Q: [0:00] So if we could just start with how you like to introduce yourself.

A: [0:06] Hmm. It sort of depends on who the audience is. But my name is Abigail Barrows, and I am a marine research scientist and oyster and kelp farmer.

Q: [0:16] And can you tell me a little bit about where you grew up?

A: [0:19] I grew up right here in Stonington, Maine.

Q: [0:23] And can you describe that a little for me?

A: [0:25] Well, Deer Isle is an island off the coast of Maine. It's pretty rural. The ocean is a really big part of most people's lives here and is definitely a part of mine. I didn't grow up working in the working waterfront. My parents were transplants here. But my mom had a deep love for the ocean, and I took that from her. I spent a lot of time on the water, mostly just mucking around on sailboats and canoes and other watercraft and a lot of time swimming, and that sort of blossomed into my love for marine biology. And I'm now a diver, and I surf, and I spend as much time in or on the water as possible.

Q: [1:07] Great. And you mentioned this just briefly, but where are your parents from, and what did they do?

A: [1:11] My parents – my dad was from Connecticut, and he moved here in ’68 or ’69 as a 21- or 22-year-old and bought the local newspaper, which is still running to this day as editor/publisher. And my mom moved here in the early ’70s as a nurse practitioner, and she worked in the health industry as a nurse practitioner both locally and up in Bangor for the majority of her life.

Q: [1:43] Do you have any siblings?

A: [1:45] I have three siblings. I have two sisters and a brother.

Q: [1:48] And are they in the area?

A: [1:50] No. They were all in the area, but now they're pretty dispersed. One sister lives in Alaska with her three kids and husband. One sister lives in Scotland with her Scottish husband and their child. And my brother lives up in Canada, up in Quebec, and has two kids, but he comes down and I see him the most frequently.

Q: [2:13] Do you have any family history of fishing? You’ve mentioned briefly no, but I just wanted to – like beyond your parents.

A: [2:20] Not that I know of. I don't have family history in the fisheries that I'm aware of.

Q: [2:31] And I'm guessing the answer to this, but I'm going to ask it anyway. Do you have any history of your family working in other roles in the fishing industry, such as bookkeeping, processing, marketing, bait, gear?

A: [2:44] No, other than I think my dad kept the local sardine cannery in good business when he was in his early 20s. (laughter) I don't think that any relatives that I know of closely have been involved in the fisheries.

Q: [2:59] Are you married?

A: [3:00] I am.

Q: [3:02] And do you have any children?

A: [3:04] Just the one.

Q: [3:05] And how old is –

A: [3:06] Io (sp?). She is five years old.

Q: [3:09] And would you want your children to go into fishing or a marine-related industry?

A: [3:15] I haven't really thought about that. But she has been out on the boat with me since she was born.

Q: [3:22] Awesome. Well, we're going to transition into sort of your role in the sector. How would you describe your role in the fishing or aquaculture industry in Maine?

A: [3:33] Describe my role? I guess I am a member of the aquaculture industry, oyster and kelp farmer, small business, owner-operated – pretty small role, but with the hopes to help people rethink how we could cultivate oysters and kelp not using plastic. So I'm hoping that even though my farm is really small, that some of the work that we're doing there will have a much larger impact on the industry in the Gulf of Maine and further afield.

Q: [4:09] Can you describe your farm a little for me?

A: [4:12] Yeah, so Long Cove. So the name of my company is Deer Isle Oyster Co., or Deer Isle Oyster Company, and we are situated in Long Cove, which is in Deer Isle. And Long Cove is actually a really unique body of water. It's long, as the name indicates, but about half of it drains out totally to clam flats at low water. But there's also a deep hole – 120-foot-deep hole just a few hundred meters off the edge of my farm. And the tide comes in and out of this very narrow channel and it creates a really strong current. So every tidal cycle, it pulls in this really cold sort of open ocean nutrient rich water and then really bakes on the flats coming in and out.

So we have a diversity of species in there. There's short and long-nosed sturgeon, I believe. There's lots of pogies and herring that come in and a variety of wading and shore birds that call Long Cove their home for at least some of the season. And historically there's been a lot of fisheries in Long Cove between soft-shell clamming and I think dragging back in the day for scallops. There's elvers that come in the freshwater systems there, a lot of pogie seining and things like that – and a lot of lobstering around Deep Hole. So it has a pretty interesting history.

The farm that I am currently cultivating oysters and kelp on was established in 2001 or 2002 by a fellow named Danny Weed. It was sort of before aquaculture was really taking off further than Damariscotta. He set up a three-acre lease and he farmed that for about just over a decade, and he sold a portion of it to some shellfish dealers here on the island, Ginny and Blaine Olsen. They run a clam shucking facility down in Oceanville. They're also lobstermen. And they farmed it for a few years and realized they weren't really farmers. They're more just wild harvesters. So I purchased it from Ginny. And I didn't know what the hell I was doing, (laughter) figured it out slowly. And then two years ago, I purchased the remaining section of the lease from Danny, the original fellow.

