DRAFT Theme Session J – Is there more to eels than SLIME?

Conveners: Mike Pawson (UK), Håkan Wickström (Sweden), and Willem Dekker (The Netherlands)

Is there more to eels than SLIME? Undoubtedly yes, said the presenters of 26 papers and 11 posters during Theme Session J of the Annual Science Conference of ICES in Maastricht.

The serious condition of the European eel (*Anguilla anguilla*) stock has now been universally accepted, and both ICES and the European Commission have recently held a number of meetings and commissioned studies to develop eel recovery plans and associated data collection. These initiatives have generated new information on the status and management needs of eel stocks, and new and important research findings have been emerging in eel genetics, life-history energetics, parasites and environmental contamination.

ICES ' interest in eels began in the 1970s, when the decline of stock and fisheries yield was first noted. Due to the peculiar biology of these animals, development of scientific advice for management was not a straightforward task. In the 1990s, a severe decline of recruitment from the Atlantic Ocean forced ICES to provide precautionary advice. This Theme Session provided a platform for exchange of ideas concerning the many odd characteristics of eel biology and the scientific basis for management actions. Over two days, an audience of 30-100 scientists enjoyed papers that came largely from within Europe, but there were also contributors from Canada, Japan, Taiwan and New Zealand.

Presentations were mainly concerned with a single species, the European eel, *Anguilla anguilla*, but other eel species were also included. They provided a multi-disciplinary review of the biology of this mysterious creature, its position in the ecosystem, and of the many anthropogenic threats to its survival. Most of the work presented was of very recent origin, ranging from genetic structure, chemical contamination, population demography and dynamics, through behaviour and reproductive studies on Anguillid species that occupy oceanic, coastal and freshwater environments, and the whole gamut of anthropogenic impacts from chemical contamination, fishing and habitat obstruction or destruction to climate change.

The well known result of all these impacts is that recruitment of glass eels of *A. anguilla, A. rostrata* and *A. japonica* to continental waters has declined steeply in the last 30 years, and freshwater populations of growing yellow eels and escapement of silver eels back to their oceanic spawning grounds has shown a severe decline, whilst catches have declined since the early 1960s. The question is, why?

Although much of the work presented is still at an early stage, it is clear that exploitation may be just one of the causes of eel population decline, though reduction in fishing may appear to be the most immediate solution to a growing lack of reproductive capacity. Few presentations dwelt on this, though some speakers described a number of initiatives to either directly assess or to model the status of eel populations in specific river catchments/basins, and to elucidate the most likely remedial measures in response to the European Commission's proposed Eel Recovery Plan. Most of these were involved in a recent EU-funded workshop (which named this theme session) to develop a Study Leading to Informed Management of Eels (SLIME), based upon national research initiatives.

The numerous environmental impacts on the eel include aspects related to its position in the ecosystem (as predator, and prey), but the most worrying effects are related to its complex lifestyle and its vulnerability to barriers to migration, parasites and disease, bio-accumulation of chemical contaminants that disrupt biological functions, and changes to water quantity and quality brought about directly through industrial and agricultural developments or through the effects of climate change (including El Nino and NAO effects). Papers were given that began

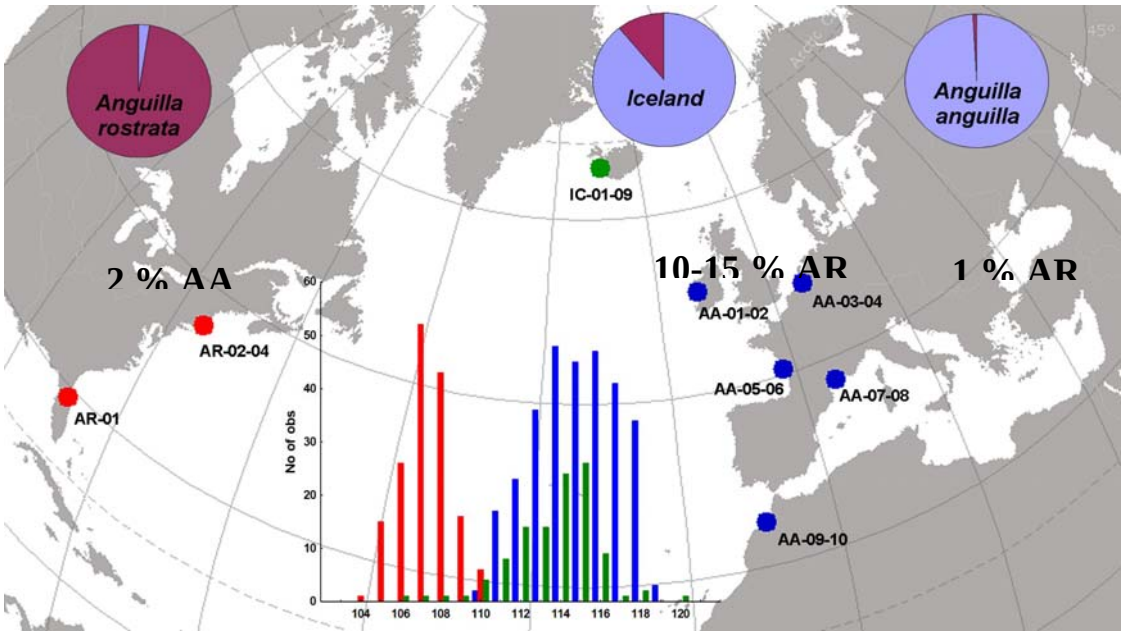
to describe and quantify many of these issues, though it is still not possible to apportion `blame` in any meaningful way. Several speakers stressed that density-dependent regulation plays an essential role in eel population dynamics, possibly both in oceanic (depensatory) and continental (compensatory) phases, but quantification of these crucial processes requires further investigation. Mitigation measures, such as fish passes for upstream migration and re-stocking with glass eels or elvers were discussed, together with the potential for efficient deflection schemes at hydropower stations, tuned to river runs and silver eel migration peaks. Apart from being a victim of environmental pollution, the eel has also been proposed as a useful bio indicator of lipophilic pollutants; water-phase concentrations are often below detection levels, while fatty eels provide a good opportunity for monitoring.

