The Marine Environment

The Ghillies Seminar
Friday 16th April 2010
(Part-funding courtesy of the Scottish Government through RAFTS and the North & West District Salmon Fishery Board)

Speakers and their topics

Dr Shona Marshall (WSFT)	Introduction and area update; introduction to the Biosecurity Plan
Mr Jim Raffell (MSS)	Time to head home! Investigating marine residence times and growth rates of sea trout finnock in Loch Sheildaig.
Dr Bill Turrell (MSS)	Climate Change and Scottish Fisheries
Mr Hugh Richards (WRF)	Jellies – Blooms and their Consequences
Dr Shona Marshall (WSFT)	The Sea Trout restaurant. What's on the menu?

Dr Shona Marshall (WSFT):

All were welcomed to the seminar and a short report on local issues given. It was suggested that information be shared within the area to assist in any restoration projects. Some of the work mentioned included:

The Polla are trying to establish a riparian wood; Loch Innis are involved in a large restoration project; Reay Forest are undertaking a large scale genetic project to look at hatchery efficiency; a fish pass will be installed in Bhadaidh Daraich to help with sea trout restocking; hatcheries are used in the Laxford, Inver and Osgaig. It was suggested that these three (Robert, Geordie, Keith, Scott, Henry and Ian) get together and produce a 'Best Practice' document for the area.

Billy Adams asked as to the possibility of repairing the fish pass at the Key Loch. Shona agreed to look into this and contact the Estate.

The need for vigilance against pearl fishers was raised. It was asked that any signs of unusual activity be reported to SNH, the Police or Shona.

The Biosecurity Plan for the area has now been produced. The need for help in the implementation of the plan was highlighted, particularly in the need for reports of anything unusual along the river banks. Similarly, all were reminded about the need to disinfect tackle between water courses.

Charlie Shaw raised the issue of other users, particularly canoeists. It was agreed that this was a problem but that awareness raising amongst this group was increasing.

The request was made that the Trust would be happy to read any scales collected. Also please inform us of anything unusual in the catches, for example any rainbows caught. Charles also asked for photographic evidence of any predator marks.

Mr Jim Raffell (MSS):

Jim's talk centred on the data generated by the Sheildaig trap, Wester Ross. This involved a run through of the project, its rationale and what it means.

There is a two-way trap on the river, catching fish moving in and out of the system. Each fish is individually tagged with a PIT tag – placed in the body cavity and read with a special machine. This allows the marine residency, grow rates, etc., to be calculated.

Brown trout and sea trout are the same species, as are ferox, etc., simply different varieties. They may spawn in different locations but can cross breed. With regards to the sea trout/brown trout relationship, most sea trout (85%) tend to be female, while brown trout are male. The decision to go to sea is a mix of genetic and environmental factors, with environmental triggers being based on growth and food availability. At this point Jim gave the details of the life cycle of the species and the physiological changes required to move between fresh and salt water.

The talk then centred on finnock, fish which return to freshwater after one summer at sea. These are fairly uniform in size: 200 – 300 mm, averaging 260 mm. They are a mix of mature and immature fish, although mature finnock tend to be male.

The main smolt run in the Sheildaig is the end of April/start of May, with 800 – 1500 smolts. Adults then start to return in early June, peaking at the end of August/beginning of September. The trout average 115 days at sea, ranging from 57 – 193 days. This duration is influenced by the sea temperature in June, with higher temperatures resulting in fewer days at sea.

As a result of the tagging, the growth rates could also be compared. The Thermal Growth Coefficient is used to compensate for changes in temperature. There is a negative relationship between rate of growth and time at sea, thus faster growing trout spend less time at sea. In addition, early smolts tend to spend longer and sea. This would suggest that early smolts are slower growing. Returns are even in size indicating that there is a threshold size for return. It leads to many more questions:

Why don't faster growing fish stay at sea? Is this to minimise contact with predators? Why should smolt date influence return time? Do they continue to grow slowly as temperatures increase?

Questions and discussion

There is flexibility within the life cycle and the movement of brown trout to sea. When asked at what stage brown trout should be killed, Jim pointed out that you need to conserve your brown trout as much as sea trout. 'Old' brown trout can suddenly go to sea, or sea trout can remain in freshwater for several years before returning to sea. The male/female ratio was also shown in the Laxford, again highlighting the need to rethink brown trout management.

There was a slight improvement in sea trout catches throughout the area, with the exception of the Polla where the catches were down together with weight.

Should we be pushing for the 3 mile limit? Acoustic rtacking work in the Sheildaig showed that the fish stayed close to the river mouth for the first 2 weeks. After 40 days some had strayed as far as the outer mouth but most remained within the loch confines.

