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[00:00:10] Discovered on my own. I mean, I think of all what I should know. I first went fishing with my dad when I was probably about five or six years old in Ireland. And I remember he had little yellow fishing rods and we went spin fishing for mackerel in all in Southern Ireland. And we didn't catch a thing, but other people did. And I was impressed. And then I really started fishing, moved to Australia, went back to England, moved back to Australia, went back to England, 13 years old. And I could see trout in the stream. One of these lovely pristine English trout streams. And I rigged up a big, thick, bright orange hand line on which I dangled a rope, a worm off a hook, and I caught a beautiful trout. And then I got told off by the lady who the street I wasn't meant to be fishing me, but now I was too late. I was gonna go fishing. So. Yeah. And then. And that's where in England, that's where I started to really enthusiastically fished. And again, favorite memory there is what we lived in a place called the Slide Valley. Little tiny stream down the bottom of the valley flat brook. And I can remember myself from a brother going looking for let's go and see if this fish and the slide broke and we drifted a worm down the stream. And I can still feel the tug on the end of the line. And that that was just fantastic. Probably the best fish ever called. So there were fish in the slide, Brook. It was only a little. Yeah. Best fish ever caught. I think it was just good.

[00:01:51] The first fish you're catching was a trout on a hand line.

[00:01:58] I hold it in so quickly.

[00:02:00] The trout bounced over the water as it came in, and I had three sticks to keep the worm floating in the water column and I saw the sticks jiggling. And then I just hope that it.

[00:02:19] I'll fish with anything that catches the fish. If I go fishing in the rivers around here, I'll usually take a fly rod and spin rod, one or the other usually works. Sometimes it's a bit too windy for fly fishing, but I've got the spin rod in that car and I know, you know, I wouldn't I wouldn't hesitate to stick a worm on a hook and it wasn't catching anything and it was a sunny day and sit there and wait. Yeah. I mean, apart fishermen are fishing places where if I keep officiates in a place where I know there's lots of fish. So something like the Clutha River, hardly anybody fishes there. And the river is loaded with fish. And I don't hesitate bringing back a couple of trout from the river like that. If I was fishing in a big one of the backcountry strains with relatively small numbers of fish, now I'd put it back. But then I probably wouldn't be bothered going fishing because I if I go fishing. I do like to catch fish or two rather than endlessly stalking one day after day just to get one. Fishing in the Yarra River once I hooked. So we go fishing for carp there, actually.

[00:03:39] So this is in Melbourne and dark evening, beautiful still evening.

[00:03:46] A little slightly creepy light coming in. Hook a big what I seem to be a car swims out across the river, reel it back in, another run out across the river, comes back in, goes around to the side, round a corner, and then starts to come to the surface. And I think. Right. Gotcha.

[00:04:03] And then it becomes quite obvious that the line has come out of the water and is now climbing up the bank, which startled me somewhat. And then it's quite high at the bank. And I see this big Murray tall turtle freshwater turtle come out of the grass tussocks with a hook in its mouth. Surprisingly, two things. One, I didn't expect to be a turtle. One, I

didn't expect the fish to be coming out of the water. And it was a it was a very short Murray River Murray freshwater turtle. So not even native to the area. So somebody whacking great big one that somebody must have released into the Yarra as an introduced species. So. Yeah, yeah. Half-court think. I think ever since I've been little. I mean, I like animals. I like catching animals. I like looking at animals. And there's something about water, about what's under the surface of the water.

[00:05:02] And, you know, give me a name.

[00:05:06] I'll be sweeping around trying to see what's in my poem. And I have been like that ever since about four, three, four years old. I just want to find out what's in the apartment.

[00:05:15] And she's got an element of extension of that. I think, you know, it's that mystery of what's under the water and different species of fish, different sizes of fish. And when you come to a bit of an understanding about, you know, how the river works and have a where the fish are and just how the world works, I think, yeah, I always like I think some of the best. Fish biologist with which I've worked with have definitely been fishermen because they know they know the biology of fish from the perspective of going fishing. And it definitely helps as well.

[00:05:56] And there is there is something nice, too, about. I mean, I think back to as a kid, you can catch mainly small fish. I mean, a sufficiently an for roach. And there is something pretty special the first time you're hooking to a big fish, you know, I mean, you probably fish for two or three years before I caught something that was like, whoa, this is this is a big fish. And sometimes your issue is you think it's a snake. Yeah. Yeah. And it's just that, you know, you get that ball.

