



# Oceanic Occupations

## Teacher Guide

### Grades 9<sup>th</sup>-12<sup>th</sup>

**Program Description:** Join us as we explore a variety of career pathways one can take to care for our animals here at Georgia Aquarium. Dive deep below the waves and explore how animal care specialists, chemists, engineers and nutritionists keep Georgia Aquarium afloat! Students will be able to determine if they are interested in pursuing the careers highlighted.

#### Enduring Understandings:

- ◆ What I am learning in the classroom has relevance for real world careers.
- ◆ Animal care institutions feature individuals with diverse academic backgrounds.
- ◆ Human behaviors have the ability to impact aquatic environments.

#### Objectives:

- ◆ Students will be able to identify potential careers in STEM-related fields.
- ◆ Students will be able to analyze the backgrounds of people that work in an aquarium.
- ◆ Students will be able to explore how human actions impact aquatic environments.

#### Georgia Performance Standards Addressed:

##### Oceanography, Biology and Zoology

**SCSh9. Students will enhance reading in all curriculum areas by:**

- c. Building vocabulary knowledge
- d. Establishing context

**SO5. Students will analyze how the unique attributes of seawater determine the types of marine organisms and the ecology of marine food webs.**

- a. Compare and contrast the physical and chemical structure of pure water and seawater.
- c. Describe patterns and relationships between biotic and abiotic factors among marine ecosystems, including estuaries, coral reefs, open waters and the deep ocean.

**SB4: Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.**

- a. Investigate the relationships among organisms, populations, communities, ecosystems and biomes.
- b. Explain the flow of matter and energy through ecosystems by arranging components of a food chain according to energy flow. Compare the quantity of energy in the steps of an energy pyramid. Explain the need for cycling of major nutrients (C, O, H, N, P).

- d. Assess and explain human activities that influence and modify the environment such as global warming, population growth, pesticide use and water and power consumption.
- f. Relate animal adaptations, including behaviors, to the ability to survive stressful environmental conditions.

**SZ4. Students will assess how animals interact with their environment including key adaptations found within animal taxa.**

- a. Discuss morphological and physiological adaptations relative to ecological roles.
- b. Relate animal adaptations, including behaviors, to the ecological roles of animals.

**SZ5. Students will evaluate the relationships between humans and other animals.**

- a. Describe the effects of human activities such as habitat destruction, over hunting, introduced species, and pollution on animal biodiversity.
- b. Explain the importance of species diversity to the biological resources needed by human populations including food, medicine, and natural aesthetics.
- c. Compare and contrast how humans can preserve animal diversity in human care and in natural environments with regard to habitat creation and conservation, research, legislation, animal enrichment, diet, medical, breeding programs and management of genetic diversity at local and global levels.

**Pre-visit Activity:**

- 1. "A Day in the Life" Reading Assignment

**Post-visit Activity:**

- 2. STEM Career Newsflash!

# “Day in the Life” Reading Assignment (Pre-visit Activity)

**Grade:** 9th - 12th

## **Objectives:**

- Students will describe basic roles and responsibilities of highlighted careers using material provided by Georgia Aquarium employees.
- Students will identify how their current curriculum is directly related to real world careers.
- Students will determine which highlighted career best matches their professional interests.
- Students will develop a plan detailing how they intend to enter the workplace of a highlighted career.

**Duration:** 45 minutes

**Vocabulary:** STEM, Association of Zoos and Aquariums (AZA), chemist, ecotourism, engineering, biochemistry, quality control (QC), problem solving, technology, water quality, design process, robotics, programmer, scientist, interdisciplinary, psychology, skills gap, zoologist, nutritionist and life support. **These are recommended terms students should know as they develop presentations.**

**Materials:** Copies of “Day in the Life” articles for each student

**Background:** Students often think working at an aquarium only entails working with animals and that you need a biology or marine biology background. However, this is not correct. While aquariums do have a number of staff whose responsibility it is to care for animals, aquariums also employ electricians, plumbers, engineers, nutritionists, educators, graphic designers, accountants, veterinarians, chemists, interpreters and computer technicians. Even caring for animals requires more than a biology background. It also requires experience and knowledge in designing and maintaining life support systems, preparing diets, communicating with other departments and checking water quality. It takes all these people to run an aquarium and create the “exhibits” the guests view.

