

'Drop-out' row hits soft spot for UK universities

London. A row over disputed university 'drop-out' rates published last week has highlighted the problems faced by science, engineering and technology students, who are more likely to fail than their peers studying arts and social sciences.

Figures published in *The PUSH Guide to Which University*, a rough guide aimed at helping prospective students to choose a university, show that in some UK universities as many as 1 in 5 students fail to graduate. According to the figures, the average drop-out rate for students expected to graduate in 1992 was 13.2 per cent.

The PUSH 'league tables', which are calculated using statistics from the Committee of Vice-Chancellors and Principals (CVCP) and the Universities Funding Council (UFC), have been attacked as inaccurate by some of the universities singled out. But even if some of the figures are wrong, the guide has succeeded in drawing attention to a mounting problem which many in the universities would rather keep under wraps.

An earlier study of Scottish universities confirmed anecdotal evidence that the highest non-completion rates are in engineering and other subjects with higher-than-average numbers of hours spent in the laboratory or lecture room. The study was funded by the Scottish Office Education Department to find out why the rate was 4 per cent higher in Scotland than in the rest of the United Kingdom.

Robin Knops, professor of mathematics and vice principal of Heriot-Watt University in Edinburgh says that his university has taken steps to address the problem since the Scottish Office report came out. He thinks that the difficult ideas and concepts in-

volved in science, engineering and technology subjects have combined with an overloaded syllabus and all the normal pressures of student life to aggravate the problem.

The PUSH guide lists Kings College London, part of the University of London, as having a drop-out rate of 21.3 per cent, second highest in the 'league'. But the college says the correct figure is 14 per cent.

A spokesman for the London School of

senior assistant registrar, says the university's unusual mix of courses tends to inflate its non-completion rate. Salford runs a high proportion of '2+2' courses, where students with one A-Level can study for two years at an associated college for a diploma before deciding whether to study for a degree. Although all are registered at Salford as degree students, many successfully complete the first two years but decide not to continue. Once these courses are taken into account, Salford calculates its non-completion rate as 16 per cent compared to the 26.1 per cent quoted by PUSH.

Others, such as Brunel University on the outskirts of London and Heriot-Watt, accept that the PUSH figures of 21 per cent and 20.3 per cent respectively are about right. A Brunel spokesman says the drop-out rate is a "matter of concern" and that it is conducting an internal analysis of the reasons. Both Brunel and Heriot-Watt point to the very high proportion of students studying science, technology and engineering subjects at their institutions.

According to the latest edition of the CVCP/UFC management statistics, the percentage of successful leavers is 86 per cent for physical sciences and 83 per cent for engineering and technology. That compares with 90 per cent for social studies, humanities and business administration.

Knops is confident that the measures introduced at Heriot-Watt can stem the tide of non-completions. They include a compulsory mentor scheme for each student, remedial teaching and support for any student identified as struggling and a modular course structure with students being examined at the end of each module rather than at the end of the year.

Maggie Verrall

IMAGE UNAVAILABLE FOR COPYRIGHT REASONS

More students in — fewer out?

Economics (LSE) says that the college is "very, very annoyed" that PUSH has released figures into the public domain that the LSE says are wrong. PUSH calculates drop-out rates for LSE to be 19.4 per cent, but LSE says the true rate was 7.9 per cent in 1992.

According to the CVCP, which commissions the Universities Statistical Record to compile statistics annually, using them to create league tables is likely to be "misleading" because of the different subject and student mixes of the institutions. A CVCP spokesman said that the national success rate of 87 per cent for 1992-93 was something that the country "should be proud of".