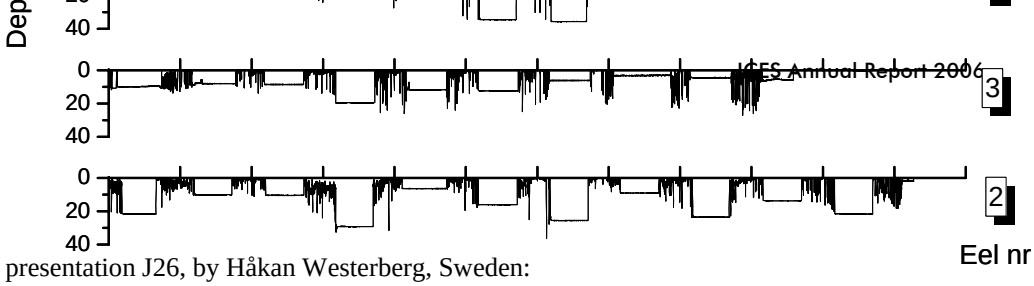
Several papers examined new work on the movement and migratory behaviour of eels, through direct observation of glass eels in estuaries, the use of telemetry and Data Storage Tags (DST) with silver eels, and examination of environmental `signatures` in otolith chemistry, using Sr:Ca for example. These presentations in particular promised scope for new insights into population dynamics and stock assessments (including estimates of silver eel escapement), bottlenecks in production, and remedial measures. Additionally, otolith analysis enabled discrimination of natural recruits from trapped and transported animals.

The general conclusion of the Eel Theme session was that it had achieved its goal in raising the profile of the multitude of issues surrounding the sustainability of the European eel (as a species, if not as an exploitable resource), informed those tasked with developing national management plans for stock recovery, and established personal and scientific links between scientists working in many different disciplines and over a number of continents.

Suggested illustrations:

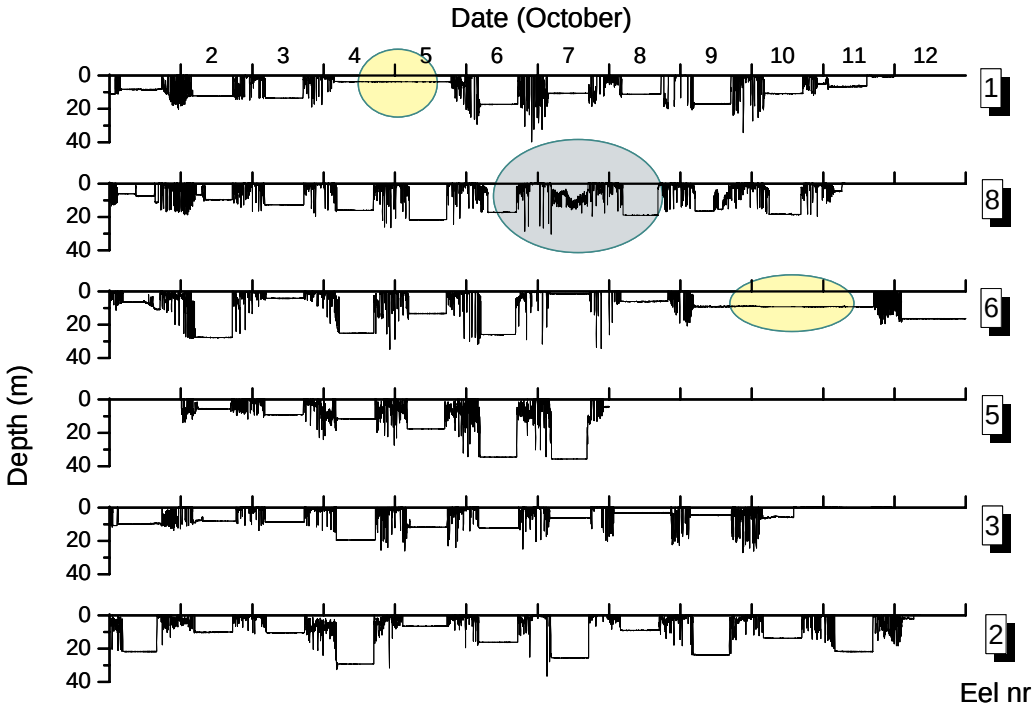
From presentation J32, by Gregory Maes, Belgium.





