P4 chat

[First 5 minutes chit chat]

[Sandra: introduction – 5 – 9 minutes]

Sandra: So the three resources that I used was the Vertebrate Taxonomy Ontology, which is a taxonomy that is written in .obo, just looking at vertebrates, The Catalogue of Life and the Integrated Taxonomic Integration [sic] System. So are you familiar with these? The latter two are more database things and the first one is more a taxonomy converted into an ontology with the markup language.

P4: Yeah.

Sandra: So you have the taxa that I chose, Oncorhynchus mykiss, you can tell me when I say these wrong as well, Sander lucioperca and Salmo trutta. [Explains the slides] Is that to you, are you familiar with these?

P4: Yes, that is a problem [inuadible] With marine species also. I've actually just written an article, a reference article, for something to do with animal behaviour and cognition just about sharks and [inaudible] and brackfishes [inaudible] I mean I don't know every species of shark, my PhD is on shark biology, but I kind of got this review back and the editor had been quite diligent and had come back and said well that's actually not a junior synonym of this species, this is an old version of it. And all I've done is I've just gone to the papers and some of them are relatively old I guess, sort of early 2000s and then obviously since then their name has changed quite a lot, you know the taxonomic classification had changed. You know, with genetics and that. But actually I realised just how much is out there that's incorrect, because you know I'd checked some of those species, you know I normally use FishBase and they're still wrong in there some of them. Considering when I look back to some of the other databases] But it's just a nightmare. You know, we think that taxonomy is a, you know, telling us what we need to know about these species and people still get it wrong. You know. I remember one species that I worked on changed. Not only did the common name change, it went from a dogfish to a catshark, and I don't know but I still call it a dogfish. I've been calling it a dogfish for twenty years and if I start talking to local anglers or fishermen, you know commercial fishers and I start saying to them, "Oh yeah, can you get me some catsharks?" They look at me like, what?

Sandra: What are you talking about [laughing]?

P4: But then you go back to the old name, old spotted dogfish… "Oh yeah, yeah, I can get you loads of those. What the hell's a catfish?" "It's the same thing as a dogfish but they have been classified differently." So I get this problem a lot, yeah, and I mean probably if you speak to some of the more experienced anglers that are really into their taxonomy, because I do quite a lot of work with anglers, they just get totally confused as well. You know if I'm getting information out of people and you know, talking cross.. so just another example because I did quite a lot of work in South Africa, did some work on great whites and the guy who was running the project said to me, "Can you run down and get me a soup fin shark?" from the fish mongers, and I was thinking, "What the hell is he talking about?", so I went down [inaudible] I've been asked to ask for a soup fin shark, I have no idea what it is, and he went no worries, I've got some in the back and he comes out and I was like "Ah, that's a tope", if you'd said tope

I'd have known what you mean, and yeah so yeah because this this whole thing is so crazy, then you fall back on the Latin term, and then that's wrong, Salmo trutta that's a common one. It's just a common one, the one globally that's probably confused… but certainly in the UK that's not a problem because that's one of our sort of main important commercial economic species, so that's not a problem. But certainly when I talk to other people across the world about this, or sort of have papers back, that have kind of questioned my naming of that species.

Sandra: Any why is that?

P4: Just because they call it something different. Or their taxonomy of it is slightly different. So it's a bit weird, it's a weird thing. We're always fighting this kind of… you know and then also we talk quite a lot, I mean I don't know all the Latin names of all the fish, but you know, fair enough there are 1000s of them…. But you know, we, kind of… there are lots of funny names that people use for there, you know they are very kind of, they are sort of abbreviated names, and also, it's just random, you know you have to fight to get the information out. And say right, what species are you talking about. So yeah, I do get it.

Sandra: So you weren't surprised about the number of variants. Concentration of variants was actually more stable than this picture suggests. But lots of variants used – both on the scientific and vernacular level.

P4: Yeah, yeah, definitely. To be honest with you, quite often when I've been writing papers, or often when I've been writing proposals. I mean for proposals it's not so bad, because it usually goes to a generalist board, so I am not so concerned. But I'm looking at a paper, and I don't know exactly what that fish is. Then I go back and I go OK, hold on a minute and find something that I'm not actually aware of. And normal with the species I know quite well and you're reading a paper and you are like, what's that and then you find out it's actually the species you are working on or that it's something totally different has been called the same thing. And that's a real issue for us. It's just getting to the bottom, I mean to be honest with you, most people are working on such a select number of species. So they just become familiar with those species. It's like what I was saying, I have been writing this paper about these two shark species. Just how diverse the nomenclature is for these, that surround this species. [inaudible] I was actually quite embarrassed when he came back with so many that I got wrong. And, you know I'm a shark biologist… so…

Sandra: But it's got to be really hard, because if you have all these different resources, and everything is constantly changing…these all need to be kept up to date to, I found it all fascinating.

