

Interviewee: Lindsay Ross  
Dates: 1974 - 2015  
Role(s): Professor of Aquatic Physiology  
Dean of Faculty of Natural Sciences  
Professor Emeritus



## Interview summary:

### *Summary of content; with time (min:secs)*

**00.00** Lindsay Ross (LR) is interviewed by Christina Sommerville (CS) on 27<sup>th</sup> February 2024. LR came to Stirling as a PhD student with an NERC studentship to work with Peter Tytler on swim bladder function in saithe. He remained in Department of Biology for 3 years where there was a good fish physiology team – Peter Tytler, Monty Priede, Les Oswald, working on muscle function and jaw function in fish. Later Professor Bill Muntz and Melanie Johnson Joined the team.

**01.15** LR was a mature student as an undergraduate, having done other things before embarking on an academic career. First degree from Polytechnic of Wolverhampton, now Wolverhampton University. LR met his wife, Barbara, there and both came to Stirling, with Barbara working with Tony Berry. LR's research project was studying how the swim bladder worked in saithe and how they control it to maintain buoyancy and move up and down in the water column. Project looked at the control mechanisms, vascularization and innervation. The Department had a link with Oban and PhD students went about once a month for seminars at Oban, which was fun, but LR was not directly involved with the team at Oban. Certain memories stand out, such as fishing for juvenile saithe on the west coast and coming back with bags of fish to work with. A notable opportunity was joining the research vessel Challenger, arranged by Peter Tytler. LR's first cruise of many was through the Bay of Biscay to Madeira, then further south of Madeira to the Salvage Islands almost as far as the Canary Islands. They did deep-water fishing, 4000 to 5000 meters. LR was particularly interested in two kinds of animals they were catching – mesopelagic fish, which migrate vertically daily in the water column and demersal fish, which live very close to the bottom. They have interesting swim bladder structures and control mechanisms. Notable academic John Blaxter was on the first cruise, and although LR met John Blaxter several times, he did not work with him. LR enjoyed rubbing shoulders with the many senior scientists on these expeditions.

**5.11** LR finished his PhD and joined the Aquaculture unit in 1977 as one of the team studying tilapia where he worked with today's interviewer, Christina Sommerville, and James Muir. Funding from the ODA, the Overseas Development Agency as it was then, was for work on tilapia and systems for growing tilapia and understanding them. The Tilapia fish was already a cultured animal at that time but these were early days, whereas now this is very big. The unit of aquatic pathobiology had moved to Pathfoot and was expanding into an aquaculture unit. It was expanding from studying disease into becoming aquaculture focused. LR recalls

that, in that first year, facilities were primitive. He recalls cleaning out fish tanks and constructing fish tanks from plates of glass. There was no recycling of the water, but static tanks with little airlift pumps inside.

**07.25** After a year LR had the opportunity to return to biology as a lecturer as his supervisor, Peter Tytler, went to Kuwait to work at the Kuwait Institute for Scientific Research for 3 years on leave of absence. LR deputized for him and taught physiology to first year students and to third year animal physiology students, running projects. This was interesting and gave LR good experience of teaching. He also took over an NERC fish tracking project Peter had set up. LR worked with John Thorpe at the freshwater fisheries lab at Pitlochry. Also, they did their own work here at Airthrey Loch, tracking fish using ultrasonic tags. They manufactured the tags on site and were helped by Archie Young, the then Head of what was called Shared Technical Services. Archie Young was into electronics as was John Wieworka, a very able young electronics engineer. LR worked a lot with John on tags, how to build them and get the best out of them. They were joined later by a graduate assistant, Bill Watts. This was an active and very enjoyable period working on Airthrey Loch, tracking fish. Also, they worked on salmon smolts at Loch Voil. This involved heading off with a caravan full of equipment and teams of people to cover 24-hour periods. They tracked fish up and down Loch Voil in their migration towards the sea, trying to find out how they moved, how far and how quickly. LR was following on from earlier projects set up by Peter, work which was NERC funded.