Yeah, so it's about three acres that are under pretty much full cultivation at this point. I'm growing sugar kelp out there as my winter crop. And in the next few weeks, we'll raise our *Crassostrea virginica*, our eastern oyster that we grow using surface culture.

Q: [6:58] Great. And can you describe the seasonal cycle of the farm for me a little bit?

A: [7:04] In terms of – like there's so many aspects. What –

Q: [7:10] I don't know. I guess sort of the focus on different species, but also anything else you might be inclined to share.

A: [7:18] Yeah. When I first got into it, I'm like, oh, this is great. It'll just be like a few months of work in the summer. It's a full – more than a full-time job year-round. And that's, I think, just the reality of small business, but also farming. So the seasonal cycle is – for oysters, we raise the farm. That is a shifting date with climate change. Now that we're like really living with climate change here in the Gulf of Maine, that date has been creeping earlier and earlier each year. I think we'll probably raise the farm the earliest that we ever have this year. So we raise the farm. And when I say raise the farm, that means back-breaking work that takes multiple tides. We go out there with a boat and gaff onto some of the buoys we have out there, and we have cinder blocks tied every couple bags on the line. So we're pulling up hundreds of pounds that are all like stuck in the mud, untying those, and trying to do it at low water so you're not pulling it through extra feet of water column, and fill the boat with cinder blocks and go drop them off and then repeat until we're done. We do that in April, May each year.

And then once the farm's up – all those bags have been sort of overfilled, because we want to reduce – contract the farm in the winter. So as quickly as possible, we have to spread those three bags that are in one bag back into three bags so the oysters can thrive. That really kicks off our spring – just getting everything organized and ready for starting our weekly harvesting for wholesale and retail and events.

So all summer, we're cranking along pretty hard out there, and then we basically have to make all our money in three months. That's kind of the season – a little less than three months. So we push it really hard. It's sort of a sprint-like pace, but at a marathon length.

And in the fall, things start to slow down in terms of sales, but the work on the farm is still cranking, because the water end of August, early September is the warmest the water is, which means everything's getting biofouled. Everything's growing really rapidly. So a ton of work out there – lots of tumbling, lots of flipping a bag, lots of sorting, lots of repairs. You know, it's the marine environment. Something's usually going wrong that will steal your attention when you're like, oh, I thought we had a such a straightforward day.

Oh, and I also didn't mention that in the early spring or early summer, we receive our oyster seed, so we receive hundreds of thousands of baby oyster spat, which just looks like tiny little baby oysters about the size of quinoa. And we put those out and try to take as best care of them as we can and upgrade them throughout the season into larger and larger mesh sized bags, because the saying is more flow, more grow, more dough. So we're always trying to get get more water flow in the oyster bags.

And then in the fall we start thinking about winter and that balance of not tumbling the oysters too much, making sure that they have enough time to grow and repair and get nice and fat so they can hibernate once that water temperature drops. And this past year, we sunk the farm a little bit later. We aim for doing it around Thanksgiving, but I think we did it early December this year. Again, climate change, water temperatures, all those sort of annual dates seem a little bit more diffuse and unpredictable – so really just having to pay attention to the weather, rather than being like, this is how we did it last year. It's like, oh, this is totally different from last year.

So we sink the farm, and then we then we seeded the farm with 2,000 feet of kelp – sugar kelp, *Saccharina latissima*. And sugar kelp is a pretty different farming interaction. You kind of set it out there and then go out and check on it a couple times a month.

It's been a little bit – not a disaster this year, but there's a lot to learn. I've learned a lot. This is only our second year doing kelp and our first year really doing it on this scale. And there's already – like 90% of what I have done out there I need to change for next year. I was out there this morning. Things are growing, but there was a lot of crazy storms this year, a lot of movement, a lot of infrastructure things

that I need to change to be able to have a good, robust spring harvest and make it worth our while.

Kelp is a spring harvest, and we'll be – I went out and measured it and checked the water temperature. And again, that's where climate change and farming intersect directly. We will just keep watching those water temperatures. And looking at the growth, there's a bump that happens at the very end of the season that you don't want to harvest before, but you don't want to harvest too long after, because the water temperature then is warm, and stuff starts to grow on the seaweed and decreases value. So it's a little bit of a dance. And of course, the weather never cooperates, so it's going to be blowing 35 when you want to harvest. So yeah, diversified into kelp, and that's part of our seasonal routine now. We're still seeing how that feels and how that works, especially with the need to raise the oysters that are underneath the kelp.

Q: [12:52] Great, thank you. I'm going to return to some of the environmental stuff later. But I'm curious – like what drew you to this work?

A: [12:59] The love for pain and hardship and being broke. No. What drew me to this work? So I bought the farm in 2015. And I'd never been on an oyster farm, which is kind of ridiculous in hindsight. I was doing a ton of research and lab work and had – previous to 2015, my job had sort of been more water-based in the summer, doing water quality monitoring and things like that and expeditions, and then more computer-focused in the winter.