At the University of Salford, Les Kilby,

State of Washington plans cull to save endangered steel-

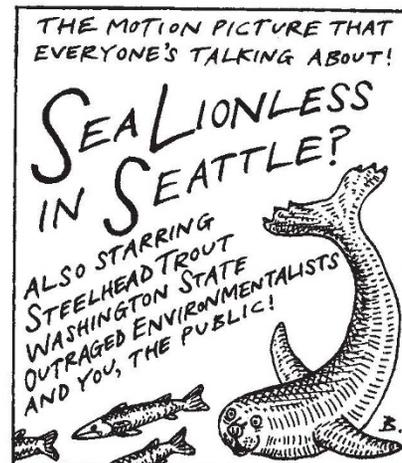
San Francisco. Environmentalists and government officials in the northwest United States are at odds over a plan to protect an endangered breed of fish by killing off the highly popular sea lions that feed on them.

The state of Washington has asked the federal government for permission to "fatally remove" about half-a-dozen California sea lions that are ambushing wild steelhead trout on their way to spawn. Both species are protected by federal law.

In a letter to the Secretary of Commerce, Ron Brown, the state has called for a task force to rule whether killing the sea lions is justified — a first step the state must take, under law, before going ahead with the cull. Environmentalists hope that a less drastic solution can be found. "We are trying to find ways to make the fish less vulnerable," says Julia Reitan of the Seattle section of the Sierra

Club, an environmental pressure group.

That something needs to be done is indisputable: last year only about 70 of the



steelhead, a popular and beautiful food fish, reached their spawning ground. This contrasts with 2,965 known fish in 1986 and is far below what is needed to sustain the species.

The fish, an anadromous form of rainbow trout, swim from the salt water of Puget Sound to Lake Washington on their way to spawn in the Cedar River. Their way is blocked by the Ballard Locks, where the waterway narrows. Sometime around 1980, a pod of approximately 60 sea lions began waylaying the steelheads at the locks. Of those sea lions, about five or six are particularly accomplished hunters — and these are the target of the proposed cull.

Unlike most acts of depredation, which usually take place in remote areas, the sea lions attack the steelhead in downtown Seattle, where the spectacle has become a popular tourist attraction. ▶

Radioastronomers hope for world observatory

Washington. The cost of future radio telescopes implies that an international consortium will be needed to build them, astronomers say. But several large obstacles will have to be overcome, particularly if the richest countries — the United States and Japan — are to be involved in such a collaboration.

Ideally, a World Radio Astronomy Observatory (WRAO) would operate along the lines of the US National Radio Astronomy Observatory, with a small central bureaucracy overseeing a facility open to all astronomers from anywhere in the world.

But the political problems are daunting. Most national governments would expect their scientists to get a guaranteed fraction of time at a telescope, in return for their financial contribution. This is not the way to get the best science from the facility — but few countries are rich enough to share the United States view, that access should be based on scientific merit alone. This causes friction whenever the US is involved, because American scientists take for granted that every facility will be open. And if Japan is involved, extra costs associated with the Japanese method of doing big science become a problem.

At last month's conference on "Radio astronomy visions for the 21st century" at Penticton, British Columbia, astronomers gathered to ponder which big problems remain in their discipline, and what instruments they need most.

They agreed that the most interesting problems are "when and how do galaxies form?", and "what does their early evolution look like?" But the answers to these questions will not come cheap. The next generation of radio telescopes will cost \$150–\$300 million to build, and \$5–\$15 million

per year to operate. This led Ron Ekers, director of the Australia Telescope National Facility, to suggest that it was time to consider founding — and funding — a World Radio Astronomy Observatory.

Two projects widely acclaimed at Penticton could potentially fit the bill. Roy Booth, director of the Onsala Space Ob-



The \$150 million millimetre-wave array: under consideration at NSF.

servatory in Sweden, proposes an array of forty 15-metre — or ninety 10-metre — telescopes operating as an interferometer at wavelengths from 0.8 mm to 3 mm, and located in Chile. Booth says that with current technology this would cost \$250 million to construct, but hopes that better antenna design would bring the price down to \$150 million.