**11.10** When the 3-year period covering for Peter ended with his return, LR applied for and got a lectureship at the Aquaculture Institute which was expanding. When he had left for Biology he had given up his connection to the ODA tilapia project. When he moved back in 1981 LR was researching respiration and oxygen consumption and used tilapia as a model as they were plentiful and interesting to work with. The Institute of Aquaculture had been inaugurated in 1979 or 1980. LR's wife, Barbara, was able to attend the splendid inaugural dinner as she was working there. By this point the Institute had expanded, with more staff, Brendan McAndrew had arrived for the genetic side and Kim Jauncey for nutrition. In his research LR was able to have the assistance of Richard McKinney for 3 years. They developed respirometers suitable for tilapias and for the type of research they intended to do. Microcomputers were appearing and they developed an entire system operated by a BBC microcomputer. They published quite a lot on that work. They looked at baseline respiration rates, oxygen consumption rates and oxygen consumption when animals are fed. They were looking at oxygen consumption, varying types of feed protein levels, lipid levels and so on.

**15.40** LR had 3 threads of research running at this early time. One was tilapia research, later carp. There was also cold water research as LR continued contact with the research vessel Challenger and through people at the SMBA in Oban. John Gordon, a very senior scientist, invited LR to join cruises to the west coast of Scotland to investigate relatively deep-water fishes off the shelf edge. The target for that work was Rockall and the Rockall Bank, a very productive fishing area. They worked on rattail fishes, very interesting for LR, working on swim bladders. These have well developed and capable swim bladder structures for moving up and down the slopes. They found that they move up and down slope depending on age. LR worked on that for a few years. The third string of research started in 1983 or 1984 when LR had the opportunity to visit different sites in Mexico. A number of Mexican students in the Institute were funded by the ODA, but things were not going very well, so LR, as course director, was sent out by the ODA to look at some of the aquaculture facilities. The aim was a better understanding to trim the course to suit the needs of the students at Stirling. At this time, a student here became a long-term colleague, Carlos Martinez who came to Stirling with his wife and kids for the MSc. When Carlos returned to Mexico he wanted to work on native species for aquaculture, something LR had always been keen on. LR was very aware of the fact that at the time people were very cavalier in introducing species into countries where they didn't belong. An example would be British people introducing brown trout in the tropics. LR was keen to support Carlos through his PhD, which was based in Mexico, in Merida in the Yucatan Peninsula. He worked on a species called Cichlasoma, similar to tilapia in body shape and size, but with a growth rate that was not so fast. Carlos was investigating aspects of biology and reproduction and how they could be managed as a cultured animal. This became a long-term association and they obtained British Council Funding which contributed to the work in the longer term and enabled people from the Institute to go to Merida and collaborate on projects and vice versa. Later they obtained ODA funding for work to try to scale everything up to commercial production level. To do so they moved on to Tabasco to Colegio de Postgraduados, one of the network of Mexican colleges which do advanced research. There, there was a field station where they were able to build a huge system of ponds, stock them with fish

and try out a much larger scale operation than in Merida. That was an interesting time with people from the Institute going to Tabasco.

**21.50** LR's association with Carlos continued as he moved to Mazatlan to a new laboratory, an offshoot of CIAD, the Centre for Investigation of Food and Development. One of the things they worked on was fish and shrimp. They set up this new facility in Mazatlan with Carlos as director and he developed it from scratch. LR continued working there through some British Council Funding and spent a sabbatical there in 1994. Later, Carlos moved to Morelia in the centre of Mexico away from the coastal area. It is interesting as around Morelia there are many high-altitude lakes which have unique fish fauna. They worked there on native species which were endangered, working on them to develop them for aquaculture and consumption but also for conservation. Funding was obtained from the Darwin Initiative, run by DEFRA UK for work which ran for 3-4 years. It is still running now, funded by Mexican sources, and very productive.

**24.30** Back at Stirling LR explains how the Aquaculture Systems Group, set up by James Muir and the Environment Group, consisting of Malcolm Beveridge, Liam Kelly and others, developed and changed over the years to become a sort of combined systems group, due to the commonality of what the two groups were doing. Later, he became head of the merged group, renamed the Sustainable Aquaculture Group because they were looking at developing aquaculture in sustainable ways. In fact, biodiversity and sustainability is something Aquaculture at Stirling has been promoting and working on since it was set up but it became much more of a burning issue over time.

**26.00** LR explains how his involvement with GIS (Geographical Information Systems) developed. It started from teaching and being asked by Ron Roberts to reorganize the Aquaculture Masters course, which had run before his arrival but with a small number of students. LR started by reorganizing how it operated, checking the material covered and so on. They introduced two weeks away with students off campus, one in Oban, working on marine environments and another in Rowardennan on Loch Lomond, working with freshwater environments. This field component was very successful in many ways, including students bonding as a group. LR also taught on the course, teaching aquatic survey and looking at spatial aspects of deciding where to place a farm in the aquatic environment, for example. They started to use more and more instrumentation, then computers and it became obvious that geographical information systems, GIS, were becoming more mature, so were introduced. LR moved almost entirely into GIS for all kinds of spatial problem solving for aquaculture. That is still ongoing, continued by Professor Trevor Telfer and Dr Lynn Falconer.