The following “Day in the Life” interviews with Georgia Aquarium employees will hopefully give your students a sneak peek into roles and responsibilities of our STEM-related careers using first-hand accounts.

**Procedure:**

- 1) Have students select two “Day in the Life” articles to read. These articles should be selected based on the students’ own personal interests.
- 2) As the students read the articles, they should record a list of opportunities and challenges associated with each career.
- 3) Once students have completed their opportunity/challenge lists, lead the students in group discussion. Focus on which profession they were the most interested in, why they were interested in that profession and the criteria they will need to acquire a position working in that field.
- 4) Lastly, have students write a one page reflection describing how they will enter their selected career.

## **Cynthia Marrero**

*Senior Laboratory Technician*

*Water Quality Department*

### **1. Can you briefly describe your job roles and responsibilities?**

I support a team of laboratory technicians and volunteers while managing the workflow of incoming water samples on a daily basis. This includes operating the Ion Chromatograph (to look at the level of NO<sub>3</sub> (Nitrate), Ca (Calcium), Mg (Magnesium), K (Potassium) and Sr (Strontium) in a habitat), running pH/Salinity/Alkalinity, NH<sub>3</sub>/NO<sub>2</sub> (Ammonia/Nitrites) tests, Phosphates water quality tests, and making decisions about what chemicals to add to a particular habitat. I am also responsible for ordering inventory for the lab, communicating with other departments and scheduling and analyzing environmental samples (air spore samples and water samples) which are shipped off for analysis at an outside laboratory.

### **2. What academic and/or experiential pathway did you take in order to obtain your position?**

I have a Bachelor's Degree in Biology with a Pre-Medicine concentration and a minor in Chemistry from Georgia State University. My previous experience includes work in an environmental testing laboratory in Norcross, GA for one year before working in the water quality laboratory at Georgia Aquarium.

### **3. What is one of your favorite parts of your job?**

One of my favorite parts of the job is getting to meet all kinds of people. I work with a great group of people, and it is definitely worth it to work with people you can get along with! Also, occasionally working with the animals (helping other departments with any medical procedures or animal interactions) is a definite perk!

### **4. What is one of the most challenging aspects of your job?**

A challenging aspect of my job is dealing with different types of personalities and moods. Everyone has good days and bad days, but sometimes the job can get stressful, and some people may forget to act in a professional manner. Professional communication is something that is very important in this type of situation.

### **5. Do you have any advice for those interested in pursuing a career like yours?**

Take on internships and/or volunteer work. These are essential to get your foot in the door. While working, be sure to help in any way you can. Be polite. Ask questions. Focus on you and where you want to go in life. Make friends. These people could become great contacts that could help you get that job you really want, but never expect anything. Always work hard and do your best!

## **Dr. Chelsea Anderson**

*Associate Veterinarian*

*Veterinary Service Department*

### **1. Can you briefly describe your job roles and responsibilities?**

As a veterinarian you have many roles. Primarily we manage the health of all the animals in the collection. The largest part of this component is preventative health. We perform physical exams and routine diagnostics (bloodwork, x-ray, ultrasound and cytologies on skin, gills and fecal, gastric and exhale samples) to make sure all the animals are healthy. Each animal at the Aquarium is on a routine schedule for exams, and the frequency and diagnostics performed during these exams depend on the species. The goal is to keep the animals healthy and avoid illness. That being said, emergencies do (rarely) happen, and providing medical care to the animal collection is a 24/7, 365 day a year operation. A veterinarian is always on call after hours in case of an animal emergency. Animals don't take holidays! We also take care of sick animals and manage geriatric disease (old age changes, like arthritis). As a part of managing animal health, we also provide medical support for animal transport between facilities and sometimes team with other organizations in animal health assessments or research projects of animals in their natural habitats in efforts to ensure aquatic species continue to thrive.