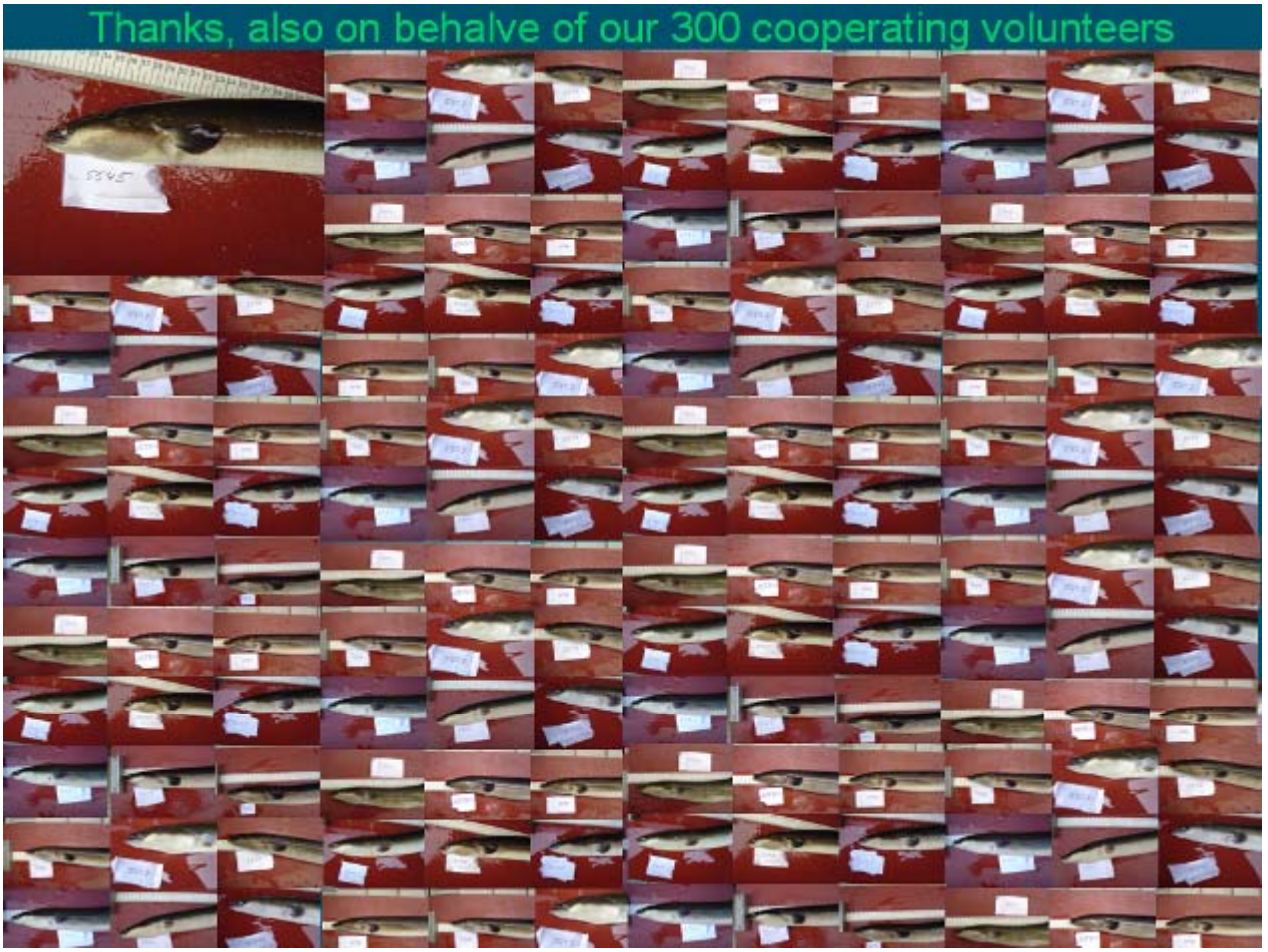
From presentation J26, by Håkan Westerberg, Sweden:

Simultaneous tracks of six silver eels during migration in the Baltic



From presentation J25 by Erwin Winter, the Netherlands

This picture is a screen dump, since Erwin's computer crashed, and he has not yet been able to restore his backup. If required, we will have to ask again.



From presentation J05 by Don Jellyman, New Zealand.

We have asked Don for permission, but he is probably somewhere around the world, and not yet answering. We should not publish without permission, but personally I think this is the best picture we have.

Release of 9 kg longfin female eel with pop-up tag