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Welcome to Doing What Works: Exploring the Blue Economy, a podcast series that dives deep into the vast potential and challenges of the blue economy. I'm your host, Ashanti Blaze Hopkins, interim associate dean at Santa Monica College's Center for Media and Design. Together, we'll navigate the uncharted waters of this exciting and rapidly growing sector. Joining us on the podcast today is a couple who is taking the term "Farm to Table" to a whole new sea level. This husband and wife team have a love of the ocean and met while studying marine biology at Humboldt State University. Ever since he could crawl, you could say he's been an ecologist, always exploring the dirt, worms, trees, and snakes in his own backyard. She is a Californian through and through, whose research on the North Coast led her to find her passion in tide pools and seaweed. Together, they work at the company they co-founded, Sunken Seaweed, as farmers, but not the kind you're probably thinking of. Torre Polizzi and Leslie Booher, thank you so much for joining us on the podcast today.

Torre: Hi Ashanti, thank you so much for having us, and thanks for creating this Blue Economy podcast. It's right up our alley, so we're really thrilled to be here.

Ashanti: I'm so happy to be joined with you guys today. So here is our first question that we ask every one of our Doing What Works podcast guests: What was your first job ever, and what did you learn from that job that helps you do the work that you do today?

Leslie: I'll start. My first job ever, probably well before I should have been doing this, back in the '90s, I was a babysitter. So I was a kid watching other kids throughout my neighborhood since I was, you know, nine or 10. I have been taking care of other people's kids for a really long time, and that taught me a lot about providing care to others, to folks who are less able to take care of themselves. But also, kind of the need to foster and build my own independence during, you know, scary times with kids. So yeah, that was my first gig. It taught me a lot. It definitely steered me into the person I am today.

Torre: I grew up in a restaurant. My parents owned a family restaurant, so my first job ever was dishwashing, lots and lots of dishes. And I don't know if that exactly taught me too much, but it gave me a good work ethic and taught me how to be somewhere on time and how to work under some pressure.

Ashanti: We referenced this a little bit in the intro, but I kind of want to dig a bit deeper into this. At what point did both of you start to become interested in the ocean, and when did you discover you could make a career out of this?

Leslie: That's a great question. I had been interested in the ocean since my first trip. I grew up in San Jose, the Bay Area. In second grade, I took a trip to the Monterey Bay Aquarium on a field trip, and that blew my mind, as it would anyone who goes to that aquarium for the first time. That got me really interested in the ocean. And then it wasn't until I was going into junior college, I took an oceanography class. I got involved with an ocean conservation nonprofit called Wild Coast Salish and started doing some tabling events, you know, ocean outreach things, and just saw how much need there was for ocean conservation and restoration, and how much interest there was in just everyday folks at festivals, at fairs, saying, "Oh, I really care about whales. I really care about eelgrass. I will sign a letter to my representative." How I was going to turn that into a career at that time, I didn't know. But I knew from that early age that I wanted to be involved in space in some way.

Torre: Yeah, I'd say my interest in the ocean didn't come until a little later in life. I grew up in San Diego, very close to the ocean, and I love the ocean, you know, I always have. But it wasn't until I was in my first scuba diving class at HSU Cow Poly Humboldt, now offers scuba diving from beginner all the way to scientific. It wasn't until that class that something clicked, and I became infatuated with the ocean, couldn't get enough of it. So it really changed your perspective to take those kinds of courses and be in the environment where you're learning stuff out of books.

Ashanti: Let's talk about your company, Sunken Seaweed. What you're doing is really aquaculture, underwater farming, and it feels like this could be a model for other similar businesses in California in the aquaculture and blue economy space. What is so special about Sunken Seaweed?

Leslie: I think that we're not remarkable in most ways. I think the most remarkable thing about us is that we saw that there was a little bit of potential and a lot of hurdles, and we decided to go for it anyway. So the fact that we started back in 2017 and are still here, the most special thing about our company, when folks start to learn that seaweed aquaculture is possible in California, and they start to go for it, they quickly learn that, yes, it's possible, but also there are lots of hurdles in terms of permitting, access, and just resources. There's a scarcity of resources for startups in this space. So I think that's what's special about us, is that we have seen the landscape and then we have just taken paths of least resistance, surrounded ourselves with folks that are most likely to be able to help support this very new, very many-question-marks-involved kind of industry.