We also monitor the health of our staff and visitors by doubling as public health officers, educating and monitoring zoonotic disease (disease that can transfer between humans and animals) and encourage safe disinfection and work protocols to minimize disease transfer.

Another large role is education; we mentor senior veterinary students for four to six week externships during their clinical phase of training to help teach them clinical skills when working with aquatic animals. At GAI, we also assist in training the Zoo Med Resident from UGA. Sometimes we provide tours or give presentations to visiting veterinary school groups, undergraduate groups or area veterinarians.

Research and journal publication is also an important component of an aquatic/zoo veterinarian. A lot of the 'techniques' we learn or perform on our patients are new or adapted from domestic species (dogs, cats, horses, etc.) and if something worked (or even didn't work) it is important to share that information with the veterinary community to help improve the medical care we provide to our unique patients.

### **2. What academic and/or experiential pathway did you take in order to obtain your position?**

I attended the University of Michigan (Ann Arbor) and majored in Biopsychology with a minor in biology. During undergrad, I worked in a sheep research lab and also spent a summer as a pre-vet intern at the Clearwater Marine Aquarium, working primarily in rescue/rehab of sea turtles and bottlenose dolphins. I attended Michigan State University for veterinary school. The summer between 1<sup>st</sup> and 2<sup>nd</sup> year, I was an intern in the rescue department at The Marine Mammal Center, managing the rescue of seals and sea lions along the California coast. At TMMC, I

also got experience in medical case management, exams and necropsy (post-mortem exams). The summer between 2<sup>nd</sup> and 3<sup>rd</sup> year I studied a gastrointestinal bacteria in harbor seal pups at the Vancouver Aquarium Marine Mammal Rescue Centre through a Morris Animal Foundation grant. In my clinical training I had externships at SeaWorld Orlando, The Navy's Marine Mammal Program/National Marine Mammal Foundation, The Marine Mammal Center, and the Vancouver Aquarium. Post-graduation, I completed a small animal rotating internship in SW Florida (1 year), an aquatic animal internship at the Vancouver Aquarium (1 year), was a relief vet for the Shedd Aquarium in Chicago, IL, completed a zoo fellowship at Lion Country Safari in West Palm Beach, FL (1 year and then stayed on as an associate for 6 months), and then joined the team at GAI as an Associate Veterinarian in February of 2015. I have presented at multiple conferences and also have a manuscript published in a peer-reviewed journal.

**3. What is one of your favorite parts of your job?**

My favorite part of the job is that no two days are alike. Every day is a new challenge where I get to learn something new and work with amazing creatures and animal caretakers. It really is a privilege to be a veterinarian for so many unique and often endangered species. It is a great feeling to know the medicine and skills I practice here at GAI not only help the animals in our collection, but also help care for and protect animals in their natural habitats - and that I can share my experiences with our guests which encourages them to be more environmentally conscious.

**4. What is one of the most challenging aspects of your job?**

A lot of times there is not a reference (book) to refer to that will tell you how to manage your case. For tricky cases, we do a lot of reading in books and journal articles, often on similar species (sometimes different species) to come up with a diagnostic and treatment plan because what we want to do has never been done before, which is really cool, but also very labor intensive. We also communicate a lot with colleagues at other facilities to see if they have ever treated something similar and get their advice.

**5. Do you have any advice for those interested in pursuing a career like yours?**

Try it out! Find an opportunity to shadow someone who does the job you think you want. If you fall in love, work really hard in school and take advantage of every opportunity to learn something new about the animals you want to work with. The job market is tight, but if you are creative, work hard, and get in the right network with good mentors, you can make it happen. There is no 'one way' to be an aquatic veterinarian, so chose the path that is right for you.

Also, there are other options than just being a veterinarian at an aquarium. You could be a veterinary technician (animal nurse) which requires less school and similar animal contact. Or a wildlife biologist working in the field. You can work in government or legislature formulating policies to protect our aquatic environments... the possibilities are endless!