P4: yeah, yeah. This is also a problem, I guess, in that when you are citing literature, if you go, if you go with the most up to date name in the actual piece that you're working on, but then you reference back, they are two different species names. So the title of the article, this is the problem I had, I went back to the editor, to ask them what to do. Because you're telling me that that species name is now wrong, but the citation, or the reference is now telling me that that was that species. How to reference that back, I've actually gone back to author's previously, when I have seen this, where people have, and I've thought, oh, that's funny, that

paper isn't about that species, and you get back to them, and they say, oh no, I did check it but the nomenclature has changed and basically that's no longer valid. So that's really bloody confusing now because you know, I'm working off an older name or not marrying the two up and I've found that quite a challenge when I'm writing.

Sandra: Yeah, it's actually something that I saw quite a lot here. When the instances of variants that weren't the accepted variant, according to the resources I looked at anyway, they would appear in the references, rather than in the main part of the document. [Thinking from different perspective – I had the variants – hadn't thought of the difficulty in matching]

P4: Yes, it's very confusing. And yeah you think, that's interesting, I'll have to read more about that, that species, you know? But that threw me a little bit. I'm a bit more clued up on it now, but a year or so ago that was a bit like, ooh. So I started actually emailing people and asking the questions, you know, what is this, but what then you do a bit of research and you're like, well that's an old name or… because sometimes it gets really difficult to find. For example I had this paper from like the 70s and things have changed quite a lot from there it was one of the first feeding, one of the first proper feeding studies that had been carried out on this group of sharks and it's actually really difficult to find the name of the shark in any literature because it had changed back in the 70s, you know? But that was quite a challenge. And when the guy told me I was a bit, I don't know what this is really, because then you've got a Latin name, that's linked with a vague common name, in Australia. And that means that it's actually very difficult to marry those two species together. So, the fun of taxonomy.

Sandra: Yeah.

P4: You can see why my students struggle so much, can't you?

Sandra: Yeah, I've got a friend studying marine biology now, and she has a lot of fun with taxonomy.

P4: [illegible] and get blown away by it. I mean they think we're amazing when you start spouting these Latin names. And you say it's only because you work with them every week. And they're all like how do you know all this stuff? It's like calling your kids' names, you know them because you use them a lot, you know? But let them be fooled.

Sandra: Concentration of hits (frequency) – more stable than the plain frequencies would indicate [explaining the sheets]

P4: So that Salmo… Salmo gairdneri, that's the one that caught me out when doing my first trout paper. It caught me out. That's the one that I thought was a different species and I thought it was a different species, because it's not a Salmo and the editor came back to me and said, this is the same species. So I felt very stupid. But I'd given is as a separate case of another species. So that one always jumps out to me when I see that.

Sandra: Interesting thing – spelling. Resources state: Salmo gairdnerii – but more frequent with one i.

P4: Yeah it's mad isn't it, when you look at that the amount of people getting confused, you know, and you're talking about a species. And but I think you know, there's quite a lot of discussion among scientists about you know the naming of this, of where it's derived from and can we not just get rid of it, you know, can we not agree on a specific name, you know,

certainly in the trout Salmonid world, where you're talking about salmon and trout is that they are so commercially valuable and, um, I've had lots of conversations with people from trout trusts and you know everything, because people can recognise what it is, but actually we're not talking about the same thing. So when you're, we had an instance when we were talking with a Japanese company about getting some rainbow trout in and they were talking about different species, or they had a different species in mind. And it thoroughly confused us. We were like, ummm, no we want Oncorhynchus mykiss, and they are, "but these are rainbow trout", but "are you calling rainbow trout what we are calling rainbow trout?" because the name is different and then when we looked at it it was the same species but I can't remember what they called them, this Japanese company, but it was just a nightmare, you know. So normally, you know yourself, we would fall back on the Latin names to know what we were going to buy, and when the Latin name is not the same, you know, you say, that's not right, and "yeah yeah they're rainbow trout", "no, no, no".

Sandra: That's interesting. So you are saying that even with Latin names, there is a geographical element to what Latin names people might use?