Torre: Getting the nuts and bolts down took a long time, and it was successful for us because we have continually worked with the places that can make it happen. So in

California, specifically, those two places right now are the Port of San Diego and the jurisdiction, which they operate San Diego Bay and beyond, and up here in Humboldt right now with the Harbor District. So these are the only two places in the state of California that have pre-permitted aquaculture lease spaces. That's really important because without those pre-permitted lease spaces, it becomes the job of the business to permit that space. And what that usually takes is an environmental impact review, which is necessary. We have to do that. But it's also super expensive. And unless you're ready to shell out hundreds of thousands to a million dollars for an EIR, it's just a non-starter. So working with those agencies, with the people that we're working with, really gave us a leg up in identifying these places that it's possible right now in California.

Ashanti: You just mentioned that when you have folks come out and see your operations, you're having them try the seaweed. There's a lot of different products that Sunken Seaweed produces. Can you tell me about the wide range of those products and what we're talking about here? And if you're a consumer, where can you start to purchase these things? Or if you're a restaurant, where can you start to purchase what you're creating?

Leslie: We really just started our commercial line of products this last May, so we're very new. You can't find them in many places outside of Northern California yet or San Diego. We're in a few stores, but the products that we focus on are fresh and dried seaweeds right now. We have a line of fresh seaweeds that we grow in tumble culture. So that's in an upland facility that lets us really control the environment a lot more, the look of the seaweed, make it really culinarily beautiful, you know, product to get to restaurants, to package up, get to grocery stores, farmers' markets. And we've figured out the right kind of species to package and have like a shelf life of about a week and a half as fresh seaweed. So people can enjoy that all week, just like any produce. We also have a line of dried products that we just started. And that's using the seaweed that we grow out in the bay, so on the long lines, the bulk kelp. This year, we're adding Alaria marginata to that species list. So that is like California's version of wakame. It's a beautiful species to be growing, and it tastes great. We are taking all that biomass, we take it out to a greenhouse, dry it up, back to a mill, and our line of products right now is a bunch of flaked products, which are really fun to sprinkle on things. In the future, we're going to be looking at making some totally California-based seaweed sheets that you can use with sushi. So really fun things like that right now you can only find coming out of Korea or Japan or China, where they make good products, but how fun is it to be able to use a totally local product in that way?

Ashanti: It's so interesting because, you know, I think when people will try to wrap their head around this idea of underwater farming and what that can be and the benefits of it,

you know, I don't even think people understand how this can impact the environment that you all are in the state of California and also the people who live here. Can we talk about that impact and why that's so important to sustainability, to the future of our environment?

Leslie: Absolutely. I totally agree with you, Ashanti, that people, like, the curtain is going to be lifted for so many minds about, like, "Wow, seaweeds are really a positive impact on their immediate ecosystems." But I'll also say, you know, in line with what Torre was just saying, every week we go to a farmers' market, our local farmers' market, and we chat with folks about our seaweeds. And so many people, either they know a little bit about seaweed aquaculture and its environmental possible benefits, or we're telling them something that they already know, you know, like it clicks for people so intuitively that growing this seaweed, this very extractive seaweed that grows very quickly, photosynthesizes really well, and is taking up nitrogen, phosphorus, carbon dioxide, all of these things, rapidly sequestering, people get it, you know? They're just so ready to hear about that. And so we do try to quantify those benefits. You know, we have partnered with researchers since we've existed, and of course, we're entrepreneurs now, but we're marine ecologists at heart and by training. So we are really dedicated to quantifying nutrient sequestration, looking at carbon sequestration as well, looking at pH buffering because we know that kelp grown in the ocean can have really great pH buffering effects, at least locally. So if you're incorporating bivalves like oysters and mussels, growing your seaweeds around them could have these great potential benefits for shelled organisms. So things like that are of great interest to us. And of course, one of the main reasons that Torre and I got started in this line of business is the idea and the potential for kelp restoration. So we came into the marine ecology world at a time where kelp forest canopies were collapsing, and we do see seaweed aquaculture as a means to proliferate that idea and to get that idea into more people's heads and hands, really.

Ashanti: You talk about the kelp forest collapsing. What are the ramifications of that? What does that mean if someone is not kind of entrenched in marine biology or marine ecology? How does that impact the overall ecosystem that we rely on?