Robert Braun, of the Netherlands Foundation for Research in Astronomy, suggests a phased-array telescope with a total collecting area of 1 km², operating at wavelengths from about 21 cm to 1.5 metre, and primarily studying emission from atomic hydrogen. The detectors, if located in the Netherlands, would be distributed over an ellipse 30 × 50 km in size, with a few outlying telescopes 150 km from the centre

and a densely packed region in the inner 400 metre. This would combine very high resolving power with high sensitivity, he says. The estimated cost today would be \$300 million, but Braun hopes this could come down to \$100 million with advances in technology.

Both of these ambitious projects would be able to study emission from gas in galaxies very early in the history of the Universe. Booth's telescope would study molecular gas from which stars form — a new but hot branch of astronomy. Braun's telescope would study atomic hydrogen in the clouds that condense to become galaxies.

Both proposals meet the rough guideline that any new telescope should realize a factor-of-ten improvement in sensitivity to be worth building. Booth's would have ten times the collecting area of the 30-metre telescope at Pico Veleta, Spain, and Braun's telescope would have 75 times the collecting area of the Very Large Array in New Mexico, and 14 times the collecting area of the largest single-dish radiotelescope in the world at Arecibo, Puerto Rico.

It is unlikely that Sweden or the Netherlands could fund these projects alone. Realistically, their funding will involve either many countries joining together to fund a World Radio Astronomy Observatory, or getting the Americans or Japanese to foot most of the bill.

In the United States, the National Science Foundation is already considering a proposal from the National Radio Astronomy Observatory to build the \$150 million millimetre-wave array (MMA) — a smaller and less powerful version of Booth's proposal. The United States is unlikely both to build the long-awaited MMA and to be a major partner in an international collaboration.

Japanese astronomers also have their own plans for a millimetre-wave array, but, in the tradition of Japanese science, it will cost more than other countries may be willing to pay. M. Ishiguro, of the Nobeyama Radio Observatory, estimates a cost of about \$1 billion for an array similar to the MMA, but operating to wavelengths as short as 0.375 mm. Japanese radioastronomers are confident that they will have \$300–\$400 million to spend on their project near the end of the century, but will be hard pushed to attract others to contribute \$600–\$700 million, much of which would go to Japanese industry for development costs.

Last month, the general assembly of the International Astronomical Union in The Hague voted to set up a committee to investigate the best options for building a millimetre-wavelength array. The committee will be hard put to reconcile the conflicting interests of the governments that would pay for such an array and the scientists who would use it.

Leslie Sage

head trout from hungry sea lions

Efforts to control the fish kill have gone on for years. State fish and game authorities have tried everything from throwing firecrackers at the sea lions and playing tape-recorded *orca* sounds to removing some sea lions as far away as the Channel Islands off Santa Barbara, California. Most of the animals so displaced found their way back to Seattle, more than 1,000 miles up the coast.

Environmentalists claim that the sea lions are only one cause of the decimation of the steelhead, pointing out the degradation of the streams beyond the lakes, pollution and the rapid urbanization of the area. Reitan says that local Indians who fish for the trout claim the fish ladders at the locks were badly designed and that rebuilding them could make it possible for the steelheads to survive. And Bruce Sanford of the state Department of Fish and Wildlife says it is possible that if they removed the most voracious

hunters, other sea lions might just improve their skills and replace them.

So why does the state want to kill the most aggressive animals? Local officials say that it takes several hundred fish to sustain the gene pool and even if the sea lions are only one cause of the decline, their appetites alone may wipe out the entire steelhead population. "It's gone beyond critical," Sanford says.

Unlike its close relative the salmon, which is also declining dramatically in the area, the steelhead spawns more than once and each year another brood tries the locks. Just because only 70 fish made it last time does not mean the fish is doomed, Sanford says. The task force's job is to determine whether evening the odds at the Ballard Locks will give the fish a chance to renew their population. A decision will be made at the end of the year.

Joel Shurkin