

Brains On (APM) | Brains On! Lighting the way for sea turtles at Gulf Islands National Seashore
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MOLLY BLOOM: Your big questions drive *BrainsOn*. Your curiosity shapes each episode. And your support can help make more episodes of the podcast that you love. You can make a tax deductible year end gift to *BrainsOn* at brainson.org/donate.

Welcome aboard the SS Brains On, the finest submarine public radio can afford.

CARTER Why are we in here again?

WHATLEY:

MOLLY BLOOM: We're doing a series on national parks, remember?

CARTER Right, right. But are we in the ocean?

WHATLEY:

MOLLY BLOOM: Yes. Yes, we are.

CARTER So where's the park?

WHATLEY:

MOLLY BLOOM: Dead ahead. Today, we're exploring the Gulf Islands National Seashore on the banks of the Gulf of Mexico.

CARTER Cool. I see it coming right towards us. Shouldn't we be slowing down?

WHATLEY:

MOLLY BLOOM: You know, I never actually figured out how to stop this thing, so yeah.

CARTER I should probably buckle up right about--

WHATLEY:

MOLLY BLOOM: Yeah, I'd say that's a great idea. Let's both buckle up. And while we're at it, cue the theme song before things get messy.

CARTER Keep listening.

WHATLEY:

[MUSIC PLAYING]

MOLLY BLOOM: You're listening to *Brains On* from MPR News and Southern California Public Radio. My co-host for this series of episodes on the national parks is Carter Whatley. Hi, Carter.

CARTER Hello.

WHATLEY:

MOLLY BLOOM: Carter lived the first 13 years of his life inside Yosemite National Park. If you want to hear a bit about what it's like to grow up inside a gorgeous national park, check out our episode about Wind Cave. Thanks for being here, Carter.

CARTER Of course.

WHATLEY:

MOLLY BLOOM: Now I am excited about this next story.

CARTER Me, too. Sea turtles are fascinating, mysterious creatures. They spend most of their lives in the water.

WHATLEY:

MOLLY BLOOM: Their journeys begin as eggs in nests or sand covered holes on the beach.

CARTER Eggs hatch. The baby turtles dig out of the hole and scamper into the ocean.

WHATLEY:

MOLLY BLOOM: A mother sea turtle returns to the very same beach 20 to 30 years later, depending on the species, to lay her eggs.

CARTER Our story today focuses on how those baby turtles know where to go. It has to do with light from the moon and

WHATLEY: stars.

MOLLY BLOOM: Moonlight and starlight reflect off the water and waves of the ocean.

CARTER Baby sea turtles are instinctively drawn towards the brightest light. What should be those reflections. Off to the

WHATLEY: ocean they go.

MOLLY BLOOM: Over the past couple decades, however, more and more baby turtles are getting lost. They aren't making their way to the ocean.

CARTER Producer Marc Sanchez went to the Gulf Islands National Seashore in Florida to follow this story of light.

WHATLEY:

MARC SANCHEZ: I have an assignment for you. Next time you're home at night, turn off all the lights. Go outside and look up. You probably see some stars. Maybe the moon, depending on how full it is. But there's a really good chance that you're going to see a glow coming from all around. The light from the buildings, streetlights, cars. These lights are called anthropogenic light.

The word "anthropogenic" comes from the Greek word "anthropos," for "human," and "-genic," meaning "caused by." So basically, anthropogenic light is light caused by humans. The bigger the city, the more opportunities for a brighter anthropogenic glow. Another term for this glow, light pollution. And if you're a baby sea turtle coming above ground for the first time ever, these different sources of light can be confusing.

If the light of, say, a shopping mall is brighter than the light of the moon reflecting off the ocean, these young turtles might become disoriented and head towards the mall instead of the sea.

REED I've had the opportunity to be at a few of the nests as they were hatching and have had quite an honor in my

HARWELL: opinion to hold a sea turtle. I believe it was a loggerhead, about a year ago.

MARC Wow.

SANCHEZ:

REED And it was a life-changing experience.

HARWELL:

MARC That's 15-year-old Reed Harwell Reed and his dad are part of a citizen science project at Gulf Islands National Seashore. It's called Turtle Teens Helping In the Seashore, or Turtle THIS. Citizen science is the term we use for when non-scientists help do the work of actual scientists. Maybe you've counted birds or tracked a butterfly across the country. That's citizen science. Pretty cool.

Turtle THIS volunteers help measure light in the night sky above Gulf Islands National Seashore. They want to find out how bright lights are, especially during the summer and early fall months when sea turtles lay their eggs. It's really important to know how much anthropogenic light is visible on the nights turtles emerge from their sandy nests.