## **Matt Regensburger**

*Senior Technician*

*Life Support Systems*

### **1. Can you briefly describe your job roles and responsibilities?**

I am part of a team that is responsible for operating and maintaining all of the filtration components. It is an extremely varied position that encompasses many different disciplines to be successful, including mathematics, physics, electronics and chemistry.

### **2. What academic and/or experiential pathway did you take in order to obtain your position?**

I have a Bachelor's of Science in Business Administration. I also completed a minor in classically applied mathematics. Additionally, I took a lot of biology and chemistry coursework before deciding on business. I worked my way from being a store clerk at an aquarium store to an aquarist to eventually a life support technician. Hands on experience and a willingness to learn something new have been key to my training.

### **3. What is one of your favorite parts of your job?**

I love how the job is varied from day to day. I am part pipefitter, part electrician, part plumber, part computer programmer, part biologist, part chemist and part engineer.

### **4. What is one of the most challenging aspects of your job?**

The most challenging aspect of the position is troubleshooting as this is such a complex field that there are rarely easy solutions. As soon as I think I have found a solution, there is another issue to be addressed.

### **5. Do you have any advice for those interested in pursuing a career like yours?**

I would recommend learning as much about aquariums as possible as that will provide a great foundation to build upon. I would then study biology/marine biology in school.



## **Gina Fisher**

*Associate Curator of Mammals and Birds  
Zoological Operations*

### **1. Can you briefly describe your job roles and responsibilities?**

I supervise the animal care personnel and actively manage and monitor day-to-day operations of the department. I am also involved in our animal encounter programs – designing programs, training the staff who lead the program and managing the animal experience with our guests. As an Associate Curator, I am responsible for facilitating professional development opportunities for my staff so they are well versed in current animal husbandry techniques and exposed to advances within the industry.

### **2. What academic and/or experiential pathway did you take in order to obtain your position?**

I have a Bachelor's degree in Psychology and a Master's degree in Animal Behavior and Conservation. I am currently pursuing a Doctorate degree in Psychology.

### **3. What is one of your favorite parts of your job?**

My favorite parts of my job are interacting with guests, my team and the animals. I also enjoy teaching visitors about the animals and the training methods we use to better take care of them.

### **4. What is one of the most challenging aspects of your job?**

This job requires long hours including working holidays. I have even missed out on family events. If an animal is sick, we have to be here to help care for the animals no matter what time of day it is.

### **5. Do you have any advice for those interested in pursuing a career like yours?**

Stay true to yourself and pursue your passion. If you want this, then go and get it. No matter what, don't give up.

## **Michael Hanft**

*Education Specialist*

*Education Department*

### **1. Can you briefly describe your job roles and responsibilities?**

The majority of my job includes leading school field trips during the school year both in-house and at schools. During the summer, I lead week-long camps on a variety of topics. When I'm not teaching, I work on creating or expanding our programming to ensure that programs correlate to what students are learning in their classrooms.

### **2. What academic and/or experiential pathway did you take in order to obtain your position?**

While in college, I was on track to get a Bachelor's degree in Biology. I was all set to get a job working in a laboratory doing research on plant pathology. Then my senior year, I volunteered at a local nature preserve taking elementary school students on hikes through forests. Through that experience, I fell in love with teaching. There was something special about turning my passion for nature into an inspiration for others and using my knowledge to teach others about the world around us. After graduation, I was motivated to continue seeking out teaching opportunities, through internships, seasonal work and volunteering, so that I could gain the knowledge and skills needed to be an environmental educator. Today, I continue to build my knowledge and skills by attending professional development workshops to learn different teaching methods and build my professional network.

### **3. What is one of your favorite parts of your job?**

I think the most fulfilling part of my job is the excitement on kids' faces as they enter the Aquarium. However, I also really enjoy doing something different every single day.