But once I was running and managing this global microplastics research project and running a lab down in Stonington, my job really became hyper-focused on the chair, sitting on my computer or sitting at the microscope. I'm like, whoa, this is a means to an end right now with this project, but this is not how I want to be living my life. So I saw it as an opportunity to hit a bunch of bases for me personally and for the community. The ability to be outside and to be doing something physical, also the challenge of small business and to be my own boss – those were all very attractive.

Also, I've been in the water quality sector and doing research and just learning more and more about the peril of wild-caught fisheries and how the Gulf of Maine is changing, and also I just kept on learning more about oysters, and I'm like, this really seems like one of the most sustainable fisheries out there. And the writing on the wall is here. Like things are changing in the Gulf of Maine. What does Stonington look like without its working waterfront? It's a pretty grim outlook. So part of me was like, well, if I can get into oyster farming and show that this is like a really viable business, then perhaps some of the lobstermen would supplement their income or diversify into some form of shellfish or sea vegetable aquaculture, and that would help maintain sort of the salty foundation of our community – which I think was a little idealistic, but I was in my early 30s.

But I think there is a grain of truth in that. Like things are really shifting here, and I think that people are seeing like, oh, there's a demand for oysters. There's a market

for oysters. You know, the lobstermen have such deep multigenerational knowledge of the waters around here. So being able to apply that and still use the infrastructure that's set up for lobstering for aquaculture doesn't seem outside the realm of possibility.

The other thing is realizing that even though we live in Deer Isle, the access to local seafood is kind of difficult. It's better than it used to be, but it's still harder than it should be to get locally produced or caught seafood. So that was sort of the third prong.

So to summarize, running my own business – the attraction was to run my own business and to be outside and work in the water and have that never-ending challenge, and also to model what sustainable fisheries could look like, and then also to help preserve or maintain some level of our community and the working waterfront which defines it, and then also access to locally harvested sustainable seafood.

Q: [16:39] Great, thank you.

A: [16:41] That was long-winded.

Q: [16:42] No, it was awesome. Which commercial licenses do you hold?

A: [16:45] Well, the DMR is ever-shifting, but I have my harvester license, which you have to have to harvest the shellfish that you buy and cultivate on your own lease. And now they have an aquaculture license. I also have that. And I also have a dealer license.

Q: [17:03] Can you talk a little bit more about the dealer side of things?

A: [17:08] Yeah. So for me, again, the DMR is really – the licensing and the aquaculture division has gone through a lot of changes in the last handful of years, and I think there's still a little bit of an identity crisis happening there, but there's been some much stronger leadership changes that now I think things are headed in the right direction. But the dealer license allows me to drive my oysters places and shuck them and sell them to a variety of different customers. With a harvester license, up until a month ago, that would allow you to sell direct out of your house. They've now made that obsolete from June 1st through August 31st, which is the time when a harvester would make money selling oysters out of their house, because of the *Vibrio* pathogen. So rather than risk any further public health issues, they did a blanket rule change for Maine which is actually dramatically and drastically going to impact small farmers up and down the coast.

Q: [18:17] Yeah, I definitely want to return to that change. But just before we get back to that, do you own your own boat?

A: [18:26] Yeah, multiple. And they're all work boats. (laughter) Yeah, they're functional and not pretty.

Q: [18:37] And do you have any experience in the industry beyond just fishing or harvesting itself? You talked a little bit about marketing and getting stuff out there I think already, but specifically the follow-ups for this are in bookkeeping, bait, or gear preparation.

A: [18:52] Hmm. I worked on the back of a lobster boat for some seasons, so I did a little gear work with that. But no, prior to buying the oyster farm, I had zero business background, had never taken a business course in my life, and definitely did not have any sort of robust accounting system for myself. No, there's been a steep learning curve.

And I didn't have any money or credit, because I hadn't been living in the country for most of my adult life. So to get a loan was not straightforward for me. So I was able to get two – yeah, I didn't have the capital for the purchase of an oyster farm. I'm like, can I put my bicycle up as collateral? (laughter) I don't have – I don't own anything. So I was able to get some loans through the Farm Service Agency, which is a branch of the USDA here in Maine, or the state branch of the USDA. And through them, they have low-interest loans for underserved, minority, or – anyhow, being a woman, I fell under one of those categories – woman farmer. So I was able to get two different loans from them. And then I also got a loan through Farm Credit East, which is a loaning service, and I was the first aquaculturist they'd given a loan to in Maine. So yeah, lots of learning curves there.

And I also hooked up with SCORE, which is a volunteer network – actually, one of their offices is based in Ellsworth – where they connect like a retired or mature businessperson with a new business owner. So I asked them – I mean, I was already really familiar with spreadsheets and things like that because of my data science background, but yeah, just like projections and no bookkeeping. It was a lot of, how hard can it be? It turns out a lot of it's really hard. But – yeah.

Q: [21:04] Sure. And do you have any experience in advocacy or community-based organizations related to fisheries?

A: [21:10] Related to fisheries? No. I worked in the nonprofit world for many, many years and have done some – I don't know, advocacy is a hot word. I've done research to help drive policy change.