REED We were just out at that nest at maybe 11:00 or so. And we had gotten home at 11:30. And then we got a call
HARWELL: saying that the nest had hatched, and so we just went right back out.

MARC Scientists and volunteers at this nest had to intervene. They had to point the close to 100 palm-sized turtles in
SANCHEZ: the right direction.

REED The nest that I was alluding to was directly behind one of the larger hotels on Pensacola Beach. And specifically
HARWELL: closer to its parking garage. And that is a lot of anthropogenic light immediately right outside that nest. And so we had to take them from the nest site itself and move them down the beach to maybe five feet from the water's edge so that they had a lesser chance of accidentally turning around and going back towards the manmade light.

MARC Within three days of the turtles' emergence, the Turtle THIS team goes out to the hatch site to take a complete
SANCHEZ: measurement of ambient light. That means all the light, anthropogenic and natural. Measurements are taken with two different SQMs, or Sky Quality Meters. SQMs are photometers, which means they can measure the intensity of light.

HEATHER So there is two SQMs or Sky Quality Meters. There is unfiltered, or which gets all light that comes into it. And
AFFORD: then the other one is a blue lens.

MARC That's Turtle THIS coordinator Heather Afford, explaining sky quality meters to a group of volunteers. The blue
SANCHEZ: lens she was talking about is a filter that only lets invisible light in the blue spectrum. The light of the moon and the stars, natural light, is filled with light from the blue spectrum. And by comparing measurements of all light to blue light, we can begin to get a picture of where the most anthropogenic light is coming from.

As night began to fall on a warm October evening, Heather and I met up to collect some data. We were going to a couple of nest sites where turtles had recently hatched. Sky quality meters in tow, we headed out to the beach. White sand dunes made up of fine quartz lined both sides of the narrow highway. We carefully made our way around the dunes to the nest site, about 50 yards from shore.

The SQMs are these rectangular metal boxes. They're about the size of a plate of French toast. They're stacked up on top of each other and set up on a tripod.

HEATHER So the first thing we do is the horizon. So I'm going to go around from 0 to 15 to 30 every 15 and I get a horizon
AFFORD: altitude, and that's what this is. So you're just going to go down this line. So it's going to be like, OK, here it's 10--

MARC Heather shoots a green beam from a laser pointer mounted on top of the SQMs. With it, she locates the horizon.
SANCHEZ: That spot where the land appears to meet the sky in the distance. Since we're set up as close as we can be to the nest site, this view of the horizon is pretty close to what the newborn turtles saw when they came out of the sand.

HEATHER Like seeing the darkest points meet the light point.
AFFORD:

MARC My equipment for the night, a pen and a couple of sheets of paper. Maybe not as high tech as a sky quality
SANCHEZ: meter, but still, I have a very important job. I have to correctly record the data Heather collects. She measures light in a complete circle at the horizon. Then bumps the meters angle up to 10 degrees altitude. And circles around again. Then again, and again. Each time at a higher angle.

When we finish, the meter is pointing straight up into the sky to take one final measurement, the zenith. The whole time we're at the site, we are very careful to use as little light as possible. We each have a flashlight and a headlamp to find our way. But they don't shine like you might think. I'll tell you a little bit more about these special lights in just a minute.

But first, Molly has something else in store for you.

MOLLY BLOOM: It's time for the mystery sound.

[MYSTERY SOUND CUE]

AUDIO TRACK: Mystery sound.

MOLLY BLOOM: Here it is.

[CLACKING]

Any guesses?

CARTER It sounds like someone picking up rocks or moving rocks around.

WHATLEY:

MOLLY BLOOM: Excellent. We'll be back with the answer later in the show.

CARTER Do you have a mystery sound you like to share with us?

WHATLEY:

MOLLY BLOOM: A question you want answered on the show?

CARTER Or maybe you just want to send us a drawing or a high five.

WHATLEY:

MOLLY BLOOM: Email us any time. We're at brainson@m-- as in Minnesota-- pr.org.

CARTER Or you can find our mailing address at our website, brainson.org.

WHATLEY:

MOLLY BLOOM: And if you're a fan of the show, please consider leaving a review in iTunes.

CARTER It really helps other kids and families find out about the show.

WHATLEY:

MOLLY BLOOM: Now is the time in the show when we send high fives to all the kids who fuel this show with their creativity and energy. Here's the most recent group to be added to the Brains Honor Roll.

[LISTING HONOR ROLL]

AUDIO TRACK: Brains Honor Roll. High fives.

CARTER You're listening to *Brains On*, from MPR News in Southern California Public Radio. I'm Carter Whatley.

