive.

On November 3, 2017, STRIDE piloted its first session of the workshop, led by Christine O'Connell, PhD and Jennifer McCauley, PhD. The time was spent with faculty and students working together in small groups, using many of the exercises promoted by the Alan Alda Center for Communicating Science such as "Rant" and "Yes, and" to promote active listening and communication.

Improvements will be made for future sessions, where we will delve deeper into exploring how trainees can be good mentees. The first inception of the workshop was successful, with students and faculty alike stating that the workshop was enjoyable and even *fun*, but did focus predominantly on being a good mentor. The changes that we plan to make will create a stronger, more beneficial workshop for both trainees and faculty alike.

INTERNSHIP REPORT

Internship opportunities are not something that most graduate students in the STEM fields get to take advantage of. While somewhat common in areas such as computer science, other disciplines like marine science do not typically have a chance to experience a professional internship.

STRIDE trainees are at a unique advantage as an internship is one of the requirements towards fulfilling the 15-credit advanced graduate certificate. In this past year, five trainees spent their summer engaged with research projects with Brookhaven National Laboratory (BNL), the National Oceanic and Atmospheric Administration (NOAA), as well as the Antarctic and Southern Ocean Coalition (ASOC).

Xin Zhou, of the School of Marine and Atmospheric Sciences and **Yaqi Zhang** from Applied Math were invited to present their research at the New York Scientific Data Summit (NYSDS) following their highly successful internships at BNL.

Computer Science student, **Fatemeh Almodaresi** interned with NOAA and designed a user-friendly interface for fisheries management to track Herring.

https://herring.shinyapps.io/herringshiny/

Cecilia O'Leary of Ecology and Evolution developed an interactive tool to help scientists sort their data by fish species, year, and location following her internship with ASOC.

https://caoleary11.shinyapps.io/REEFvis/

STRIDE IN THE COMMUNITY:
STRIDE GOES TO SACHEM
Photo from left: Emily Markowtiz, Adelle Molina, Jennifer McCauley, PhD

On the evening of Thursday, April 6, STRIDE Program Coordinator, Dr. Jennifer McCauley and STRIDE trainees, Adelle Molina and Emily Markowitz partnered with Sachem Central School District to present Science Training and Research to Inform DEcisions (STRIDE) to the children of Wenonah Elementary School in Lake Grove, New York. Wenonah's annual science fair, "Invention Convention," celebrates the innovative concepts of children in Kindergarten through Fifth Grade. Adelle, who had an intense interest in science since childhood, knew from an early age that she would one day be a scientist. Throughout the night, crowds of potential future scientists surrounded both trainees and listened intently as they discussed their research in terms that they could understand.

Both Adelle and Emily are PhD students within the School of Marine and Atmospheric Sciences (SoMAS) at Stony Brook University, working within the lab of Dr. Janet Nye. Their research interests are with varying marine life—including fish and crabs—and the way climate change affects these species. The STRIDE trainees brought along many specimens of preserved fish, including a barracuda and a jar of freshly-hatched baby fish. Children and parents alike were very eager to examine the fish and asked many questions, which both students were more than happy to answer. "It was really great for the children to have an opportunity to meet two female scientists. Experiences like this may very well encourage other little girls to pursue their love for science," said one of the parents attending the event.

STRIDE aims to provide scientists with the ability to effectively communicate with non-scientists. Within all sectors of industry and government, effective decision making depends upon scientists having the ability to interpret data and communicate results in a way that supports the decision-making process. Public engagements such as this event offer STRIDE students an opportunity to discuss their research to a lay audience.

Emily Markowitz shows a fish specimen to a curious young scientist

RECRUITING & DIVERSITY

One of the goals of the STRIDE program has been to make STEM departments more inclusive and diverse at Stony Brook University. We have been participating in strategic recruitment; visiting and building relationships with local colleges that have higher numbers of underrepresented students in math and the sciences.

Our first trip was to Adelphi University in Garden City, New York. We were pleased to present to a packed room of underrepresented women who are interested in science. Dr. Heather Lynch presented her research to the room full of students, and told them all about STRIDE, while STRIDE fellow, Lisa Herbert, shared a thoughtful account of her own experiences as a graduate student and the events that led to her current research area of interest. Subsequent local trips were made to Purchase College in Purchase, New York and John Jay College in New York City.

The most surprising aspect of visiting undergraduate students is the lack of information that is available to them about graduate school. For example, many students cited uncertainty of how they would afford going to graduate school and were unaware that STEM programs provide a stipend. With this newfound knowledge, we've begun to tailor our presentation to make graduate school more accessible to students who have not been previously informed.

In addition to local campuses, STRIDE trainee, Adelle Molina accompanied staff from the Center for Inclusive Education on a recruiting trip to University of Puerto Rico, Mayaguez. We had a presence at underrepresented conferences, including SACNAS and Tapia, and plan to continue our efforts of recruiting underrepresented students in 2018 and beyond.

STRIDE trainee, Adelle Molina with staff from CIE and UPR-Mayaguez.