Q: [21:30] Sure. And this is a hard question to answer, I know, before I ask it – but what does an average day of work look like for you?

A: [21:38] In the on season, it means getting up early, doing all the family things I need to do with my daughter, and then either having my farm manager and farmhand come here and we all carpool up to Mariners Park, which is where I access the farm, or I meet them up there – usually with coffee – and we row out to the boat, which is on a mooring. And most days, we're doing some level of harvesting, but if we're not harvesting, then we're doing husbandry – so flipping

bags, separating bags, or tumbling. We have a solar-powered tumbler out on a float out on the farm that we built, and last year was the first year that we had it running for the whole season.

So basically four to six hours on the water, which can be brutal. We have no cover out there. But it also can be wonderful. You know, we work in our bathing suits, and we have swim breaks. But we crank pretty hard when we're out there, because it always just feels like there's endless things to do. If it's a harvest day, we wash, count, and bag oysters for wholesale. The washing takes a few hours. We have a saltwater wash-down pump that's solar-powered on the float. So someone's doing that while two of us are in the boat working the farm, either harvesting or splitting bags or doing whatever needs to be done.

We come in, and usually if we have two vehicles up there, then we split up, but oysters are delivered to restaurants locally. And we also do evening events at Tinder Hearth four days a week. So we get oysters prepped for that and all the gear, plates, tea towels – make sure all of that's ready to go and be picked up.

And then come back here and fulfill. We have same-day pickup as long as people put in their orders early-ish, so we're bringing oysters back here. And we tell people they can pick up their oysters after 3:00, so we have to get back here, bag oysters. Our port, our woodshed right now is our retail space in the summer, and we sell wine and oyster merchandise and oysters out of there. So we get that all prepped and ready to receive customers and make sure things are stocked and it looks tidy out there. That's a day in the busy time. And usually a shucking event at night. So go get cleaned up – you know, wash off the mud and put on something nice-looking and go shuck oysters for people for a few hours.

And then in the winter, you're kind of looking at it. (laughter) Lots of computer work. I do a ton of grant writing, communication with other farmers, accounting, business, all the admin boring stuff. Like right now, I'm buying all my licenses for the year and recertifying the retail space and – yeah, I just picked up a boat from Mid-Coast, and soon we'll be shifting into like full gear – buoy prep for launching the boats and raising the farm, which will be a lot of outside work and just sort of assessment of what we need to do and what order we need to do things in.

Q: [24:56] Thank you. And how do you feel that your background or your identity shapes your work in the sector, including how others might perceive you?

A: [25:04] Hmm. The others – how others may perceive me is something I really am always baffled by, so I don't know how I can answer that. My background – well, I think there's multiple components there. One, growing up on this island and having a deep love and connection – like my sense of place is here, and a lot of pride. But also being an islander, I have a serious chip on my shoulder, (laughter) just because that seems to come to me with the territory here. So that love of hard work and that Yankee – sort of to a fault, I think – being defined by what you do. And I try to step back from that on occasion.

But I think a lot of my business side of things and thinking about how we can do better and how we can be stewards of our environment and actively do good for the water, not just not do bad, comes from my background in microplastics research. Doing water quality monitoring for many, many years and then working with Adventure Scientists, a nonprofit, to do this global microplastics research project all over the globe really sort of honed that lens for me about how every action we have is making an impact and recognizing as humans we have an impact, but how can we lessen that or use our position sort of as a way to demonstrate different ways of doing things?

Q: [26:44] How do you feel like your gender plays into that or doesn't?

A: [26:49] I don't feel like it does, but it probably does. Yeah, that's not something I really think about.

Q: [26:59] Sure, yeah. And how does your role sort of work with your family or caregiving responsibilities?

A: [27:08] Oh, yeah, that's a hard one. It's pretty hard to run a business, and I still do research science, so I still do expeditions, and I just came back from Australia for a speaking engagement. It's a lot. It's a lot to make sure everyone's getting what they need, including myself. But my husband's very supportive and is great at holding down the fort when I when I head further afield. My daughter – I try to bring her with me as much as possible, and she also has spent a lot of time out on the oyster farm, just being like, this is our family business. This is what we're doing. Here's a bucket of water (laughter) and a green crab. You can play for a few hours.

Yeah, it's a hard balance. I feel like in the winter, there's a lot more space and a lot more family time and a lot more downtime, and that feels a little bit more like everyone's getting fed. And in the summer, it's a little bit manic. But I think that since having her, I've learned a lot about how to delegate things in the business and also like what's just too much and also thinking about what we want this business to look like. I want to be running the business and not have the business running me, but still be able to make a living. So it's a constant assessment and balancing of the scales.

The big thing in the summer is that we only do – Ben and I, my husband and I, only do a handful of events. Most of that now we hire out to employees. That just gives us evenings. Before, she was coming – you know, like she was at every farmer's market, like on my back. And it was just like, this is a lot for her, for us as a family. Yeah, having evenings, she'd be like sitting on a cooler while we're shucking oysters. And it's just like, this is working, but this is not a long-term solution. So just trying to be aware of, you know, as she grows and the business grows, how we can balance that all out.