Torre: Yeah, so kelp, you can think of it as a foundational species. So if you think of a pyramid, that base of the pyramid, that's your foundation. That is what these canopy-forming kelps are in our ecosystem. And when you take that away, really everything collapses. That's what we've seen since 2015, like Leslie was saying. So in the story of Northern California's kelp beds, we had warm water come down the Alaskan shelf through California, a lot warmer than usual. These, they're called warm water blobs, is what they've been termed. And that fueled microbial and viral activities, which led to the

death of almost all of our sea stars that eat urchins. Pycnopodia, the sunflower sea star, is one of those really important ones that is now, I think, on the endangered species list. And when you let something like urchins go out of check, it'll just eat all the kelp and take away all the habitat for intertidal and subtidal species. So that's what we saw happen. And I guess that's how people can think about it. You know, kelp is one of the most important things for our coastal ecosystems. It's the refuge. It's the place that, you know, everything forages and eats, and it's just a really important part of the place we live.

Ashanti: Leslie, you mentioned earlier about the importance of students being exposed to aquaculture and what that could mean for their future careers. Fortunately, SMC has an aquaculture program launching in the fall. For those who complete that program, what kinds of jobs might be waiting for them at a company like yours or in the aquaculture industry in California in general, and what skills would those students need to master in order to break into the industry?

Leslie: We have students from College of the Redwoods, which is our local community college, in an internship program. Thankfully, our junior college community college has a similar certificate program with aquaculture. So we get to tell them firsthand, kind of, "This is what it looks like." Skills involved are, you know, first of all, it's just an eagerness to learn about aquaculture in this ecological context, right? I think anyone who's grown up in the last couple of decades has a keen interest to look at things in an ecological context. So that's the number one thing that I would say is that curiosity for the everyday logistics, the ability to scrub tanks, more often than you think you need to. A lot of plumbing skills are just really, really, really important to have in terms of hatchery building and, you know, just knowing the physics associated with how water moves through pipes and things is such an underappreciated skill that we really had to quickly learn how to beef up. And then another skill or sort of area to investigate or to master, I think, is in economics, right? So seeing how you can build a business plan for aquaculture, whether it's shellfish, finfish, or seaweeds, that fits a model that's not the traditional linear capitalist model, right? Because so much of aquaculture, especially this restorative aquaculture field, just doesn't adhere to a linear economic model. So understanding or coursework in circular economics, I think, and in, you know, regenerative economic models is going to do wonders for this blue economy workforce that we're all creating. And then where students can go from that when they get their certificate, what I can say for us in the last four or five years, the students who have volunteered or interned or worked with us have gone on to really exciting fields in animal husbandry at marine laboratories, things like that. They've gone on to some fabrication jobs in aquatic tank building, things like that, things pertinent to that skill set that they gained with us. And just higher education, yeah. And gone into really cool

master's and four-year programs with an interesting lens of, "How can I make a seaweed master's or, you know, a shellfish seaweed project?" So I guess those are some of the few. It just feels like there's such a wide swath of things that a student who completes a program like this could be able to do. And just the entry level kind of introduction into the industry seems invaluable to what they could do in the future.

Ashanti: Let's talk about the future for a second. What would be your dream state for the blue economy in the state of California, especially in your area of aquaculture? If you had a little magic wand and you could just boop, what would that look like for the both of you?

Torre: Well, personally, I would really like to see, you know, a lot of cooperative, farmer models going down the state. So staying away from things like mega seaweed farms and looking more into state waters and, you know, having a lot of people have a hand in doing seaweed aquaculture and working with each other. I would love to see something like that. And I think we're at a point where it can be shaped like that right now. We're at the beginning of it all. So that's not typically, you know, how things work in California. Usually, you know, a big dog gets, you know, a huge piece of something. But we're here to try and make our vision happen.

Leslie: What would your dream state be?