P4: Yeah, and also it means that you sometimes don't know if they are just different species. So yeah, you know, we were just very confused about that. You know, because this guy was actually flying over from Japan to come and work with us. And we were looking at these farmed fish, because we farm rainbow trout here quite widely and we were looking at the impacts of those farmed fish and how they survived in the wild and how they kind of survived downstream of fish farms and he was going to bring some eggs over, like some different strain of eggs over for us, he was going to bring what we thought was Oncorhynchus mykiss and it was but not by name. So the more work in it, the more you try and talk to people, the more you try and purchase things… you know the um, it's not fish but just going back to the shrimp [that he had had to remove from the lab because of the coronavirus outbreak] and yeah, they're a nightmare. We still don't know whether we've got the shrimp that we wanted. They are called cherry shrimps, but the variation we have got across the shrimp that we got, we're not convinced that they are all cherry shrimps, that they are all the same species of shrimp, because they are so different. But because they have this red pigment, but I mean they varied from anything to almost translucent with a red hue to you know, a very vibrant, deep deep deep red, and my colleague and I just said, you know, they don't even look the same, you know, but these are classed as cherry shrimp, and I can't remember the name of them, we've only just got them in. I can't remember the name of them. And we were like, are these even the same species? I mean they don't look like it but they have been classed as that, because, you know, they're red.

Sandra: Yeah, so do you have this issue of people in different areas using the common name, but you are not sure exactly what it is, and then sometimes you ask them and…?

P4: I mean I still don't know what species it is. I mean, these shrimp came through an aquatic wholesaler, like an importer, who deals with like, I mean they are very well-known shrimp wholesaler and we've used them for years, but I'm still convinced that they don't know what they are. I think they just get shrimp that are a red colour.

Sandra: Yeah and they go right and say, that goes in that one.

P4: Yeah, it's crazy so we're still not convinced, unless we do genetic testing on all of them, which, you know, we're not going to do. But it is a worry, because actually, we are publishing stuff that probably has an element of error in it. We're not convinced, we are reporting poorly

on a species and that's kind of held us back from some of the publication because it's not always clear, but you know. But that doesn't surprise me having looked at is seeing all these configurations and variations of the trout. I think the biggest thing with the rainbow, is the change from the Oncorhynchus to the Salmo. It's the biggest thing, because I've seen them call Salmo all sorts of things and actually they're rainbows. But, yeah, they're not, they're not a Salmo species. [inaudible]

Sandra: People do what they will.

P4: Yeah, indeed.

Sandra: Sander lucioperca: infrequent in the corpus. But inverted frequency of accepted name and variant.

P4: I do know zander, I have not done a lot of work on them, but I do know that the pikeperch is the one that sticks out as the most, that's what we call them most, that's what we call them, to be honest I call them zander. But then again I think it's the typical thing, people call them pikeperch and then get totally confused, because I don't know if you looked but there are another two species, pike and perch and people get very confused about what they are. They think they are hybrids of those two species, and yeah, that gets very confusing. Because I used to teach on a fisheries degree, over in Hampshire and these [inaudible] anglers, who basically wanted to become fisheries managers and had an interesting conversation around these types of naming, you know, sort of activities of pikeperch and whatever, because I just know of Sander lucioperca as the Latin name, but I would normally call them zander or pikeperch, that other bit, I'm not sure what that other the St…

Sandra: Stizostedion… or however you say it.

P4: I don't know, I need my glasses, or I need some glasses, it's tiny on my screen, but um, I've never heard of that.

Sandra: I think, if I remember rightly, it was classed as a previous name that then they decided that the genus wasn't the correct genus.

P4: Yeah, they reclassified it..[inaudible]

Sandra: They reclassified it. Yeah, but I mean… it's interesting what you said about the pikeperch, I hadn't thought about that confusion.

P4: Yeah, it's funny the naming. I mean, you know, just going back to the sharks, because I've done more work on those, you know, when you're talking about Great Whites and they start calling them Bronze Whaler Sharks, you know, and everyone is calling them White Sharks, White Death, Great White Shark, and then somebody, one country comes out with Bronze Whaler. And that confuses everybody, because in your mind, why is it bronze and a whaler? And it doesn't make sense. So where that's come from, is just totally bizarre. I mean whether that's a translation that's just gone wrong, and that isn't quite right or something else, but it's that kind of naming, the naming of pikeperch, it's just weird. And that's where the confusion comes from. I mean quite a lot of my students in the past have been [inaudible], they are big predatory fish, and they want to catch pike or perch and there is this perception that these individuals are not zander, it's crazy.

Sandra: Very funny, I think Rachel mentioned one which was a mountain chicken that's actually a frog?

P4: [inaudible] with some of these names you are like, “What?” [inaudible] Weird, weird.

Sandra: Same sort of thing with Salmo trutta. [I explain the graph of the nodes, the separate of entities rather than words, and the arrows for parent to child relations] A lot of the ambiguities I identified were linked to the vernacular usage. Sea trout: parent versus child.

P4: Basically with brown trout, nobody knows why they turn into sea trout at all. Scientists are still unsure but they think it is to do with competition in the riverine system, this is just one theory, I don’t know if it’s right [inaudible] but, um, the thing is that they are basically pushed out and they transform to go out to sea. There’s no real reason to do that…

Sandra: So nothing to do with breeding, or anything like that?