Q: [29:19] Thanks so much. Now, we're going to sort of shift gears into environmental changes. If we could start – can you just describe any changes in the marine environment you've noticed, if you've noticed any?

A: [29:29] Yeah, there's lots of changes in the marine environment. Definitely more – well, it's hard. There's changes and then, yeah, a lot of fluctuations. The pest situation – I don't know if it's increased, but – I mean, it has increased, but definitely invasive species like *Botrylloides*, the colonial tunicate. We also have the sessile – the individual tunicates are really caking our gear. Some of those are local, are native, and many of them are not. But the fouling organisms are sort of off the charts. I just saw that friend of mine in Mid-Coast posted a picture of a giant Chesapeake blue crab. That's going to be something – when I see one of those here, which I think is not very far off. And then like the *Vibrio*, the pathogen – I mean, it's always here, but now with our water temperature spikes, it's just more prevalent. Also, the risk of it is much higher, because the temperature causes it to proliferate in harvested oysters.

So on that level, yeah, a lot of changes. Probably less than some of the old-timers that have really been out there for decades. I feel like my snapshot is pretty small for Long Cove. I mean, it's been seven, eight years. But yeah, I've seen changes in that time. And I think that two summers ago, we saw a spike of 85-degree water temperatures in the surface water. And that was appalling, really. Like we're in Maine. We're seeing 85-degree temps. Yeah, and I think that will – I'm just starting to do baseline monitoring of salinity and pH and other sort of water quality parameters that will give us a better idea of how things are changing over time, because I'm interested with my oyster farmer hat on and what that means for the farm and the business, but also just as a scientist and resident of the coast – like how are things changing, and what does that look like?

Q: [31:39] You saw those 85-degree temperatures three years ago, you said?

A: [31:42] Two seasons ago.

Q: [31:43] Two seasons ago? And have you seen them each successive season?

A: [31:45] No, we didn't hit it last summer, but last summer was eight weeks of rain. I don't know if you remember, but I do, because it was miserable out there. So wet. I've never worn my foulies so much on the water. It was brutal out there. I think we hit mid- to high 70s last summer, which is still plenty warm. So again, like, OK, if that happens again this year – I mean, we didn't have oysters spawning. Maybe a few. But that's a pretty big shift in what that seasonal work looks like. If we have spawning oysters all summer, we can't sell them. So that means – like what does that look like? The tourist season is in the summer, so how do we move a product and have a successful business if it's spawning in the middle of summer and you can't really harvest them down in the southeast of the US? Just thinking about ways to mitigate that on our own farm and what that could look like.

Q: [32:42] How else are you seeing these environmental changes affect the farm and your work?

A: [32:47] The storms. The storms are more frequent and more violent. And the big tides, yeah.

Q: [32:54] Were you particularly affected by the few recent storms?

A: [32:57] No, because everything's on the bottom of the ocean, and all our boats and floats are pulled. So I was very lucky. The float that we had probably 50 feet up on the shore moved, but didn't get taken away. Yeah.

Q: [33:14] Can I ask – I just actually didn't know you couldn't harvest oysters if they're spawning. I mean, I have heard as it gets warmer, they may actually be spawning and contributing to the wild population, but why is it that –

A: [33:24] There's no legal thing. It's just that they literally are blowing their load. There's like very little of an animal left. They're putting all their energy into their gonads, and then they release their egg and sperm, and then there's this little flaccid post-release creature that is not very salable. I mean, you could still eat them. They're just not going to have a lot going on.

Q: [33:53] And is there anything you've tried in response to sort of cope or adapt to the changes you're seeing?

A: [33:59] Well, I guess in an indirect way, that's why I've been inspired to – one of the reasons to work on alternative materials, because plastic pollution is a climate change problem – or, you know, intrinsically connected to climate change. So thinking about if we're going to continue to farm on the ocean, how do we take plastics out of the equation to help secure a future of farming on the ocean? Because by using a totally unsustainable, polluting, contributing to greenhouse gas material, every step of its production from extraction to landfill, we're really not thinking about the future of aquaculture.

Q: [34:51] Can you talk a little bit more about what that has looked like to sort of transition away from plastic?

A: [34:56] Really hard. It has looked like – we're going into our fourth season of doing R&D on alternatives to plastic and growing oysters. So that means we've done a bunch of different prototypes, played around with a lot of different designs, played around with a lot of different materials, and tried not to reinvent the wheel in terms of how people cultivate surface oysters. But it's been a lot of failures, a lot of challenges, but also some successes. We've honed in on a design that is mirroring what's already existing out there in terms of like that oyster ranch structure and just replacing the plastic components with natural, biodegradable components.

But the piece with biodegradable – yeah, cool, you want something to biodegrade, but you don't want it to biodegrade in the season. And it needs to have some longevity, but what does that look like? And how do you do that without compromising the environmental impact of the product? So there's just been a ton

of challenges and things that you'd never think about until you're standing out there on the water, looking at your gear, and being like, oh, I just lost – I just seeded the cove with a bunch of oysters because I didn't think of this thing.

So yeah, it's been a lot of learning. And I'm still – I guess I'm over it now. But, you know, for years just being like, no one else is doing this? Like really? I can't swap ideas with anyone that I found in the state, in the country, in the world. I'm just rethinking about the material – rethinking the materials we're using. So yeah, a lot of trial and error, a lot of error. (laughter)

Q: [36:45] Do you hope that more people would shift to that?

A: [36:48] Absolutely. I'm not just doing this as a fun little art project. I want to really reimagine what the future of aquaculture could look like without using plastic. And I want that to be a viable pivot for people in the industry. And to do that, it needs to be accessible, it needs to be robust, it needs to be tried and true, and it needs to be economically possible.

Q: [37:12] Yeah, and I'm curious – this really feeds well into the next question. Like what has made it possible for you to try to do things?

A: [37:19] Grants.

Q: [37:20] Grants?

A: [37:21] And sheer force of will. Yeah, it's a lot to be running a research project and trying to run a business at the same time, for sure. And it's definitely impacted – I think if I wasn't doing research, we'd probably be a much more successful business. But to me, I'm like, what's the point of being in a business if you're not thinking about the future? So it's OK. We're surviving.

Q: [37:47] Can I ask you – the decision to diversify and include kelp – is it all related to any of these changes, too, or is it for multiple reasons?

A: [37:55] Yeah. Oh, totally. I mean, I would love to diversify with more species, and also more on on-land diversification in terms of how we maybe do some value-added products. But again, it's like, I'm already biting off more than I can chew. But yeah, I think it's absolutely essential to think about diversification for the future of aquaculture, because it is farming, and one storm can wipe out your whole operation. So having something in your back pocket, having something – I don't think kelp will ever be on the forefront of my business in terms of cashflow. But this is the slimmest time of year, spring. You know, I haven't seen any cashflow. The only cashflow has been out since December. So harvesting the kelp will give me a little bit of a spring cash infusion.

I've also put on – I think I have five other seaweed species that I'm legally allowed to grow. The science is still lagging. I'm hoping that the Atlantic Sea Farms

company I'm working with will come up and take some dulse and do the genetic work from the dulse in Long Cove, because it grows there.

Q: [39:03] Are you a partner farmer of theirs?

A: [39:05] Yeah. And I work with GreenWave as well. I would love to do sea urchins, even though I don't really want to have to feed something. And I also have scallops on the lease, but I realize – I think it's it's too warm in Long Cove. I could sink them way down on a couple of the lines, but I also – I'm like, I still am just figuring out how to grow oysters really well. But I think diversification is key.

Q: [39:29] Are there any other kinds of adaptations that you want to make or are sort of like looking towards the future? How would that look?

A: [39:38] Yeah, I have lots. I just need more time and money for all of them. So the adaptations that are concretely up and coming are the boat fleet piece. Part of my business is to – as I mentioned before, not just to do no harm, but to actively do good for the waters that we're in. And as an oyster farmer, to me, it's like a no-brainer to think about, how can we reduce pollution from our operations in the water that we're operating in?

One of those is the boat. Like the boats are inherently toxic. We're coating them with super-toxic bottom paint that's ablative. So that's shedding into the water that you're trying to grow oysters in. You also have an exhaust pipe in the water that you're trying to grow oysters in. And I use all those things en masse and really trying to think about how I can shift away from that and still have the infrastructure that I need.

I was lucky enough to be awarded a grant that part of that grant I wrote in a wooden boat. That is going to start being built in another month or so just a mile down the road from here, and that will be sealed with pine tar and linseed and non-toxic sealants, and we'll see how that goes. We'll build a wooden boat and ideally have an electric outboard. I'm still in discussion with that. And I really – just the technology's gone in leaps and bounds from a few years ago, but it's not quite where I would love to see it as a producer in terms of battery and charging.

So I would love to be able to have a – I mean, there's been like the green boating term around for a long time, but it's kind of green boating light. I would like to go green boating heavy and really have a non-toxic boat fleet out there. And that also could involve welded aluminum boats in the future, too, because the maintenance is really low on those.

Q: [41:48] Thank you. What is your biggest concern for the marine environment for the future of fishing and aquaculture in Maine?

A: [41:55] Biggest? I don't know. There's so many. (laughter)

Q: [41:59] A way to maybe reframe that that might be useful is like if you could tell policymakers, what's the most important thing to think about, what would you tell them?

Q: [42:10] You can also pick more than one.

A: [42:11] There's so many. I mean, with my plastic background, it's like we are literally putting like a *Valdez* oil spill worth of plastic into the ocean every season between lobster gear and aquaculture. And really, on the rule-making side, we need to have more funds available to do more robust research and development around alternatives to those materials or making those materials more robust. Because again, this is just a piece of the giant climate change puzzle and also a piece of the future of fisheries. We know it's not just plastic that's the problem. It's all the chemicals, hazardous chemicals that are associated and come along with plastic. The carrying capacity in the ocean – the whole thing in the '70s, the solution to pollution is dilution, just no longer can apply. We're really creating a very toxic soup out there. That sounds a little extremist, but I think that without making changes, we aren't going to have a future that we can grow food in our ocean or harvest food in our ocean.

Q: [43:27] Thank you. Have you participated in any climate resilience or adaptation training or programs?

A: [43:34] Training? I'm doing this oyster lifecycle assessment with Island Institute (sp?) and an organization from the Netherlands. I can't remember the name. I'm mad, because I know this is being recorded. I don't know – this guy, yeah. And I'm also doing – also the Island Institute – I'm doing the BUD program, Baseline – B-something data. Basically, I have this thing hooked up to my outboard, and it monitors how much outboard time I have in a season. That's with Sam Belknap at Island Institute. I'm also doing another climate change – mostly just surveys and interviews, but yeah, collecting some data for them, too.

Q: [44:33] What strategies do you think would be effective in building resilience against these climate-related impacts that you're seeing?

A: [44:41] Strategies – you mean in terms of like top-down stuff?

Q: [44:45] Sure.

A: [44:47] I think having some flexibility in some of the rules for people to be able to innovate and test things out, because without that, it's not going to happen. I think that creating funding or finding funding or making funding channels accessible to people who want to try things needs to happen, too, because you can't expect a small business just to be fronting money to try something on a whim.

I also think that maybe some – especially in terms of shellfish. You know how we have like local shellfish committees? Having something similar for aquaculture and maybe also zoning in terms of looking at Maine waters. Because sometimes

when we talk about statewide changes, it's really slow and clunky, and also something that's applicable in Casco Bay is not applicable in Cobscook Bay for example. So having a little bit more light on your feet oversight I think would be really beneficial. Also, we're not a huge state. There's no reason why we couldn't have a little bit more personalized sector – regions – and then sort of more self-managed.

Q: [46:13] Are there any changes that are impacting your work that are maybe not environmental? You had mentioned earlier the selling out of the house and that being an issue.

A: [46:19] Oh, yeah. I think I'm three years now waiting for a lease to go through and another standard commercial oyster and kelp lease the next cove over. To me, that's just unacceptable for the state to be – I mean, I already have my foot in the door. I've shown that I'm a good aquaculturist. But anyone who wants to get into the industry, if they have to wait three years for a lease to go through, then you have to wait two or three years to grow an oyster. It's like, that's not a business plan. That's not a business. You can't do that. So there absolutely needs to be more staffing and capacity and resources put in at the Department of Marine Resources to help pull this industry. Everyone's touting or saying like, oh, aquaculture is the future of the Gulf of Maine. It's like, yeah, but none of the infrastructure has reflected that in terms of staffing or making this actually accessible to anyone. And I'm worried that the way it's going now is that it's really favoring big business and larger corporations, because they have the time and the money and the lawyers to make it happen. And it's going to push out those smaller farmers, and we're going to see a repeat of what's happened with industrialized agriculture on land.

Q: [47:38] Can you tell me about any opportunities or positive changes that you've seen in your time working on the water?

A: [47:46] There has been a lot of great funding through COVID and through Janet Mills' office for access to diversification within the seafood industry.

Q: [48:00] And you had mentioned this a little earlier, but you really see diversification as like the way forward? Or do you, I guess?

A: [48:06] It's a way forward. I think it depends on your business model. And I think diversification can take a lot of different flavors. It doesn't necessarily have to be species diversification. But I think it's really important when your business and your livelihood rely on the climate that you have to recognize the world that we currently live in.

Q: [48:28] And what is like a hopeful vision for the future of Maine's fisheries for you and aquaculture?

A: [48:32] Well, to be totally selfish, my hope is that there is en masse interest in moving away from plastics to grow our food in and that through some of our work

that has made accessible – and it is really a viable alternative for people to incorporate into their farms as they think about buying new gear – as new farmers enter the industry that this seems like a real option for them to delve into, so we can think about disruptive innovation. And hopefully that would then go on to spur and incite change within people's businesses, not just on the water. So really create a much more robust and sustainable – even though it's an overused word, sustainable food-growing system into the future.

Q: [49:29] Great. Have you noticed any changes in women's presence, participation, or status over time in fisheries and aquaculture?

A: [49:35] I'd say there's a lot more women in aquaculture than there was. I remember a conference I went to maybe the first year I bought the farm – Northeast Aquaculture, NACE – one of the big northeast aquaculture conferences – and I've definitely felt like very much the minority. I was like, cool, there's like a bunch of boomers and maybe a generation older than me white men, and like a handful of women out of the few hundred people here. And when I went to – I was just there at NACE in Providence in January, and I was like, wow, it's very much shifted. I mean, there's still plenty of old white men – we are in New England – but a lot more minority representation, a lot more Indigenous, and a lot of women. So that's been pretty heartening to see. And it makes it really fun to – not to say it's not fun to collaborate with men, but there's definitely a camaraderie, I think, within women in aquaculture that did not exist even five years ago.

Q: [50:42] Great. Is there anything else you want to talk about in this interview?

A: [50:48] Not that I can think of.