Leslie: I think, you know, in having worked in San Diego and Humboldt Bay where the port has done this pre-permitting work and kind of done the heavy lift of allocating spots, I see that happening throughout California and I see these local jurisdictions taking that on, seeing the successes, also seeing the programs being created in community colleges, right? These certificate programs are huge because they are influencing the minds and the mentality of these local jurisdictions and of our legislators, right? So the fact that these programs have resurfaced in the last few years, you know, when we started, there were really not many aquaculture programs, if any, to pursue in California. So the fact that they're becoming a real kind of statewide presence is huge, and I see that as one of my main kind of magic wand ideas is that this aquaculture seaweed and other aquaculture becomes accessible to all interested and not just accessible to, you know, folks that have studied, have a master's in aquaculture, etc. So by opening up access, I see a lot more people of color, indigenous people who are interested in aquaculture, which by the way, is many, many distinct tribal nations throughout the coast that have a keen interest in kelp forest reforestation or aquaculture. So I see just a lot more accessibility in terms of who can get into this space. That's my vision. And I think that's just coming true. So I'm excited for the next decade.

Ashanti: You know, what do you think some of the hurdles might be to getting to the dream state that you both have kind of outlined?

Torre: Hurdles in getting to my dream state is the permitting involved in state waters in California is already this massive hurdle, a lot of really smart people have put brainpower to and can't seem to make it happen. That's for a lot of factors, but being able to work out a system that streamlines that and open it up to more low trophic aquaculture operations, I think, is going to be the key to success there. And I see, you know, there are obvious market hurdles like this. So many of the target species that we, in the regenerative aquaculture space, have are pretty novel. And so, you know, perhaps not novel to the world, to the global seaweed market, but in California or just particular aspects, there is some novelty to get over. So I think kind of conveying to folks, to people in the middle of the country, to people who haven't seen the ocean that they should be paying attention to and supporting cultivated species like kelp and oysters and whatnot is a hurdle that we have to allocate resources to. And for us, you know, we're doing our part, but there's a lot more marketing and outreach that has to happen.

Ashanti: What do you think is working well in the state of California in terms of growing the blue economy? And what can other regions learn from what we're doing here?

Leslie: A really good example of a place that's doing it well is the Port of San Diego and their blue economy program. That is a program that sunken seaweed entered into, got some initial funding to explore the idea of seaweed farming. Without that program, we wouldn't be doing what we're doing now. It certainly wouldn't have been possible for us to get to the point we're at. But programs like that where funds and space are allocated for entrepreneurs, innovative new businesses to come in, test their ideas out, or businesses that, you know, have some pretty good idea on what they're already doing, you know, expand their business in the blue economy space, specifically. So I'm thinking aquaculture and blue technology, bioremediation, artificial reef building, things that help the ecosystem and just make our waters cleaner.

Ashanti: Leslie, what do you think that other regions can learn from what we're doing well here in California?

Leslie: Yeah. I mean, so we do, we've all touched on this, but we do have some of the most stringent sort of regulatory policies in this state, right? So we have such a vast conservation, marine conservation background, you know, that started up well before all of these big aquaculture initiatives. So I think what people can really learn is that we have the ability to be really aggressive with ocean conservation policy while still facilitating meaningful aquaculture. So that's what I hope people are taking away,

broadly speaking, is that, yes, we do have really strict policies and activities like marine protected areas, lots of groups dedicated to that, but we're still able to bring aquaculture in. And I think that's a really important thing to think about. And then lastly, I just want to say that I think folks can learn a lot from our educational institutions. They're such a backbone, especially in this space, where it's all about getting young minds excited about it, getting those into the workforce, into the world to implement the things that we've been talking about, you know? So I think that's another area where folks can look to us and learn some things.

Ashanti: Torre, do you have any final thoughts that you'd like to share with our listeners today?

Torre: I'm really excited to see this field grow. I think it's just the tip of the iceberg, and we've got so much potential to do good things for our coastlines and our oceans. So yeah, just thanks for having us and listening to our spiel.

Ashanti: It's been such a pleasure having both of you here with us today. Thank you so much for joining us and sharing your expertise.

Torre: Thanks so much, Ashanti.

Leslie: Thank you, Ashanti. It's been a pleasure.

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Ashanti: Thank you so much for joining us on today's episode of Doing What Works: Exploring the Blue Economy. I'm Ashanti Blaze Hopkins. Be sure to join us next time when we talk with oceanographer and explorer, Dr. Nancy Rabalais, about her groundbreaking research on dead zones in the Gulf of Mexico and how the blue economy can work to mitigate their impact. Until then, stay curious and keep exploring.