Dr Bill Turrell (MSS):

The Gulf Stream is driven by winds and is a gyre around South America. Only 5 % of the Gulf Stream crosses the Atlantic (called the North Atlantic Current). Scotland is, instead, warmed by the Slope Current, flowing north for France/Spain. The Rockall Trough also stores heat and releases it during the winter to keep Scotland warm. This also raises questions about eel spawning, with suggestions that the bay of Biscay is important, not the Sargasso Sea.

Seas are warming up, possibly as a result of Global Warming, although some 'blips' can be seen in the data. This means that we will see more warm water species in this area, i.e. snake pipefish. *This has already been observed*. Other species affected include Gadoids, with an increase in gadoid numbers linked to the cool period in the 1970's and 80's.

Salmon use the slope current to migrate. In the 1990's trawls were undertaken in the current using specially buoyed nets as salmon smolts are only found in the top 1 m, fish were found. The SALSEA project was then started. The slope current is trawled using cameras in an open cod end to find salmon - smolts and

adults - what they're feeding on, etc. They have found that the current is used by Irish and Spanish salmon as well as those from the west coast of Britain.

It is important to look at other changes as well, including changes to the plankton. The Continuous Plankton Recorder has been operating for over 100 years. This has recorded a massive increase in plankton since 1965, with the spring and autumn phytoplankton blooms of 1965 – 1985 being replaced by a continuous bloom since 1985 (increased primary production). In addition, zooplankton changes have been observed, with southerly (warm water) species moving north, although overall production has remained the same.

Despite this, landings of plankton eating fish have remained the same, while predatory fish landings have declined since the 1970's. This would suggest that there are more fish now available to marine mammals, and numbers have been seen to increase. There has also been as increase in sea-bed animals, i.e. Nephrops, following the decline in predators.

The talk then centred on the cod fishery of the North Sea. There were 800,000 tonnes of cod in the North Sea in the 1970,s and 80's. This declined to 50,000 tonnes in the 2000's. Cod recruitment has been negatively affected by the changes in the planktonic community. While stocks will never return to the levels in the 1960's, it is possible to recover the fishery. However, this will require changes in the management of the fishery and the introduction of real time closures.

The future was discussed. It was noted that climate change model predictions have been shown to be correct up to now. This will result in changes in the different fisheries, with cod disappearing from some areas but appearing in others. However, as they watm our seas may become more productive.

Mr Hugh Richards (WRF):

Hugh started with a description of the various jellies – their families and Latin names. He then moved onto a description of the different impacts associated with jellies around the world. These ranged from a particular swarm in Japanese waters that is frequently taken in the trawls and can capsize the fishing boats, to the introduction of a comb jelly into the Baltic which resulted in the loss of the Anchovy fishery.

He noted the way that things are changing in the oceans, both with regards to water movements and increased temperatures. Jellyfish blooms are caused by a mixture of different factors – eutrophication, climate change, translocation, habitat modification, overfishing, etc. – and that this is increasing. Overfishing is particular relevant, with fisheries taking out top predators first then working down the food chain to plankton feeders. This results in less predation, more plankton and therefore more jellyfish. Inthis way the ecosystem can change to leave jellies as the dominant animal – a situation which may be irreversible as the jelly eats the fish eggs, larvae and food.

Questions and discussion:

How do you treat stings? *This depends on the jellyfish but you have to be careful. If you get some tentacles on your hand, these can be transferred to eyes, etc. Stinging cells remain even after the jelly is dead and ropes can also be covered in stinging cells with little sign of the jellies.*

Is there a relationship between jellies and sea lice? *He has a theory that there may be. When they have blooms of moon jellies they see less juvenile lice on the cages.*

Dr Shona Marshall (WSFT):

Shona started with a description of the sweep netting carried out in the Laxford and Polla estuaries and the data collected. The differences in growth rate raised the question of 'why?' and led to a project looking at the food availability in the two areas.

A beam trawl was used to collect the samples and the species caught listed. The ones likely to figure in the sea trout diet were given in red and it could be seen that most of the species caught were not suitable for sea trout.

Questions and discussion
What species were found in the stomachs of the sea trout examine? *These included shrimps, gadoids and sprat.*

The importance of small shrimps in the diet of sea trout was raised. It was noted that these were listed as Amphipod and were found more in Eriboll than Laxford.

Jim Raffell noted that he has witnessed sea trout feeding on wind blown insects within the estuaries.

Was there any historic evidence that the populations had changed. For example Loch Stack historically had large fish and has the food availability changed that much? *This led to a discussion of changes noted by the Ghillies. In particular the reduction in numbers of birds in Loch Laxford and changes in populations in other areas.*