### **4. What is one of the most challenging aspects of your job?**

One of the most challenging aspects of my job includes working with students of all different ages and educational backgrounds. It is unbelievably difficult to teach high school students for an hour and then turn around and teach kindergarteners for an hour. Over the past seven years, I have gained a deep understanding of the incredible amount of work that goes into teaching students. This job takes more than just a love of teaching and animals. It has required me to learn more about computers, art, chemistry, mathematics and psychology than I ever thought I would.

### **5. Do you have any advice for those interested in pursuing a career like yours?**

Do what you love. Passion will make any job better, easier, and more enjoyable. During my college years, I thought I wanted to go into scientific research. However, it wasn't until my senior year that I discovered my true passion was teaching others about science. Your educational pursuits can lead you to any job you want in the future. Take every chance you get to teach others, and learn how to improve from each experience. In school, focus your studies on psychology. Learn to think about how people learn. But most of all, have fun with it.

## **STEM Career Newsflash!** (Post-visit Activity)

**Grade:** 9<sup>th</sup> -12<sup>th</sup>

**Objective:** Students will investigate various STEM-related careers of interest at Georgia Aquarium. All students will present their findings in one of three communication formats – brochure, graphic panel or news article.

**Duration:** homework assignment with a 15 minute in-class presentation

**Vocabulary:** STEM, Association of Zoos and Aquariums (AZA), chemist, ecotourism, engineering, biochemistry, quality control (QC), problem solving, technology, water quality, design process, robotics, programmer, scientist, interdisciplinary, psychology, skills gap, zoologist, nutritionist and life support. **These are recommended terms students should know as they develop presentations.**

**Materials:** Research materials include but are not limited to resource books, internet, peer-reviewed scientific journals and Microsoft Office Suite (or similar software).

### **Procedure:**

- 1) Have students reflect back on their visit to Georgia Aquarium and discuss each STEM-related career that was highlighted.
- 2) Working either individually or in small groups of 2-3, have student(s) select one career to further research. Research should include general information about the chosen career such as minimum educational and experiential requirements, or average salary in that field, career demand and availability, an action plan of steps to follow to obtain their career, and why this career was of interest to them.
- 3) After gathering information on their selected career, students should use Microsoft Office Suite or similar software to create a brochure, graphic panel or news article about their selected career.
- 4) Once completed, have students present their brochure, graphic panel or news article to the entire class with a short 5-7 minute presentation. Have the other students use the attached assessment rubric to grade each presentation as it is being given.

### **Assessment:**

Use the attached scoring sheet to score each student in the following areas:

- Creativity
- Accuracy
- Flow of information
- Did they address the STEM career selected and provide a suggested action plan for obtaining that career
- Verbal presentation – did they articulate the topic clearly

## Resources:

1. **Marine Careers: A Sea Grant Guide to Ocean Opportunities:**

<http://www.marinecareers.net/>

Browse this useful website that highlights a host of careers in the marine sciences! Marine biology, oceanography, social policy and ocean engineering are but some of the professions students can identify and determine if such careers can benefit from their unique skills set.

2. **Marine Conservation Institute:**

<https://www.marine-conservation.org/who-we-are/jobs/career-resources/>

Students can explore career resources for marine science and conservation professions. Answer questions like “How do I become a marine biologist? How do I become a conservation advocate?”

3. Association of Zoos and Aquariums

<https://www.aza.org/careers-zoos-aquariums/>

Student can explore careers in the zoo and aquarium field.

# STEM Career Newsflash!

**Student Name:** \_\_\_\_\_

**Group Name:** \_\_\_\_\_

**STEM Career:** \_\_\_\_\_

**Product Format:** \_\_\_\_\_

## Scoring sheet:

Did the student(s)...	Total Points	Possible Points
Creatively design their product and tell the "story" in unique way?		15
Provide accurate and unbiased information?		10
Present the information in a logical format?		15
Provide an action plan on how to obtain the career?		20
Explain how and why this career was interesting to them?		20
Articulate the topic clearly in their presentation?		10
Use proper grammar and spelling?		10
Overall		100