**29.06** LR explains how his background in teaching and organising courses developed. He was course director for one of the first-year biology courses from an early point and later spent about 15 years as course director for the Institute, including for the MSc course. This course recruited students from around the world, a very interesting group, many quite senior and having worked in aquaculture and fisheries departments already. There were issues to do with cultural differences and adapting to living and working in Stirling and learning how systems worked. There are well over a thousand Master's graduates and some are in very senior positions worldwide, running aquaculture and fisheries departments in lots of different countries. In addition to the Master programme LR was involved with an ODA programme which Rod Wooden was running to support the development of aquaculture and fisheries at the Bangladesh Agricultural University in Mymensingh. Many colleagues from the Institute also went out there to help. Christina Sommerville (CS) mentions she was the first of the colleagues to go there. LR says their 3 Master programmes needed reshaping and he went out three times to help reorganise these programmes and how they interdigitated and he understands the programme he re-wrote is still in use. Kim Jauncey (KJ) did a similar job for the undergraduate programmes. So, LR and KJ rewrote programmes to show how they could be adapted to benefit from Stirling experience. CS recalls how a building was built at Pathfoot to house a training unit for students from Bangladesh. LR explains that Bangladesh was a big recipient of funding from the ODA and money was provided to offer training to people not only from the Bangladesh Agricultural University but from all over Bangladesh, many of whom were members of staff and lecturers from various colleges and universities. The unit, BAFRU – the Bangladesh Agriculture and Fisheries Research Unit – was run initially by one of the graduates from their programme, Chris Price.

**34.20** LR explains how he has done training for the FAO (Food and Agricultural Organization of the United Nations) in Thailand and for the Darwin Initiative in Ghana. He has also run courses in Brazil, in the Amazon. He has done a lot of short course work and found it very interesting to work with groups of people from

different parts of the world. CS also recalls that around 1985 the British Council funded a Tilapia aquaculture course in Stirling and later using more computing technology in aquaculture extensions courses around 1992. LR also did a lot of external examining in Mexico, initially in English with help from colleagues there, but LR later learned enough Spanish to do the examining in Spanish. At Stirling LR supervised many PhD students over the years, usually between 4 or 6 at a time, which involved a lot of work, especially when LR took over as Dean of the Faculty of Natural Sciences. It was a stretch doing these jobs and running a research team in the Institute. CS points out that efforts were made to make sure the students were carrying out research relevant to the country they came from and their future, meaning more overseas work and more effort. LR agrees that with a multinational group, there were projects in Brazil, Tenerife and various places. LR spent a lot of time in Brazil with his student Philip Scott and later worked with him delivering training courses on GIS in Brazil. LR says there were very bright students in all cohorts. The Masters included a research project where students worked on a research project offered by different members of staff in different topics. Often students carried out projects in other countries such as Kenya, Thailand, Bangladesh, Mexico and elsewhere. Staff from the Institute would sometimes do supervision on site. LR suspects funding for such things would not be available now. At the time, there was, for example, an Endowment Fund which Ron Roberts set up, which accumulated money earned by staff as fees for the university when they did work for the ODA and the DFID (Department for International Development). This fund was considerable, at one stage amounting to 7 figures, and it funded a lot of overseas work and also staff, postdoctoral staff, research assistants and technical staff. Later, the Institute was no longer allowed to maintain or retain this fund and it was eaten away.

**41.36** LR is asked about the Institute's programme being expanded to include an undergraduate degree. Initially, LR felt Aquaculture should be a postgraduate programme. He recalls discussing this with Ron Roberts and John Sargeant, Head of School at the time. LR was involved with preparing a curriculum for the degree which would interdigitate with components available in the Biology Department, as the Institute was not intending to teach a 4-year degree in Aquaculture. They had to make sure it worked well over 4 years and it did work reasonably well and is still going. Numbers were always going to be small. Some students have, for example, gone on to PhDs, to manage fish farms and similar.