P4: Yeah, I know they call them anadromous but they are not truly anadromous because they don’t need to do it, but they basically… so to me, what I was going to say to you, in relation to your graph, I would say that brown trout is Salmo trutta as a pair and this is an actual offshoot of the same species. They don’t speciate, they are still essentially the same species genetically they are the same but it so happens that some do go to sea and some don’t. So that’s where… but again they look very different, if you look at a picture of a trout, of a brown trout and a sea trout, they actually look very different. So they are very silver, it’s like salmon silver up to go out to sea, and brown trout silver up to go out to sea as well. And actually they change shape slightly to [inaudible] so you kind of get this very bizarre, you can understand why people get confused, because physically they are very different, but genetically they are still brown trout. They come back into the rivers, still breed the same…

Sandra: But they change quite a lot physically when they are out… ahhh.

P4: Yeah, Google sea trout and brown trout and you’ll see the difference, they are quite physically different but yeah. There again, this is pure confusion [inaudible] are these, they’re a Salmo species, like Salmo salar, salmon are they a typically anadromous fish that have come back in and basically found a niche in a river and now they don’t need to migrate and go back out to sea? But a few of them do? Or is this an adaptation of a riverine species, you know. And I guess that’s the debate, no one really understands the reason why these fish go out to sea.

Sandra: That’s fascinating, I didn’t know any of that. Because I noticed the same thing with the rainbow trout and the use of steelhead.

P4: Yeah, steelheads, yeah, a similar thing.

Sandra: It’s the same thing?

P4: [inaudible] There’s a really, really interesting case actually the walking… the catfish. The riverine catfish, where they originally thought there were 30.. I think it was something like 32 species of catfish they found, but then when they actually narrowed it down, there were only about 9 different species. I mean they look different, because some of them were darker, bigger, blacker, and then when they actually did the molecular testing on them, they whittled it down to about 9 species, they reckon. And you know this is a typical case of that. You’ve just got species that just behave differently in different habitats. You see that a lot in other areas. You’ve got crayfish that in normal riverine systems they are quite clear and light coloured and then you get these random black ones that live in silt and they just grow bigger because they have more detritus and it’s kind of black and then people think they are different species. So they call them something different and … [inaudible]

Sandra: then it sticks

P4: yeah, then that's what they are, it's really weird. Like you say, it's funny, like the mountain chicken, [inaudible] I mean apparently to us, when we're talking about these species, apparently to us, there's no real reason why they are called these things [inaudible] but you know with some of these fish you're like, why is it called that? Why has anyone ever come up with that name. You know, it's weird.

Sandra: Why, yeah? Cos if, for example, there's something about the appearance of the species that helps you to identify it through that name, then it seems to be a useful communication tool in that, but when it doesn't have anything to do with it..

P4: Yeah, exactly it's totally random. Because, you know we were talking at the [inaudible] and the guy who was running it was a really well-known fish expert [inaudible] and he was chatting away about these things and um, fat-head minnows, they're called. And basically all it is is that, because I was like, why are they called fat-head minnows, weird, but apparently they have a little fatty lump on the top of their head. You can't see it, so some of them you can [inaudible] but if you are just looking at them, why? But they have a little lump of fat on their head. And you're thinking it should have a big fat head, you know. But no. [inaudible]

Sandra: This was just one, this might be a sort of example, with the Japanese. [Parasalmo mykiss and Kamchatka, geographical specificity]

P4: Yeah, Yeah.

Sandra: Here I had identified steelhead trout and rainbow trout were both very frequent common names used in relation to Oncorhynchus mykiss. Synonymous exactly or not? Looked at whether they appeared in the same documents, same parts of documents. Saw they were often used in combination. Also, looking at other descriptions (future work).

P4: So are you saying that in your lit review you found a combination of those names in the same document?

Sandra: Yes. A lot. Let's see if I can go back.

P4: So that's the number of times that steelhead trout was found with rainbow trout in the same document.

Sandra: Yes, out of 47, where's the 47 from, yes, out of the 47 which would have been the number of times that steelhead trout appeared, because rainbow trout, rainbow trout was by far the most common, across the whole thing…

P4: Maybe part of that, may be that if you are working on a population and if the rainbows are doing the same as the brown trout and the majority of them are staying and some are migrating out, it may be that they are classifying what proportion of that is actually seaward and trying to identify which of those they have sampled actually go to sea, which are steelheads and which are rainbows maybe. I was just thinking actually as you were talking if I was writing a paper on brown trout and I mean I have actually written reports back to different organisations when I've done [inaudible] fishing with students and go out and catch fish and do surveys, I would probably identify if I found sea trout by calling them sea trout. So that would be an assumption that the people I was reporting back to knew that they were the brown trout that had gone to sea. So it's possible that maybe that's what they are doing in the literature. I guess, I mean I don't know because I have worked with rainbow trout a lot but in

aquaculture. [inaudible] But it took me years to realise that steelhead when they went seawards. So that is probably, what I imagine that is what is happening in the literature.

Sandra: Definitely. And so with things like sea trout, is sea trout exclusively used in relation to brown trout?

P4: Uh, yes. Well, as far as I know, that's the only time we ever use sea trout is when brown trout have gone to sea. Because we only have two Salmonids, well we have other Salmonid species here that we work with, the two main ones are Salmo salar, which is the Atlantic salmon and Salmo trutta which is brown trout. And basically, because we use that distinction to distinguish between, because they both go silver, the salmon and the trout, so we use that to distinguish between the salmon and the trout basically. So if you look up on Google you just put Salmo trutta and seatrout, sorry you look up Salmo salar and sea trout, you will get a images of the two together where they look very similar and there are diagrams of the differences and stuff so…[inaudible] my thought would be that, just trying to distinguish between [inaudible]. I might be wrong, I might be wrong.

Sandra: That makes sense. And just, like, with salmon and trout, as common names, are there specific differences? Because I know that looking at the genera and things then within a genus then you have lots of names which are called salmon or trout, it doesn't seem to be split by genus.

P4: So yeah [inaudible], everything is further back. So on the mouth, if you look at the side of a trout, the maxilla extends beyond the eye. And on the trout it doesn't. And also on the tail, on a trout it's sort of pushed back straight, can you see, it's pushed back straight. Hold on my camera's here. And on the trout, I mean the salmon, the fins are more like forked. So yeah, you've got a fork in them and basically [inaudible] the lateral line, the line that runs down the middle of the fish, the spots on the trout actually extend, they are usually much more defined, but they extend below the lateral line quite a way and the salmon doesn't. So I always tell the students, you know everything is further back on a trout. So yeah down that way the maxilla comes back beyond the eye, the tail pushes out and everything on the salmon is further forwards. So yeah that's the main way that we identify usually between salmon and trout. I mean, there are other things, I mean fin sizes and shapes, and that's what defines the genus. And normally trout are quite fuller bodied whereas salmon are much sleeker. They have a much more aerodynamic-shaped head. And basically, but I mean you know, for all intents and purposes, I mean we had somebody, I mean I was doing some salmon tagging when I first started working with salmon and I had someone from the environment agency come down and say oh look that's a nice trout. And she told us she'd worked on a salmon farm for two years before she'd come into the environment agency. I mean these are farmed salmon but for all intents and purposes they're not trout. So, you know. And I can get it wrong. I have just got a PhD student's report who is handed in today and he has got a picture of what I am sure is a salmon but he's called it a trout. And I'm like, that looks like a salmon but until, because his imaging was so bad [inaudible] collapsed. I can't really, it's hard to tell I mean even we're struggling [inaudible]. I mean he's working with them all the time, I'm sure he knows what it is but yeah so it's really weird.

Sandra: Nothing's clear is it?

P4: No. Nothing's clear. [inaudible] To be honest with you, quite often when I've done these things, and I have reported on surveys for environmental work, we did some work on a stocking thing and you're always a bit nervous that you got it wrong and that you are actually working with the wrong species. So you always hold back some papers where you're not quite sure what it is we've got, you know. It's a bit tricky.

Sandra: And then there's just.. there were a couple of contradictions. They were all related to the Catalogue of Life and the inclusion of common names, that when I looked at the data it didn't look like they should be included in the taxa that they had been included in. So with brown trout, it was included in Salmo trutta but it was also included in the Oncorhynchus mykiss, which like, I mean, obviously in the data then it showed that it wasn't linked, but it that something that surprises you or not?

P4: No, at all. It's what I said to you before, I think the rainbows and the browns get confused quite a lot, like what I was saying about the Oncorhynchus mykiss is not a Salmo. And often in the literature it is referred to as a Salmo something. And that's a huge sense of confusion for people because we are working with a totally different genus here. So certainly, I mean I'm not going to talk about the work in the UK that we have done, but we do have farmed rainbow trout that are Oncorhynchus mykiss but basically they escape into the wild and then people catch them and people will think they are, well in the literature they will go and find Salmo and they will think they are a Salmonid, well a Salmo genus and they are not, so… yeah it doesn't surprise me because I've seen it, I've seen it before. And certainly if you are talking about literature from countries you know don't have rainbow trout in them. Sorry, they have rainbow trout but not brown trout and they're calling them Salmo something, you're thinking they don't have those species there. So it's no surprise.

Sandra: And that was just in the other corpus just to show the same thing came up. And here if you can see it is, so also, so in the Salmo trutta then terms both brook trout and lake trout were included, but then I saw that these and in both of the corpora they actually linked brook trout with Salvelinus fontinalis and lake trout with Salvelinus namaycush.

P4: Yeah, I give a lecture on invasive species and there is a really famous case in Yellowstone lake, where the lake trout, I think they introduced lake trout and then they pretty much wiped out the brook trout.

Sandra: Oh wow, yeah.

P4: And when I was reading it to give the lecture, the two names were used interspersely. Basically there was so much confusion about those two species, so it was actually quite difficult to get a feel for what [inaudible] which one was invading which. So, um, and again, I've got, one of them came up as the Salmo gardinium, or whatever it is, and there was another one that was… I can't see the Latin name there… Salmo… clarkii? So that came up as the lake trout species as well. So I was like, bloody hell how many species are in this lake, you know? So yeah, I'm familiar with those species and that kind of thing. So yeah, one paper called it brown trout and they are not brown trout. Not as we know them. They are not even Salmo genus, so…

Sandra: Such a confusion.

P4: Yes, it is.

Sandra: So that is just the same: you have the lake trout linking with the Salvelinus namaycush and the brook trout with the Salvelinus fontinalis. And it not being linked to Salmo trutta, which is what the Catalogue of Life… what I haven't check is, well the Catalogue of Life mainly, well they have people curating it but also there are links to where they've found these references to, because the Catalogue of Life is very all inclusive, well trying to look at all of the times that this species has been mentioned but I don't have access to a lot of the things. I mean the one with brown trout coming up in the Oncorhynchus mykiss I think was a paper in Nepal, which matches up with what you just said about how…

P4: Yeah, yeah yeah. Yeah, because I've had the same problem you know, where you are looking for species, you think you've found something and actually you are looking at a geographical location and you are thinking, that can't be right. I mean I know that we're, certainly for the brown trout, I know where they extend to. You're kind of thinking, this just can't be. So you end up sort of discounting literature because you're not sure if you would be including… For example the example that I gave with the paper and the guy came back to me and was like can you give me an example about the same species. So I had to change the discussion around that. But that's interesting, so. It creates somewhat of a headache, I can tell you.

Sandra: I bet. Because, a lot of the time there isn't actually a way round, because I mean if you don't have the physical things, it doesn't matter what research you do, you can't find out what they were talking about.

P4: Yeah. I mean also, the biggest problem and also it's something I've actually, when I've written papers previously, I've actually excluded literature from it, because I'm not sure, I've thought, actually I've got no evidence, I've got no proof, there's no images to be able to say actually that is Salmo trutta or that's Salmo salar or whatever. And actually what people are calling these things is just random. Random and quite often, I haven't got a nice example, ut I'm not convinced either, whatever you're talking about, where I know the species range, isn't there, because it wouldn't survive in that environment, it's too warm, you know. But that's a different trout species, but I don't know what that or sharks... I know geographically those sharks don't exist. Where they've called them something where you know it isn't actually capable of living in that environment, its range doesn't extend to that point. I mean it's not that often, and I not that great a fish biologist that I know where all the species exist but there are a few where I know enough about that species to know that that isn't right. And somebody much more aware of kind of, because I don't really look at taxonomy so much but in toxicology when we buy things in for the lab, to do tests in the lab, we get them from accredited suppliers if they're fish and we know 100% that the fish is Carpio, for carp or whatever, or Salmo trutta. So that way we sort of have that confirmation but I'm sure there are people that I've spoken to that, there are a few people, I mean one of my friends has described a few species of fish and he just knows naturally, he knows oh, that's wrong, that can't be that fish. You know, we've sort of written a few papers together and he's kind of said to me, look, that's not the right species. So yeah, it can be very difficult pinning down what people are talking about. And actually, because there's no control over it, with nomenclature across the world, people are pretty much freewheeling it, I mean mostly Salmo trutta is pretty much the accepted brand here but you across sort of the Atlantic and so many people are using it and confusing it with other species that are related to America. I mean we don't find brown trout, well we do find it there but not in the abundance that normally of other species. SO yeah, it's interesting, it's a really interesting thing. Headache for you, trying to work it all out.

Sandra: I mean in a way, I've got the… I'm trying to work out how it's being used. I can't tell anything about what they actually meant, well the actual physical meaning of what it is so I mean, but yeah. But I mean from what I showed you, do you think the representations can go some way as to identify where there are ambiguities and clarifying some of the ambiguities in the usage of the terms?

P4: Yes, I mean in terms of what you're doing yeah. Yes, because I think there is real confusion. And quite often I've seen, because I mark so many pieces of students' work as well, I've seen that coming through from the student's perspective as well. And I think what really needs to be done, and I think part of the problem is coming back to the catfish scenario that I told you about where actually if you've got something that looks different it is different and actually quite often, they're not, they're just the same species. It's like us isn't it. I mean you go to Africa, you know, OK we've got the same appendages and so on but we look different. You know and if you go to Alaska, you know, and the inuits they look different from a Kenyan.