[00:06:28] Oh, yeah. But that still sends a bit of a thrill up a lot.

[00:06:32] I mean, other times you just really lots of fish. But yeah, there is that little excitement of catching something a bit special.

[00:06:44] TONY EASTLEY But we're not really I mean, I I'm I'm not a I'm an extra in fishing since last summer. I'm not a particularly sort of avid fisherman. But I whenever I'm on holidays and I've got the time, I'll drop a line in the water. And I think it comes back to sort of, you know, won't see what's in here. That's the biologists bit of me. So I could be just as happy, you know, going to somewhere in England and putting a few worms and all to see if there's a few perch in the canal.

[00:07:15] We've got perching. We've got roaches. So I think it's the biologists that made it a curiosity of just seeing what's actually there. If I get a nice fish along the way and it happens to be a trap that I can eat all well and good.

[00:07:32] Not as good as it used to be. Certainly I've been here 21 years. There's been a lot of lot of intensification of agriculture. So a lot of the low land rivers is definitely salty or muddier than they were. The other big blow as the introduction did IMO, much was over 10 years ago now. So yeah, when you go fishing on a river like the clue that which used to be just all smooth clean Grafton's, now it's got this layer of Feltl over it.

[00:08:02] Does that affect the spine or pray?

[00:08:06] Pray. Yeah. So then all the evidence would suggest again that fishing has gone downhill. If a lot of those clear rivers since they got in, there's still a lot of fish that mean for someone going fishing on the truth, they'll think it's a wonderful river. But, you know, you just hark back to what it was twelve years ago. But it's not as good as it was. And I know that. You know, if I talk to somebody who was here 10 years before me, I'd go, well, you should've been here 10 years ago. And that's a common pattern.

[00:08:36] I can see it in the way my students have fished. So if I go back to Eric Espin and Toby, they used to teach me to go down the Clutha Fish. The evening's wonderful big evening mayfly rises most of the fish caught on fly. Then the next cohort of students who came through, which would be would be particularly particularly manner and manners. And they might go fishing. So go fishing with him. And he's catching fish on spin fishing and they're out of deeper water. So you could see the rises weren't happening anymore. So you can see the way people are fishing is adapting to the way the fish are changing. The altered habitat and the fish seem to be in deeper water, probably feeling where the did hemo isn't growing. And just the number of fish you don't get the sort of the big evening rise as he used to get, it's just dropped away. So but, you know, people adapt and adjust to different ways of fishing.

[00:09:35] These are primarily rainbows and browns in the COFO.

[00:09:38] Yeah.

[00:09:41] You'd see the same. I mean, the tyree's not as clean gravels as it used to be, at least in higher reaches particularly. There's been a lot of forestry in here and probably clearer once the trees regrow a little bit.

[00:09:54] But yes, SOUTHCOM, some of the rivers are definitely a bit dirtier than they used to be.

[00:10:03] Cinema is a lost cause. I mean, once it's in, once it's once it got into the rivers, it's everywhere. I think we're starting to turn a corner when it comes to water management over the past 10 years.

[00:10:22] There's definitely a period in the early 2000s where things were declining very quickly. It's probably reached a stage where things are at least not getting significantly worse. And I'd like to think over the next 10 years, things will start to claw their way back up a bit again as new legislation comes in. You know, it's definitely worth fighting for. There's. And when I go to other parts of the world, I can see examples around the world where other people do it better. And you think, well, why don't we do it? Why they do it so we can lift our game and still have farming. It's not good. It's not an either or. Traveling around the big glacial lakes in Central Europe. But the Swiss and the Austrian lakes. And for very good, Nick. And they have much higher populations than we do have around those lakes. So, you know, if they can do it, we can do it. We have we haven't got the management pressures that they've got. So we should be able to do a lot better.

[00:11:29] It certainly has in the past. So the I mean, perversely sport fisher better protected than the native fish here.

[00:11:39] And that was driven by the angling quality, the angling, the significance of the angling. And by the culture as well. It's probably the economic value is probably not as appreciated as much as it should be. No one's done a detailed study for a long time yet.