WHATLEY:

MOLLY BLOOM: And I'm Molly Bloom. Before we go back to the Gulf Coast of Florida, let's hear that mystery sound again.

[CLACKING]

What do you think? Any new guesses?

CARTER No, not really.

WHATLEY:

MOLLY BLOOM: Here's the answer.

LAUREN This is the sound of hiking around on little pieces of petrified wood. It often sounds like glass because it's also

CARTER: made of silicon dioxide.

CARTER Whoa.

WHATLEY:

MOLLY BLOOM: Yeah. It's really cool. And that is Park Ranger Lauren Carter from Petrified Forest National Park.

LAUREN Some petrified wood is farther along in the fossilization process. And it sounds very heavy and dense, making a

CARTER: clunky noise. Other pieces are a little bit lighter and brittle, and they make more of a clinking noise, like glass.

The paleontology here is very rich. Just this morning in the few hours that I was hiking in the wilderness, I actually took photos of and recorded three different fossil bone fragments that I can show to the paleontologists.

I didn't collect them though, because only the paleontologists or the scientists with research permits are allowed to do that.

[VOCALIZING]

AUDIO TRACK: Brains On.

CARTER Now back to the Gulf Coast of Florida. The Gulf Island seashore is a good place to hang out with turtles in the

WHATLEY: dark.

MARC When we left off, we were talking about how light generated by humans can disorient a baby sea turtle's sense of direction. We were hanging out in the dark measuring this light, trying to see how sea turtles might be affected. **SANCHEZ:** But we need light to do our own work. And that means red.

Whenever Turtle THIS volunteers head out, they're very careful to only use lights with red filters. Remember how one of the sky quality meters had a blue filter to measure blue light? Well, if you look at the visible light spectrum, the light that we can see, blue is on the high end. Its wavelengths are closer together, which translates to more energy. Red light is on the other end of the visible light spectrum. Its wavelengths are longer and have less energy.

Turtle THIS volunteer Reed Harwell has a good explanation.

REED The red lights not only help our eyes, but are also the least distracting for sea turtles. If we come across them **HARWELL:** when they're hatching, those are the ones that are less likely to orient them. And so they'll be more likely to focus on the natural light.

MARC The natural light of the moon. **SANCHEZ:**

So if you find yourself out for a night stroll on the beach during turtle nesting season, make sure to bring a red flashlight. Or better yet, says Heather Afford--

HEATHER If you're walking on the beach if there is nothing you're specifically looking for and you're not walking through **AFFORD:** dunes, if you're just walking on the shoreline, you should be OK at night. So just don't use light at all. Try and use the moonlight, honestly. Act like a sea turtle. Feel like a sea turtle. Use the moonlight to guide your way.

[MUSIC PLAYING]

MARC Looking at light pollution and measuring the brightness of the night sky helps inform the role we play in turtles' **SANCHEZ:** lives. The street lights around Gulf Island's National Seashore, for example, emit less blue light than your average city street light. They've also been outfitted with special lampshades so the light doesn't spill out everywhere. Even the locals have learned a thing or two. Turning off porch lights and tinting their windows, all in the name of turtles.

But still, why all the fuss over these little turtles? I mean, besides the fact that there's so adorable, well, even tiny shifts in nature can have huge consequences down the road. In this case, turtles helped to strengthen the sand dunes. The ones that don't make it to the ocean decompose and provide important nutrients for vegetation on the beach. That vegetation forms the framework that makes up the sand dunes. And the dunes help protect homes and businesses from stormy weather.

But we shouldn't try to protect them just so we can protect ourselves. We still have a lot to learn from these mysterious sea creatures.

REED Sea turtles have survived for so long, and they haven't changed very much. So it's almost like you're holding **HARWELL:** history. And you're also holding the future of sea turtles in this area. Because one or two in the 100, 120 of the turtles in that nest will hopefully come back and nest in the same spot. Keep the population going.

[MUSIC PLAYING]

MOLLY BLOOM: You can check out the rest of our series on the national parks at our website, brainson.org, or wherever you usually listen.

[MUSIC PLAYING]

CARTER *Brains On* is produced by Marc Sanchez, Sanden Tottten, and Molly Bloom.

WHATLEY:

MOLLY BLOOM: Thanks to Susan Teal, Matt Harwell, Leslie Whatley, Lauren Dee, and Corey Schreppel.

CARTER You can see photos from Gulf Island National Seashore on our Instagram.

WHATLEY:

MOLLY BLOOM: We're at @brains_on.

CARTER And that's our Twitter handle, too.

WHATLEY:

MOLLY BLOOM: You can also keep up with us on Facebook or by subscribing to our newsletter. You can do that at brainson.org.

CARTER Thanks for listening.

WHATLEY: