EPISODE 3 TRANSCRIPT - BEC WELLARD - FROM THE FIELD PODCAST

BEC WELLARD: You tell people when you want to work with marine mammals and you immediately get pigeonholed. For me being a young female scientist, you will be pigeon holed to not be that hardcore scientist but I hate the terminology that people use - a dolphin hugger. And for me fighting against that to prove that I can do the hard science and I am there for the real science and not be fluffy about it. One of the other things I definitely found challenging was people telling you that it was a big dream and it was hard to make it to that next step.

PRIYA SHELLY: Welcome to From the Field, a podcast logging real life scientists and their efforts to improve the world one study at a time. I'm Priya Shelly. - Beat -

In this episode, I speak with Bec Wellard, a marine mammal scientist and Ph.D candidate at Curtin University in Western Australia. Bec is currently studying Killer Whale bio acoustics and population dynamics. Knowing that she would have to face the stereotypes and gender inequality surrounding her career as a marine biologist, Bec still decided to push forward in her Killer Whale study because of the importance of collecting data. Her first encounter with one in the wild, helped too.

BW: I do remember the first time I saw a killer whale. I was out at sea and I remember thinking how big they were. Killer Whales being the largest dolphin, I'd expected them to be big, but my breath was taken away. They were so sleek and so agile the way they moved in the water and so fast, but I just remember I had one come right up to the boat. Her name is Split Tip, she has a split in the tip of her dorsal. We've been seeing her for many many years now and she's really inquisitive and friendly towards the boat. So what an introduction to have.

PS: Bec even had a small revelation during her brief interaction with split tip.

BW: She came right up to the boat and she came right up to the bow and she turned onto her belly and she turned back over and her eye ball just followed us the whole way. She went down and I was thinking, wow, all right, they're checking out us as much as we're checking out them, they're really intelligent. There's more going on behind them that I could ever imagine.

PS: Killer Whales also known as Orca, have a pretty high profile in today's culture, especially the ones in captivity. But despite this, not much is really known about their behavior in the wild, especially in Australian waters. It turns out that Killer Whales have an intelligence level that humans are only at the beginning of even understanding.

BW: They have different languages. They live in complex societies have strong family bonds. They have distinct diet and language and there are learned cultural differences. Orcas have evolved this complex culture where animals learn collection of behaviors from one another and they communicate with these distinctive calls and dialect and they can live at 80 years or more, not much unlike ourselves and they stay in tight knit matrilineal groups that are lead by the older females, by the grandma's and they model specific behaviors to younger animals and their inquisitive nature and their playful attitude.

I will do anything to keep following that dream and pushing through all those boundaries that people are telling me that it's too hard to work with marine animals and to do that science. I feel like hat just made me more determined.

It feels like you get to know them, I know the scientists in me tells me you don't, but, you can't help but grow that connection when you see that same animal every year and then you have the anticipation for the next year. And if they have a calf, it's even more exciting.

PS: And, it's with good reason. Bec is among the first scientists - ever -to monitor killer whale behavior off the Southern Coast of West Australia in an area called: the Bremer Sub-Basin.

The Bremer Sub-Basin just so happens to one of the most unique deep water ecosystems on the planet because of what it attracts to its waters.

BW: So Bremer Bay is on the South West coast of Australia. It's a tiny little town and you go 50 kilometers south of the shore on that and you come into the Bremer Sub Basin and the Bremer Sub Basin area extends over eleven thousand five hundred square kilometers and it's in water depths ranging from 100 meters to 4000 meters. This stretch of ocean is just a tiny pin prick in the big blue and it has such a variety of marine life there. I've worked there for the last 5 years and every year I see a new species there. It really does blow my mind. So out there we've got pelagic species such as monk and pilot whales with deep diving species such as beaked whales and sperm whales and small delphiniums like bottle nosed and common striped dolphins and we've had false killer whales. But it's not just cetaceans. So we've got pinepeds and sea birds, pelagic sharks, sunfish, just the list really goes on and on.

BW: I've been studying this population of Killer Whales for nearly five years now and my research is the first of its kind for this region. We know very little of the killer whales here in western Australian waters.

We still don't know the force behind this large aggregation here at the Bremer Sub Basin. There are theories that are floating around but we still have yet to get the hard science to prove what's actually happened.

PS: Several sources point to a phenomenon in the ocean called upwelling - where blowing wind pushes water away from the ocean surface and deeper colder nutrient rich water rises from beneath the surface to the top.

And all those nutrients are like a beacon for the larger attractions of the ocean.

BW: So we do think there is an upwelling of some sorts whether the hydrocarbons are contributing to that, they may not be the main factor contributing to it but we still need to do some more research and figure out what's actually happening and why it's during this time of year it is. Its it just through this Austral Summer or is it happening all year round. We may not know because there may not be the right amount of people going through the area during the winter time to see that. We really need to get to the bottom of it, Pardon the pun to the bottom of the ocean there to figure out what actually is and have more oceanographers come and explore it a bit more and look into it because it really is an interesting area and it is definitely an area that needs to be protected as well.

PS: Because this area has been left, for the most part, unstudied, it's also unprotected. And that leaves room for exploration on all fronts.

BW: There are oil and gas exploration permits but no wells have been drilled there, but there are exploration permits held. We're hoping for full protection. That's one of the things that the Australian Federal Government is looking at with the new draft management plan under review. So let's hope that it does get protected. This really is one of those last wild pristine places that is still untouched.

PS: Knowing that the fate of Bremer Sub basin could potentially fall into the hands of oil and gas drilling, time is of the essence to find out what these Killer Whales are all about.

BW: Very little is known about Killer Whales in Australian waters. We know very little about their abundance, their movements, their behavior, their ecology or population status is kind of astonishing given the fact that they are so charismatic and they are the oceans top predator. So there is not a reliable estimate of the population size of Killer Whales and population trends are pretty much unknown. Most of the information we have on Killer Whale distribution has been obtained from incidental sightings from fisherman out at see and other people out on boats. Killer whales are listed as data deficient, meaning there is inadequate information to assign a conservation listing status for this species in Australia.

BW: This is such a frontier of science that we do need to get that baseline data and without that we don't have a leg to stand on. So that's where we all come in.

PS: In order to find out more about Killer Whales, Bec has formulated a research study based on acoustic data and photo ID data collection, two non invasive techniques, that she uses out on open water at the Bremer Sub Basin.

BW: With this acoustic data, I am looking to describe Australian Killer Whale call repertoire to see if the killer whales here have an Aussie Slang. I'm looking to use passive acoustic monitoring to look at the distribution of Killer Whales within our Australian Waters and I'm investigating the dialects within our different killer whale aggregations so looking from the West to East coast.

BW: We can detect different marine mammal species that might be in an area, so we use hydrophone arrays to detect position of a whale producing a sound and then sometimes we can successfully follow these animals and track them as they move about in the ocean. This is passive acoustic monitoring. This is a really inexpensive and effective way of observing cetacean distribution migration behavior and population density and it's powerful, it's a non-lethal and non invasive method I use for assessing killer whale abundance and trends and defining their habitat use.

PS: But hold on, some of you may be wondering, like I am, why particular marine life uses this sort of language to communicate in the first place.

BW: The ocean is far from quiet. So every time I lower my equipment or hydrophone which is an underwater microphone, there's always something that I can listen to. Whether it be sounds that the ocean makes, like waves or sound that's man made, like ship noise, or sounds from animals of the sea. Many animals produce sounds, so from the tiniest shrimp o the biggest whales. Why do marine mammals use acoustics/ The ocean is very deep and light can only travel so far on the surface of the ocean is making that many marine mammals living in an environment that they can't rely on their eye sight, so many marine animals have evolved to see with sound essentially. They use acoustics for navigation, for detecting predators and prey and for communicating with other members of their species. Sound travels almost 5 times faster through sea water than through air, so acoustic communication for marine mammals provides an efficient and effective way for them to communicate. Each species of whale and dolphin produces distinctive sounds, so including whistles and moans and clicks and buzzes.

PS: Just by recording and monitoring these sounds, Bec opens up the potential to locate specific pods all over Australia and eventually, beyond.

BW: A massive question that just hangs over my head and it's probably one of the biggest questions I do get asked by people is where are all these killer whales going. That's the million dollar question.

BW: If we understand what they sounds make, I can look at the noise levels all over Australia and I can look through the data of all these noise levels that have been recording acoustics and I can see if there's other killer whales within different regions of Australia. We don't know much about the distribution so if I can look through all the other data loggers that are around Australia and figure out if that's another area the killer whales are passing through or once I know if there are different dialects within a range and back and see different family groups traveling to different areas. It would be a huge step in learning more about our killer whale population.

PS: Photo Identification and cataloguing, another research method, has always proven to be a helpful way to track sea life and even help the public learn more about the ocean.

BW: So photo identification, it's the foundation of cetacean research. It's a non invasive technique. It's being used by scientists around the world since the 70's to study whale and dolphin populations. The basis of photo identification is that each animal within a population is unique with certain characteristics and distinctive markings which distinguish it from other individuals. So with the killer whales, I use three diagnostic features. One is the dorsal fin. I look at their dorsal finds and I look for nicks and notches. Each dorsal fin is so unique to each individual, it's like a fingerprint of a human. I then also use the saddle patch which is directly behind the dorsal fine. Then I also use the patch which is the big white eye patch behind the eyes on the killer whale.

BW: You'd be surprised at how much a good photo identification catalogue can do. It provides information about the population demographics of the species, group structure, sight fidelity, movement patterns and population size. Once a catalog has been put together, experts can use it to study everything for things such as social structure and behavior patterns to population trends over time. Having a catalog is also great public outreach. We want to make people aware of how unique they are and let them track along with each individual. I think it helps people connect to what we're studying out there. It's can seem so remote for people sitting at home on land and they hear about these Killer Whales that are so far off shore and they haven't seen one but once they start to learn their names and they start to track along with the animal, they make that connection. So we give those killer whales numbers and we catalogue them numerically but we also try and give each of our killer whales in our catalogues suitable names, so we've named some of the Killer Whales in the Bremer Catalogue using the Noongar language - Noongar is the shore language of Aboriginal people of the south west of Western Australia and we named some of our animals names from this region to show our respect to our heritage and to the custodian land holders.

PS: There's a particular killer whale Bec has catalogued that sticks out her in mind for a reason that may come as a surprise. I'd like to take a moment now to warn listeners that this particular portion of the story is a little graphic.

BW: One of the animals in the catalogue is named Philana which is the name for dolphin in the Noongar language and another one is Mirro, which means spear thrower in the language and Mirro was one of the animals we saw in a very unique predation event.

BW: In my years of studying killer whales here in Australian waters, I've been lucky enough to see some pretty amazing things. One of the most standout sighings I've had was Killer Whales of Bremer Sub Basin hunting and killing a beaked whale. Except this didn't just happen once but four times which is really unique because it's never been recorded in observation of Killer Whales hunting and attacking and killing a beaked whale. We were out at sea, we'd had a group of killer whales. I think for about 20 minutes. And all of a sudden the behavior just changed that we're traveling slowly to start up with. And then it was just like a flick of a switch and they were off. They were porpoising and flying really really fast speeds. Through the chop

of the water. It was about a 4 or 5 meter swell that day, it was rough it was the southern oceans, so that's just a normal day but I do remember it being notoriously bad that day. They were tracking nearly 18 20 knots and then all of a sudden we just saw a big smash of water and just white wash flying into the air and of course you've got the camera and you just clicking away and sometimes it takes a while to process what you're actually photographing when it's happening all that quick. But essentially we had a Beaked Whale in the mix there and I have got so many visuals still stuck in my head. There was the calf that was really involved in it in the attack and a lot of other animals and it was such an amazing cooperative hunting and it really was such a quick and efficient kill it showed me why they are the top predator of our oceans and not to be too gruesome. But they did kill this Beaked Whale and they ended up pealing its skin off in under 30 seconds and then they took the beaked whale down into the water and yeah it was just blood and oil all over the surface and easily a couple hundred of sea birds trying to pick up the scraps here and there. Everyone in the boat, we were all a bit speechless to take in what we had just seen. They really showed you how they worked together. And why they are the apex predator. it was, I've never been speechless but this was definitely one of those times. And to see a Beaked Whale. They're deep diving marine animals and so they can be really illusive. In the Australian waters it's not common to see beaked whales out at sea. Granted there there are over 20 species of beaked whales world wide but in Australia most of our information on beaked whales is actually from stranding records. So to one see a beaked whale out at sea and then two, actually see it get hunted and predated on and not just once it's happened three years now we've seen that. So, It was definitely one of those days where you're just gobsmacked you again. You never know what you're going to expect when you head out there.

PS: Mirro showed Bec and her team how unique this particular pod's hunting techniques were, which earned **Mirro** her Aboriginal name.

BW: And this animal is really quite active in hunting and taking this marine mammal down, so we were like, we need to give a good name for that one! So spear thrower seemed quite fitting!

We have this joke on board that some people are the Orca team and some people are the other whale team and I'm definitely proud of the orca team. I have so much respect for how mother nature works and for Apex predators and what it takes to take down a prey species.

PS: Witnessing an event like this adds ammunition to Bec's arsenal of data to help protect the Killer Whales and their habitat of the Bremer Sub Basin.

BW: The fact that there can be a population of apex predators in our waters in our own backyard and we don't know anything about them, to me it's really symbolic.We're not just benefitting Killer Whales. So the Killer Whale is a charismatic animal and its something that people are naturally drawn to. By highlighting people's interest in this animal, it also gives us an avenue so we can highlight the whole ecosystem. We can make them realize that there is a whole ocean and we still have so much to learn. Getting people to realize that we're all connected to the ocean and that life doesn't end at the shoreline. Life began in the ocean and I want people to feel that excitement and to appreciate it. I want them understand there are some beautiful things on our planet that are worth working hard for and that are worth protecting.

The ocean is space to me. That's the next step to the next place that discovery Ive never had the mindset that i'de love to learn, of course as a scientist, idle love to learn what's out there in the solar system, but the next frontier of us exploring should be our own backyard, our ocean. There are animals that are being discovered in there, new animals every day where we're discovering new species on this beautiful big blue planet. And it does blow my mind that we

some people are more invested in looking at what we find on planet B. We should be focusing on planet A, which is our own big blue planet and the ocean. It's the lifeline.

PS: Bec's strong belief in protecting the waters prompted her to start Project Orca, an organization dedicated to sharing data on Killer Whales, which allows the public to become citizen scientists.

BW: Connecting research and the general public creates a powerful tool for education. So by people contributing photographs to the project, people contributing crucial information to this whole study. Citizen science, it's widely used for monitoring a diverse range of animal species worldwide and it's something that everyone at project orca is completely supportive of and grateful for so many people in the community whoa are active int he marine environment.

It's hard for researchers to be out in the water. It's expensive and we can't always be out there and to have that support for the general public and these citizen scientists on board, I think it helps build a story and it helps them connect to what we're doing as well.

PS: And that simple connection can be an important tool to protect regions like the Bremer Sub Basin from drilling and further disruption that could alter a truly great and unique ecosystem.

BW: All marine mega fauna - so sharks, fish, other cetaceans - they all face issues such as pollution, overfishing, habitat degradation and they're an apex predator, so Killer Whales, they play a significant role in the ecosystem that they reside. Knowledge of the killer whale population status that can serve as a proxy for the ecosystem health assessments and monitoring. Once we know more about these Killer Whales in Australia, we can help protect them and we can also protect the environment they live in. I hope that my research helps work towards this so I can make a positive impact. Not only on the killer whale population but also to their ocean home, because we are all connected. The ocean is Earth's life support. 50-70 percent of our oxygen comes from the ocean and that's more than all of the world's rainforest combined. The ocean regulates our climate, it absorbs carbon dioxide, it holds maybe 7 percent of the earth's water and supports the greatest abundance of life in our planet. So at the end of this, we should still have hope….Everyone of us can and does make a difference. I think sometimes you just get so knuckled down in all the horrible things in the world and well, yes, sometimes you just have to sit backhand say wow. We've just discovered all these cool killer whales off the Australian coast. There are people that care and people that are making a difference. And so we just have to have hope.