You only have to look at random number of fishing licenses sold and the number of tackle shops and the number of people who come over here primarily for angling to know that it's big business. But the figures are all out of date and old. So it definitely is big business for sure. There's a lot of guides, particularly when you get into the brand Queenstown and want to get into those sort of areas. It is big business. It's obviously big business and pretty important for a lot of local economies as well.

[00:12:32] It is. It is a little bit yeah, it's a little bit more complicated here.

[00:12:37] So we buy a universal fishing license so you can go fishing anyway. In theory, we do it then out of courtesy. You should go ask the farmer if you want to go fish on land. And then there are examples around where people have deliberately tried to exclude people from going fishing on my land. Thankfully, there's not too many yet, but they do exist. And so there has been a debate over the past few years about underhand capture of private of public fishing space. And then it does get murky. And some areas have what's called the queen's chain, private land, public land running along the river and then other areas where all the titles don't have public land running along the river. And then you get rivers, which, of course, move around as rivers do. And they were surveyed 100 years ago. And now the private land is 100 meters over there. It was over there. And to no longer match up. And so you'll get the farmers say, well, it's no queen's chain along this river. But if you look at the catastrophe maps, they'll be a funny little pocket of private land stuck out in the middle of its farm, hundreds of metres from everyone. That's what the river used to flood. So it does get a little bit messy, but mostly you can go fishing along the rivers.

[00:14:05] And this is the Keys chain is basically a response to the waves in England and a lot of Europe. Is that correct?

[00:14:14] That's my understanding of it. Yeah, it was brought in. So the common man could go fishing along the river. So that's the way I understand it. But it doesn't it I'm not sure when it comes in. I think it's about the 1880s. So if you get titles older, you will get rivers, which don't have any queens chain along them. And then the you know, the landholder would be quite within the right to refuse access. The tricky ones were getting, I guess locally we're having more problems with, you know, if you got a central target. So getting access to the Clutha River where, you know, there's been historic access, someone's own the land for, you know, past 50 years, they've always said yes to people going across the line to go fishing in the river. Now there's a bunch of houses or vineyards going in with prime views of the Clutha River. And the same way we don't we don't like people go down whatever our river, that's where you're getting the sort of the capture of the public land. We had a problem in parts of around like then people mowing, mowing their properties down to the edge of the lake and then getting angry at people walking along the lake shore over their lawn.

[00:15:32] So we tried and thought we'd have a public barbecue on their lawn, which seemed to change their tune a little bit. So there's a little bit of that that goes on, people wanting to claim exclusive capture over nice river views. And, you know, we get there's a lot of paper road surveys that were survey but never actually officially put in. And the public has the right to vote dam unless there's good reason to oppose it. And then all of a sudden, you know, suddenly you get somebody saying, no, no, no, wait, it went up like this down on Paper Road, but that's the only way you can get to the river. And then there's you know, they'll be 10 kilometers of river, which is now inaccessible to anybody. It's private land barrier all the way down. That's where the problems are cropping up.

[00:16:22] You could track the river if you wanted to. So, yeah, much of. There isn't much for practice of doing that in New Zealand. People tend to come in, walk along the banks and I for love of the rivers, you know, the land of fish.

[00:16:36] So if you look at the license conditions, you're not allowed to fly from a floating object. You're allowed to float down the river on a boat and then fish. But a lot of the rivers in Atlanta actually fish from above. So there's restrictions on that as well. It's not it doesn't apply to all rivers. It varies from river to river. But there isn't much for culture of the fly fishing boats that you get drift fishing and you get in the US, save some.

[00:17:07] Climate change will become a bigger and bigger problem. First on the North Island and then we'll start to see the northern South Island.

[00:17:17] I would guess that here we'll probably see a shift more towards rainbow trout, both fisheries, they do better in warmer climates. It worries me on the North Island that as you lose, as the pressure comes on to the angling resource up there, you'll get pressure to introduce other things. So there was a push 30 years ago now for largemouth bass to be introduced into New Zealand. And I fish for large may have passed that wonderful fish, you know.

[00:17:45] But I don't want them in the North Island. But then, you know, when this when when no one's got any rainbow trout to catch. That's the sort of pressure that you'll get people sort of saying, oh, we need something to catch. So that would worry me. You'll get pressure to introduce other things.

[00:18:04] It worries me a little bit. You know, the the angling sales are slowly declining. That's a global issue that people were doing less and less fishing.

[00:18:18] If people don't go fishing, they won't value the resource. I mean, we've got white baiting on the rivers here for the native lakes, since I've got big doubts about commercial white baiting. But we should have recreational white baiting. If you exclude someone baiting the larvae or the juveniles or the native fish that come up the river from the scene. They're all declining or potentially threatened species of native fish. You can't tell the white vote. There isn't any strong evidence to say that the white baiting has caused the degradation of it's causing a decline in the numbers of of galaxies which are the adults of these fish. But there isn't any good evidence to say that it is easily collected the data. What we can say is that people been white baiting for 100 years and we've still got white paint. We've got a new pressure in the form of commercial white baiting, which wasn't there in a big way 30, 40 years ago. Now you can't catch a big load of white bait. Put them in a freezer and fly them up to Waterland in a day or two. It didn't happen 50 years ago. So there's a new pressure on the resource that wasn't there. Am I worried about unregulated white baiting, commercial whitebait, etc? And should we have recreational painting? We go down and collect a fee, won't they?

[00:19:42] Yes, absolutely. Why gets people out Moravians? It gets people worried about white baiting. It gets people worried about silt and rivers and rubbish and excessive poorly managed farming upstream and rivers. And one of the strongest advocates we've got for cleaning up our rivers are the white pages. We need white. Just as we need anglers. Fish and Game is probably the most effective and well-resourced.

[00:20:11] Advocate for rivers in this country, we lose fish and game, we lose that advocacy. They've driven a lot of improvements in water quality over the past 20 years. No

doubt about it. Why? They're independent. They've got some money. If you want to fight a lot of these issues, you're going to end up in court. She went up in court. You're gonna need a lot of money. It's the anglers who pay for it. So, yeah, that worries me. That is that as that interest of angling in art or pursuits about nature go down and you lose that advocacy and you lose it can contact with nature. So I think it's very important.

[00:20:52] Yeah. Yeah, I I agree. I've often considered talks about youth getting out fair. If you just write about class or whatever, you may not care. But yeah. And there is smarter that you felt the cold water. It is a different experience in real time.

[00:21:09] And if you eat something out of it, you feel comfortable eating. You think of this fish taste wonderful. You know, it is a different experience than just standing there and taking a photo of it. You know, I mean, if you're out fishing, you're giving your hands.

[00:21:21] Did it literally, you know, in the water. And, you know, when you say you smell it, you feel it. You know, whether it's good or bad. You know, I used to catch a little fish here for five years ago. Now there's there's nothing. I, Michael, go back to Melbourne, where I grew up, and there's places I used to catch big perch and now a whole bunch of introduced fish, but there was still big perch and roach. And now I go there and then you're going to catch anything there today. You know, this stream has obviously degraded. So it's a.

[00:21:59] Not on the same scale, sufficient game of the primary drivers of all things fish management in conservation, so they are a management organization and advocacy organization. They play that dual role.

[00:22:15] We have fishing clubs. They play a role. So there's a lot of good, strong, active fishing clubs around the place. There is a registered guides. Fishing guides, organizations who play a role as well. But the grungy advocacy work and management work is all about fish and game. No one is allowed to say you can't really trout in hatcheries apart from fish and game.

[00:22:45] So all that sort of side of it too is taken out of Chinook. Salmon have got conditional operations, but all you know there are like commercial or recreational releases a trap. It's all done by Fish and Game and quite a closed shop in that sense.

[00:23:05] No, no, it is not salmon, but you cannot get rainbow trout or brook. You have to go and catch one. You can't sell one. You could give it away, but you can't sell it. And the only way to actually catch one would be with a fishing license, an efficient.

[00:23:31] So many I'm a freshwater ecologist, first and foremost interested in anything in freshwater, but I've always had my my primary interest, as always, been fish. So fish biology, fish, life history. And I work on native fish and I work on someone else. Few people have said what he worked on for a moment. And I sort of know as a biologist. Why wouldn't you work and stuff on it? There are an amazing fish from a life history perspective. You've got this. You've got brown trout which have just this amazing tool box of life histories where they can adapt to a whole range of different circumstances and situations with which tend to put them at the top of the food chain doing pretty well. The one to one sort of constraint in their arm or the one sort of common narrow point of their life history is they all have to spawn in cold, gravelly streams and feet. They all have to get back there. At some point they can disperse and migrate away from it. But at some point they have to go back to that cold, gravelly stream. And if they can, you know, are within

the physiological tolerance range, within the adult habitat, which is, you know, to the low 20s for brown trout. So long as they can get back to that stream and spawn where the water temperature is no more than eight or nine degrees, then you will get brown trapped. It seems to be the basis of the life history. I think Central also wanted, you know, they all got to get back to that cold water straight to spawn. So. No, not totally. What's our best guess? Oh, probably, probably odor, but it's a flexible system as well. My my my way of thinking of the Trump life history is actually they spawn in the cold water stream.

[00:25:30] If a stream has got a low density of individuals, they'll probably stay resident if there's no reason to move. They'll probably stay there if there's a reason to move. Most likely competition for space or food. They got a choice. They can you know, if they're getting hungry, they can either go upstream and they'll go downstream. What would you do? I'd go downstream. It's easier. So I think they just I think they dispersed downstream and criminally drop downstream and they keep dropping down downstream.

[00:25:56] Every time they hungry. And eventually they get to a point where they find enough food and they get big enough to get to spawn and they go back to their homes stream or they try and get back to the stream.

[00:26:15] And if they can't get back to it, they'll go somewhere else. And the best evidence on them on homing is it's a combination of probably learning and odor. They can definitely follow odors. We know that they're good at following odors, but fish are pretty good at following that. They have good local knowledge of where they've been and where they go. And you can see that in at least small scale studies of what fish do they they definitely know where they've been and where they go. So they probably have reasonably good spatial maps in their heads as well off of where they go. But we also know for Brown transporting that fairly flexible as well. So if they can't get home, though, there's another good stream. I'll go up. That one is form there anyway. So I think it's you know, a lot of these are monitored. It's a downstream dispersal to where you can grow big enough to get to the point where you can spawn. And then at some point you will try and find your way back as close as you can to the stream, which you started from to spawn. They need to spawn a big, gravelly, coal grumbly stream because I got they got an enormous X when you look at some woodlands as a whole. What stands out about their biology is the size of their eggs. Big eggs probably have very tight physiological constraints and simply can't grow quickly in a in a low oxygen high temperature environment. So they have to develop slowly in a well oxygenated environment, otherwise they just poison themselves in the waste products. And to me, that's the basis of haterade life histories work, but for some simple little processes you get these wonderful mix of life history. So the Museum of Travel attracted here, you know, from a mixed stock of migratory and resident trout. And those life histories have reappeared in the New Zealand landscape almost like magic. So, you know, it was all there and the genetics of the fish. And it's just played itself out on the landscape probably in a fairly opportunistic way. But that's the way I think it actually works.

[00:28:24] The more we look at it, the more common it probably is.

[00:28:28] So, I mean, particularly working with native Glasgow City. We've got a lot of what we call Didymus Fish here. Going from freshwater to saltwater, I can get a larval galaxies, make jihadist's, which is about six millimeters long. I can pick it up, drop it in freshwater and it'll swim around and I can get a dropper and I can put it in seawater and it'll swim around. So a lot of fish, I think, have that innate ability.

[00:28:56] They they're not they don't really care whether a salty or freshwater. Clearly, some fish need a bit of acclimation and someone it's definitely fall into that category. But I suspect it's not as hard as we think it is. And again, you know, I can I can try Dan Tiree mouth here and I can find trout living in the Tory estuary and they are swimming in freshwater for four or five hours of the day. And then they turn around and face the other way and they swim in seawater for the next three or four hours.

[00:29:29] And then the tide goes back out and they're swimming in freshwater. And I don't think they really can. You know, they said they need some activation. If you get a brown trout from headwater stream chuckled in seawater, it'll probably die. But give it a few days to get used to the idea. Yeah, it'll probably live. So I don't think it's as bad as much bear as we think for a lot of fish. For some fish, it's definitely a barrier. I mean, you know, some fish cannot tolerate seawater and some fish can not tolerate freshwater. But yeah, it's a whole lot in between. Where I don't think it's much of an issue is we. We tend to think.

[00:30:11] Particularly for the early history. So when you when you you look at it across all the cell models, they know they're almost all universally swarming in in cold, gravelly streams, which don't get above about 10 degrees Celsius. That seems to be the defining trait of the sun monitoring.

[00:30:34] And then, you know, if you dig back and you think, well, what is the defining trait? There are some very nice analysis of life history traits for fish in general. And one of them is when you look at egg size and you get this big cluster of fish and you get, you know, from little eggs to a reasonably large eggs, and they all sort of form a big cloud. And then up here you have this little cluster of eggs up here. They're not big things. They're huge eggs. And that's what, you know, if you go through this on one of them say what's really different about someone? They produce these massive eggs, exceptionally large eggs. And particularly when you get to things like Chinook salmon and that big Chinook salmon, their eggs are about a centimeter across their massive for a fish egg. But, you know, if you think of a fish egg, it hasn't got a respiratory system. It's round. So without a respiratory system, they're relying on diffusion. And relying on diffusion is not very efficient. So you've got to somehow slow your metabolism down. How do you slow your metabolism down? If you're an actor, you lay your eggs in cold places and they develop very slowly and they don't produce waste products too much. And, you know, they develop over 3, 4 months in a you know, in a gravel nest, in an icy cold stream. And then when they hatch out, they produce these really large juvenile fish, which seem to be, you know, when you actually look at global fish, very few fish, actually, the juveniles in headwater streams and even fewer fish, rare, the juveniles in icy cold headwater streams. That's one group of fish that do it exceptionally well. That's the sad moment when you come down to the southern hemisphere. Yeah. We get Klaxons, which way their eggs in icy cold streams, but they don't get any bigger than that. We didn't like his policies. L don't know which which have eggs which get up to 2 3 millimeters across and that's as big as I can do. And then previously, previously bigger and bigger eggs and they lose all the fecundity. So these fish are down to produce about 50 eggs for each year, maybe every second year. So there's another little trick to solve to do. And as they grow massive. So not only do they produce great beginnings, they also have a fish which hook up with genetic genetic capacity to grow huge should they get down to the resources which support and allow them to grow to that large size to children which swim a thousand kilometers downstream and get to the sea, grow massive because they're massive. They can swim miles upstream, they dump their eggs in icy cold water or less constrains.

[00:33:21] Now they've got a problem. And like I call it the Everest, the Everest problem, you look at mountaineers, winter mountaineers die. They don't die on the way up and down the way down these Chinooks like Everest Mountain. Hence they they grew big down in the ocean. They swim a thousand kilometers upstream. They're used all the resources. They've got no food left or in the worst condition of their life. How did they get back to camp? So they die up there. You know, they could become genetically hard wired that you just throw all your resources into that life history if there is no other life history and the landscape that's going to operate. But if you get a more complicated landscape where there's some areas where you can get to, in some areas where you can't get to, and then you get something like brown trout, you know, some places the migrants and places are not migrant.

[00:34:16] Some places one life history is a bit more optimal over the other one. So in that part of the landscape, you'll get migrants which grow massive in that area with these big ultra competitive migrants can't get to will get the little tiny residents. And that's what you see with the brown trout and you'll see it with the rainbow trout muckrakers markets to some degree. You'll see the cutthroats. You'll see it with the Brook Charren, certain parts of the landscape along the Rockies, you'll get this, you know, big mountain range running right along the sea. And all these migratory life histories will dominate the whole landscape. So, you know, there's a fish biologist that's my pet middle's hypotheses as to how always life history sort of manifest themselves out across the landscape, driven by downstream competition, driven by whether or not they can get back upstream. And then the competitive balance between the residents and the migrants. And who wins at any one location? Fisher Wonderful. I mean, there's more than the most diverse group of vertebrates on the planet. You know, people get get all excited about mammals and all the others. If you want to see life, history, diversity and and a greater range of ways of living and study fish. Most fish we know nothing about freshwater fish in particular. There is there are as many freshwater fish species as there are marine fish species. Yet freshwater fish species are squeezed into about one per cent of the planet.

[00:35:54] You know, the single most diverse group of any of vertebrates on the planet. And it's like, you know, why wouldn't you study wherever you go? You'll find something interesting to look at. It's just wonderful. And, you know, it's what makes life interesting. You know, if you're if you're interested in biology, I tell the students you'll never be bored. There's always something interesting to look at. Yeah, just go and enjoy it.