Sandra: Yep.

P4: You know, but we are the same species. And I think I try to get that across to my students. Their default is always colour and size. They are the two worst characteristics you could use, I mean look around the room, we're different colours, different sizes, all different shapes, and we're the same thing. But I think if you, I think that's the confusion. But what I think really needs to, some clarification is really needed on you know what… because there are mistakes being made. I mean there are people testing species out there that are reporting testing on species when they are not using the right species and that's actually misinformation, you know. We are talking about things, that effectively, you know, because fish do react different depending on where they are found. I mean you know, I'll give you an example, tilapia for example, they are really tolerant of all sorts of temperature but then there are different species, um, noroscus and mossambicus and actually they react slightly differently to different stimulus, one's more able to sustain itself with no/low oxygen and higher temperatures than the other. SO testing on those two species, they don't look similar but if you're testing on them you are going to get two totally different results. So yeah, I think there is definitely a need to try and bring this together in terms of you know people need to be more aware and I think we need a more reliable resource to go to. I mean, I say the one I tend to favour is FishBase because I'm familiar with it… how accurate it is I have no idea and actually if you look at each fish entry it can actually be quite confusing and if you go country by country sometimes you see, you're like wow even some of the Latin names are different. And there needs to be some clarification on, you know I mean these parent names are really important, the synonyms are probably less so but they are useful to go OK that's a species, but I have found that you know, where I've known about a that species has been used incorrectly, they don't appear on that FishBase. And that's a problem. So there we go back to where I have left out papers from the literature because I'm not convinced about what it is. Going back to the example of the paper where it came back and I'd given the example as another species and they said it's the same species, I felt like such a fool, I'm very careful about what I use in terms of species now. Yes, I think there's definitely scope to put something in place. I mean how you do it, I have no idea. I mean I don't know who controls all this.

Sandra: Many different people all over the place! One of the many issues I think… Oh and there was something just in your, in the questionnaire you filled out for me. You said that you used resources to annotate data.

P4: Did I?

Sandra: I think so…

P4: Oh did I? What do you mean, or what did I mean?

Sandra: I asked if when you use taxonomies or ontologies, taxonomic resources, if you use them to check name variant status or this and there was one about.

P4: Yeah, maybe it got misinterpreted but I do go back to FishBase and check all the synonyms, is that what you mean? And I just check back… I mean it depends what I am writing and what I am doing. But certainly for papers, that's how I got caught out with that shark paper, because I thought I'd checked it all, and I'd gone back and basically I'd checked, because there were some sharks, that I thought, oh, I think I know what that is, I think what highlights it is when you look at the genus of a species that you're working with and you think, I know where that shark should fit. [inaudible] aren't that many sharks out there, I'm dealing with lots of them. I go back and check the junior synonyms and some of them I've found are actually considered a synonym of this species. Some of them didn't exist and they're the ones I got wrong, but because they're so old, that…

Sandra: They're not there anymore?

P4: They're not there anymore, yeah. And they're the ones I got caught out on, so yes, I do tend to do that. I think my problem is I don't quite know what to do with it, do you know what I mean. So, do I just wrap them all up in the same name? Or do I just put something in there to say that this species is now referred to as…[inaudible] because I am always just nervous about, about, nobody ever tells us what to do. And every journal comes back with a different….

Sandra: I was going to say, everybody tells you something different? Because different people have different ideas and also…depending on the way, I don't know, this is just how I see it, but depending on what you're doing a different approach might be appropriate? But if you don't have a, a homogeneous approach, an approach across the board then you're still not going to be able to bring everything together.

P4: Yeah, yeah… depending on, I think it comes back to, we're doing lots of work on [inaudible] but the word we kept using was standardisation, standardisation. There's no standardisation. Everything is so different, you can't compare. People are using different methods, different even the same chemicals, they're using different tissue, different temperatures, different concentrations, different timings, you can't then compare that against, you know. And it's the same with this. You can't, it's actually very difficult to actually marry two papers up when they are using different terms. It's the same thing like with steelhead and rainbow, even for me. I mean I've worked with trout for what, 15, 20 years now, and, well it still confused me. It took me years to realise they're the same bloody thing. To start with I thought they were a different species. Not that I needed to worry because I don't really work with rainbows, but it was only when someone said they're just the equivalent of sea trout. Oh yeah, I thought they were a different species, and uh, yeah, until someone kind of gets that and there's that uniformity in what we do with the information then it's going to remain this kind of jumbled mess of confusion for everybody. I mean students always ask me about taxonomy, and get it wrong, and because of my colleague Anya, and she's very, she's German, she's very German, she knows she's very German and she's like – you have to know this, this, this, and I did this in my degree and I did this, and all that. And we're like, Anya, me and my colleague who's deputy

head of school, Anya, just lay off them a little bit, you know, they don't know taxonomy, it's confusing for us, it's confusing for them. You know. Anya's like, these are the next generation of scientists… yeah but there's nothing actually in place to allow you to grasp this with ease. You know, it's only when you start working with it, that you get a better feel.

