Public Facing Links:

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https://research.noaa.gov/News/Scientist-Profile/ArtMID/536/ArticleID/2604/The-building-blocks-of-life-A-day-in-the-life-of-a-NOAA-%E2%80%98omics-scientist

The building blocks of life: A day in the life of a NOAA 'omics scientist

In honor of Women's History Month, NOAA scientists from across the country are taking readers inside what a typical day in their life looks like. Today's story comes from Kelly Goodwin, a microbiologist at NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML). Kelly is a co-chair of the task force that's laying out the plan to implement NOAA's Omics Strategy, one of four science and technology strategies that aim to guide transformative advancements in the quality and timeliness of NOAA science, products and services.

I'm a microbiologist, so what has always drawn me to the oceans is biology of all kinds — even the kind that you can't see. Because even though microbes are too tiny to see by eye, you feel their impact every day. They regulate all the fundamental biogeochemical cycles, like oxygen, carbon, nutrients, and metals. Life depends on microbes. **They're these tiny things that affect the whole world, and I've always found that fascinating.**

Kelly speaks at the All-Atlantic Ocean Research Forum in Brussels.

My typical workday requires balance. On the science side, it involves working on my projects, which use molecular techniques to characterize the microbiomes of the ocean, and working with postdocs and technicians to analyze data and figure out what to do next in our research. That's balanced with promoting and communicating what other NOAA scientists are doing with 'omics, which is the study and use of molecular elements — like DNA, RNA, or proteins — to learn about the oceans and the creatures that live in them.

As the co-chair of the 'Omics Strategy task force, my role was to help write the strategy and the (pending) implementation plan for new 'omics research. The plan represents NOAA as a whole, so I had to become familiar with how scientists across NOAA are working within 'omics, including people who are working on harmful algal blooms, environmental DNA (eDNA) of fish and protected species, and more. This involves learning what other scientists are doing and figuring out how to tell their stories to government

leaders and the public so that we can better explain why working with ‘omics will help NOAA meet mission objectives.

Kelly Goodwin in Lake Erie posing with autonomous vehicles (AUVs), along with colleagues from NOAA’s Great Lakes Environmental Research Laboratory (GLERL) and the Monterey Bay Research Institute (MBARI).

Through this work, I’ve also been involved with a lot of partnerships and have been able to work with scientists from a lot of different countries. Through my work with the Atlantic Ocean Research Alliance (AORA), I was invited to Brussels to speak to about 600 people at an event called the All-Atlantic Ocean Research Forum in early February 2020. I gave a brief talk about the **microbiome, which is all the different critters, from viruses to phytoplankton and bacteria that make up the majority of the biomass of the ocean**. I talked about the ways ‘omics can help us discover new molecules and new drugs, and that using the microbiome can help secure sustainable food chains and better understand environmental and climate impacts to the ocean.

Kelly takes a selfie with an AUV.

That experience was satisfying and fun because I was able to take the stories about what I do personally — and what many other scientists do — and communicate them to an international audience, trying to spark fascination and optimism about solutions to sustaining ocean services. That’s what I really enjoy right now about my job — **not only do I get to do my own research, which is fascinating and fun, but I also get to tell people about all the cool research we do at NOAA.** I feel lucky to be able to tell people about how interesting and fascinating and cool the ocean is — but also how important it is to their everyday lives. NOAA is working on issues that affect people every day, from the oceans regulating climate and keeping the earth livable, to feeding people with seafood and aquaculture, and creating jobs in tourism, fisheries and more. I’ve been really grateful for the opportunity to take part in one of these four main strategies for NOAA, and play a small part in communicating the fascinating and important research the agency does.

Microbes are hard to study — under a microscope, you just see dots or squiggles. It wasn’t until ‘omics technologies came along that we could look at DNA, RNA and proteins, and really start to unlock mysteries of the microbial world. And as we’ve done so, we’ve realized that the world is more complex and diverse and interconnected than we ever thought before. Working in ‘omics is like being an explorer. I can sit at my desk and look at A, T, G, and C’s (the DNA code letters) and explore the depths of the oceans by looking at DNA sequences. **And to be able to do that at NOAA — to be able to blend that basic scientific curiosity with something that can benefit the average person — that’s the perfect combination.**

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"*eDNA is tissue-free," said Kelly Goodwin, a microbiologist at NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML). "So instead of having to take a biopsy or a tissue sample, or physically capture the animal, the idea is that you can just use seawater to figure out where animals live*." Meet Our Scientists: NOAA Research Scientist Profiles. The DNA found in sea turtle poop could be scientists' newest monitoring tool. Tracking the signal of environmental DNA, or eDNA, can be used to track animals themselves. https://research.noaa.gov/News/Scientist-Profile/ArtMID/536/ArticleID/2454/The-DNA-found-in-sea-turtle-poop-could-be-scientists%E2%80%99-newest-monitoring-tool. May 17, 2019.

"*The lessons learned during this experiment will help NOAA define the operational requirements that will guide MBARI's development of the instrument," added Kelly Goodwin, a NOAA researcher working on the project. "The result will be a nimble tool that can navigate the shallow waters of the lake 24/7, even at night or in foul weather*." MBARI robots cruise Lake Erie looking for toxic algae. https://www.mbari.org/esp-lake-erie-2019/. August 26, 2019.

"*The LRAUV is a nimble approach to ecosystem assessment. The instrument can be deployed day or night and in foul weather, allowing rapid response to events," said Kelly Goodwin, a coauthor of the study from the National Oceanic and Atmospheric Administration (NOAA). "Because a big, expensive ship is not required, samples might be collected more often. Better sample coverage could aid models and forecasts, which help keep waters and seafood safe and help sustain the services we get from the ocean, like fishing*." "An autonomous vehicle coupled with a robotic laboratory proves its worth", https://phys.org/news/2019-08-autonomous-vehicle-coupled-robotic-laboratory.html. August, 15 2019.