**43.30** LR describes the social life in the Institute as very good, especially in the early days when staff were closer in age to the students. They organized get togethers, such as the international food night held at the Guildhall in Stirling. People from different countries brought dishes everybody could try, and there were competitions, even recipe books. There were also Christmas parties, both one organized by the students and the Institute Christmas Party, organized by Ron Roberts and held in Bridge of Allan in the Royal Hotel or similar. Another big event was the visit of Princess Diana for which LR wasn't present, having left for a short course on GIS in London. He recalls the Institute being checked out by special branch people in the days before. It was an important event for the Institute and a lot of people enjoyed it hugely. LR was Dean of Faculty when Princess Anne visited Machrihanish and met her with a small group of people. It was a big occasion, many senior staff of the university attended and Ron Roberts had invited significant people from Europe and the aquaculture world.

CS invites LR to consider how the management of the Aquaculture area has changed since it started as Aquatic Pathobiology and developed into the Institute of Aquaculture, with reference to Ron Roberts who has been mentioned several times. LR says RR arrived with a small group, was very entrepreneurial and forward-looking and, with support from Bob Beaumont, the University Secretary, he built this up into the Institute of Aquaculture. He was allowed at that time to do various entrepreneurial things, much less likely to be possible today, and to bring in people from various places, including LR and CS. Once Ron Roberts moved on, the management changed and it was run by a small group of people, including Ron Wooden who efficiently managed day-to-day with Randolph (Richards) as director. They were assisted by Neil Bromage and James Muir. As time went on the role of director changed to be more like head of department. LR thinks the University later introduced a fixed term for Director. The University Secretary of the time was keen on the Institute being seen as "just another department". LR points out that the Institute is not like other departments as it doesn't have large numbers of undergraduate students and has always been predicated on research projects. After Randolph Richards, Brian Austin took over, then Selina Stead and now Simon McKenzie.

**50.40** LR then reflects on the period when the university created faculties from the Schools and he became vice dean to Keith Smith who was Dean of the Faculty of Natural Sciences. Later, LR took over as Dean, initially to cover Keith Smith's sabbatical, but he was later asked to continue in the post by then Principal, Andrew Miller, and the Heads of Department. LR continued in the role for two three-year terms. A main issue was to encourage Institute staff to be more involved in how the wider university worked. Until that point, the Institute had been rather isolated, even geographically, being based in Pathfoot. LR encouraged staff to serve on committees and the Faculty Board. CS continued this approach when she took over from LR as Dean. During LR's time as Dean there were many financial issues, both for departments in the Faculty and across the university. At senior management level there were issues over funding and how the RAM, the Resource Allocation Model, operated. LR devoted much time to understanding the components of the RAM and checking they were correct. Looking back, he considers the RAM worked up to a point, but was inflexible. When times changed and, for example, the Department of Biology didn't have the income needed to keep things running, the university, because of its RAM, wasn't flexible enough to decide that a Biology Department was needed and would be funded. There were changes to the faculty structure towards the end of LR's time as Dean. One major issue was that the shortfall in the budget for the Biology Department meant a painful merger of biology with environmental sciences, involving staffing, space and resources. It was very difficult for the individuals involved. Now, the combined Department of Biological and Environmental Sciences, BES, is a big department which has completely reformed itself.

**56.45** After stepping down as Dean, LR firstly took a further sabbatical in Mexico in 2003-2004, working with Carlos in Morelia. He revised a book on fish anaesthesia, written with Barbara. He worked on native species in high altitude lakes. LR put forward a project application to the Darwin Initiative which was successful and was well funded for three years. Later there was a funded project to look at cage aquaculture in Lake Volta, a huge man-made lake, a major water resource with good scope for fish farming. This project was funded by the Royal Society/Leverhulme. The funding was modest, but they ran good training courses and had good publications. Prior to retiring in 2015, LR had been involved in an application to the European Union for funding of 7 million euros for a project on the sustainability of European aquaculture. LR coordinated the application with a consortium from all over Europe and submitted it just before he retired. The application was successful and was run by LR's colleague Trevor Telfor who had also been involved in its preparation. It was a very successful project, now completed, and has resulted in many publications and produced guidelines for development of sustainable European aquaculture which LR hopes will be implemented. There is also a toolbox on the web to help people get their applications started, get permission to do things and deal with the regulatory side.

CS sums up that much more could be said about LR's very rich career and asks if there is anything in particular he wants to mention. LR sums up by saying he has enjoyed many aspects, particularly being a post-graduate and the time spent on ships, probably over a year. On the negative side, he mentions the attrition of the Institute's resources, such as the endowment fund as a big change and a pity. It has been a very interesting time and he has enjoyed being at Stirling.

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