Sandra: Feel, because…

P4: And trying to get this into students' head when they actually don't give a shit whether it's a Salmo trutta or a Salmo whatever else, but it becomes a bit more real when they use it. Nightmare. I mean, my view on it, is I submit it, and if it gets picked up, it gets picked up. And I've stopped worrying too much about getting it 100% because normally the journal will pick it up and…

Sandra: Yeah, you do your checking and leave out anything you're unsure of in the actual thing and then see how…

P4: Yeah, and also, we're submitting to quite a few American journals, or they're international journals. We just put one into um, it's a review paper, we've just put it into an Asian Fisheries Journal, from, they're publishing in Asia. And their view on, I mean they sent some stuff back and we were just like, "what?" like, what is going on here? I mean we're not comfortable, we're not comfortable with that, but we've done it and resubmitted it. But the way they were asking us to present the Latin names, wasn't quite how we would present, and we were like, no, we're not doing that, but yeah, just the way they wanted it presented, and you know, it was just like really weird. Abbreviated species names as well they suggested, and…

Sandra: What? It's the opposite, right?

P4: It was like, what are you doing? So yeah, [inaudible] it's a minor journal, it's a review for a MA thesis, so, yeah, he's quite happy to get through. You know what country you're working from and what the general requirements are and the way that they want this done and how diligent they are in checking the Latin names, and whatever so… so yeah, my view now is to stop worrying about it, I do what I can, and they can sort it out if they want to and they do generally. I mean every time I publish a paper, I don't publish hundreds by any means, but I just sit and wait for the torrent of abuse. It's never happened, it's never happened yet, [inaudible]. Just one guy [inaudible], and he's a bit of an arse, but he knows about sharks and said that's the junior synonym and it needs to be changed so I changed it, but that's the only time I've ever had something come back to me. I think to be honest with you most people aren't sure anyway, unless they work with that species specifically. [inaudible]

Sandra: I was going to say with so many things you can only really be focused on the thing you know the best.

P4: Yeah, I say to the students, there are 32500 species of fish that are listed. And they are finding new species every week.

Sandra: All the time, yeah.

P4: I mean the value is predicted to go up to, I mean with all the deep-sea exploration, I was speaking to someone yesterday who predicted that there are 1 million new species down there.

Sandra: Wow.

P4: So how are we meant to know that. I mean my students always tell me, “wow you know so many Latin names!” Yeah, I know the Latin names of the things I work with, you know. If you ask me what’s the Latin name of a you know, of a [inaudible] crystal mouth, you know [inaudible] If you shout out a few Latin names occasionally they think you are a genius. [inaudible]

Sandra: But it’s the fact that everything is so different. So if you had something that could map at least the way that different terms in at least authoritative resources and seeing if geographically there were different patterns in the way things were being used, would things like that be useful?

P4: Yeah, very useful. I mean I think for me you know, coming back to it, always, I don’t care what common name they use now, all I want to know if the Latin name is sound, and actually the Latin name isn’t sound. And that’s the underpinning, and I’ll tell my students all the time. It doesn’t matter, why do we have taxonomy, why do we have taxonomic names, this nomenclature that basically tells us, because there’s such discrepancy in the common names.

Sandra: Yep.

P4: We should be confident when we are talking about Latin names and species. And I understand that not every species has been genetically linked, so there will be constantly changes as the genetic analysis of these animals goes on, but that’s fine. I can deal with that. It’s just when you see this massive discrepancy against Latin names globally. And actually, you know, that actually causes a lot of confusion. And I think misinformation out there on what those species are doing. You know, what what they are. And certainly because I’ve worked in aquaculture, you know there are a lot of discrepancies in aquaculture, as well in what species they are farming, unless they’ve been translocated out the country, um put somewhere else, there are very different techniques for different species. And that has caused some issues as where people have tried to pick up techniques for a species that they relate as the same species that have been farmed, and then gone back and it hasn’t worked.

Sandra: Because it’s not the same thing…

P4: It’s not the same thing, yeah, but they’ve called it the same thing. That can be common. Yeah it’s all fun. But yeah that would definitely do it, if you see how they derived those names that would be really useful, because that would reduce the work we would have to do working that down. But anything that would help to understand that.

Sandra: Understand that.

P4: It would be better and would make our lives a whole lot easier.

[END]