Q: [50:50] Hillary, do you have any –

Q: [50:51] I have a few, like slightly – just kind of all bouncing around different places. As a partner farmer for ASF, do you just – you dry your seaweed, but they pick it up and process?

A: [50:59] No, no, no.

Q: [51:00] Or they buy it wet, right?

A: [51:02] That's the cincher.

Q: [51:05] So they do all the processing – working.

A: [51:06] Yeah. Yeah.

Q: [51:07] So you have a contract with them and they buy.

A: [51:09] Correct. Yeah. Yeah, I'm in a three-year contract with them. I also have one line of my own seaweed that I bought from Springtide (sp?) down in

Gouldsboro. But the thing with Atlantic Sea Farms is that they came and got source tissue from Long Cove, because my big concern is that we are doing genetic mishaps that we don't even know that we're doing. Because we know there's a ton of subspecies and nuanced things happening in all these different coves, and I feel much more comfortable participating in this if I know that I'm growing Long Cove kelp in Long Cove, not Casco Bay or whatever.

Q: [51:47] I didn't even realize it was that localized. That's really cool.

A: [51:49] I mean, no one knows. There's just – there's not –

Q: [51:52] Oh, I mean, just that they –

A: [51:53] Yeah, they came from –

Q: [51:54] – source the seed that locally.

A: [51:55] Well, I insisted. (laughter) So the stuff that you see drying there by the wood stove is – this morning, I went out – and I'm doing this sampling for GreenWave as well, which is they're doing – that's climate – this goes into the climate change thing – baseline climate data on temperature and growth and how that looks all up and down New England. So monthly I'm going out and measuring and weighing a foot of kelp on the line, and I have a temperature logger out there. That, otherwise, I would just compost, because it's whatever. So I'm like, I'll just dry it and eat it.

Q: [52:33] You mentioned green crab just as something to entertain your daughter, and you mentioned blue crabs showing up. I was just wondering – I know green crabs have been here for a long time, but they are increasing due to climate change. And I know they prey on invertebrates, mostly the soft-shell clams.

A: [52:49] Oh, they are –

Q: [52:51] But I was going to say, are you concerned about that? Does that impact you?

A: [52:53] Oh, yeah. Definitely. They are one of the – they create a lot of mortality on the farm. And my background in green crabs is that I did a peninsula-wide trapping effort many, many – over a decade ago, probably almost 15 years ago, when they were first really started spiking. And all the clammers – everyone was talking about them. I did a trapping effort and tried to find markets for them. That didn't happen. My chef friends took some, but they're not super-easy to do anything with.

I mean, all these invasive species definitely impact oysters. If there's a green crab in a bag, you hear it as soon as you pick it up. You're like, damn it. They can eat like a dozen oysters in a day. They drift in when they're little, and then they grow.

And they get big, and they get trapped in the bag, and they just eat whatever they want. So that's why you got to get (inaudible).

Q: [53:47] Is there anything – you're trying to cope with that, or is there not much you can do?

A: [53:50] Just check. Just get in those bags more frequently. Yeah.

Q: [53:55] And then I just wanted to clarify – you talked about when you first started farming – were you the first sea farmer, aquaculturist, on Deer Isle, or were there a few others?

A: [54:04] Danny Weed established it.

Q: [54:06] Oh, right. Sorry, they started the farm. It sort of was the first – your farm was the first farm.

A: [54:10] Yeah, yeah. And now there's two other farms here, and maybe there's going to be another LPA up in Little Deer Isle.

Q; [54:22] And then just one last general question is like – it's just interesting and unique, your research background. I just was trying to get the picture of – like what was your educational background? Probably at some point you went away and studied somewhere else.

A: [54:36] Yeah, I did K-12 here, locally. I did a year or half a year abroad as well in South America. And then I went to Australia and did my undergrad in Australia – bachelor of science. And yeah, did my master's of philosophy and human ecology at College of the Atlantic just a few years ago. Yeah, did that.

Q: [55:04] With Chris Petersen?

A: [55:06] Yeah, because we were pals from marine education, and the organization I was working for when I was running the global project – they're like, hey, would you want to go back to grad school? And I called – I mean, since I didn't do my undergrad here, I don't really have a network in the academic world. But I called some people at University of Maine. They're like, yeah, you can come and do our PhD program. It's full-time, and you have to do a ton of 101 classes. And I'm like, fuck that. I'm not going to quit my job to do a job on research – or do a degree on research. So I called Chris, and like 20 minutes into the call, he's like, you should just come to COA. I'll be your supervisor, and you can get your master's. I'm like, great, I'll do that. So they were really flexible, and I was able to roll my consulting work into a master's program. It was definitely enough for a PhD, but they don't offer a PhD. So yeah, I did that and wrapped up the project, had my baby, and graduated in 2018.

Q: [56:09] Thank you. That was really helpful to get that whole picture. Yeah, that was my last questions.

Q: [56:14] Great. Well, then I'll go ahead and turn this off unless you have anything else you want to add.

A: [56:16] I don't think so.

Q: [56:17] All right. Great.

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