Report from scale reading training of personnel from PINRO at the Research Station of the Finnish Game and Fisheries Research Institute - Utsjoki (FGFRI), 16.04-27.04.2012

Project KO197: Trilateral cooperation on our common resource; the Atlantic salmon in the Barents region

Aim:
During their stay at the research station, the scientists Artem Tkachenko and Anton Shkatelov PINRO-Murmansk, in the collaboration with their Finnish colleagues Jorma Kuusela, Jari Haantie and Pauli Aro, took the training course on reading age of the Atlantic salmon scale.

The aim of the training was to master the up-to-date equipment used to read scale and estimate the growth dynamics of the Atlantic salmon. Also, the purposes of the training course involved comparing methods with the aid of which age is read by Russian and foreign colleagues, specifying the main boundaries of the Atlantic salmon growth zones, comparing scale samples, different habitats of juvenile Atlantic salmon, as well as the peculiarities of growth and dependence on geographic and hydrologic environmental factors. The importance of this training course consists in development of cooperation and coordinated activity in the field of reading age and determining linear growth dynamics of the Atlantic salmon. The training period lasted 12 days, from 16 April 2012 to 27 April 2012.

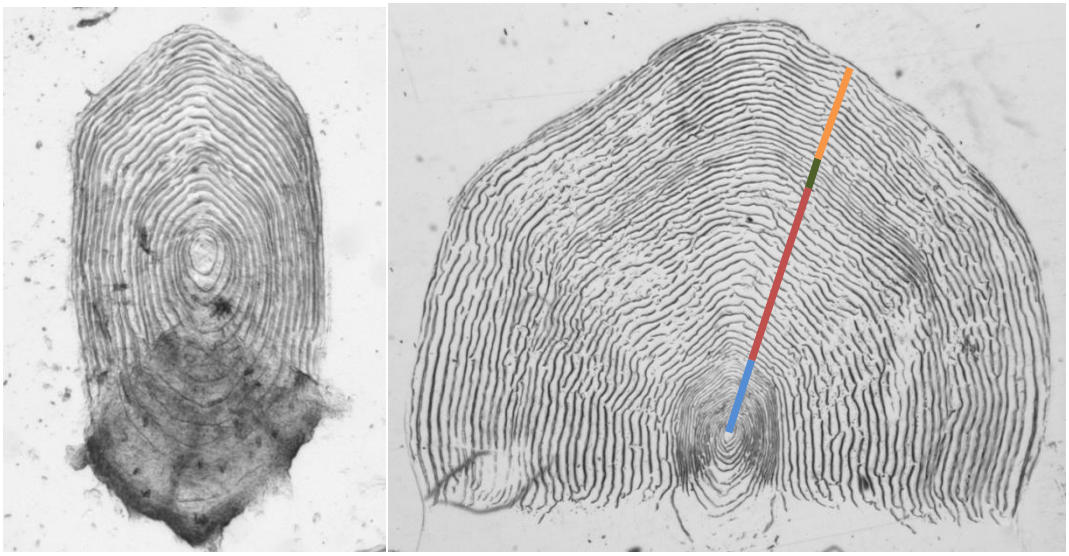
Training program:
At the beginning of the training the scientists from PINRO were acquainted with the equipment used to prepare the Atlantic salmon scale and read its age. In order to prepare salmon scales a flat rolling mill, "PEPE 188.00" (http://pepetools.com), was used to make the scales impressions on 1 mm thick polycarbonate plates (app. size 28x95mm). Scales in a sufficient number (more than 10 pieces), is put to the objective plastic on the frost side, without preliminary cleaning. After rolling the obtained plastic with the prints of scales is examined at the microfiche reader to find the prints which are suitable for further analysis. During the course, the most interesting and rare material from the rivers of Norway and other countries was studied to read river and sea age annulus, as well as to identify additional summer, winter checks and spawning marks. Scales images were digitaized with with Qimaging, Retiga 4000R and macroscope (Wild M420). The fresh water phase was first enlarged. The obtained image was saved in the TIFF format for further analysis. Then, the same procedure was done for the whole scale. The calibration was selected according to image magnification. The number of circuli was detected by the caliper tool of the Image Pro software for freshwater and marine phase. The circuli was checked and manually corrected. The different growth zones were manually determined and distances were measured with the length tool.

A special attention should be paid to recognizing the boundaries of growth zones.
A large number of scale imprints helps to select the representative salmon scale where all scale features are visible including the first growth zone.

In the course of the training, different types of scale from the Tana River system were studied with a special attention to the annual rings and typical and untypical growth zones. Also, a great

attention was paid to the scales of previous spawners. The scale samples from the Kola Peninsula rivers (Kola, Ponoi, Rynda, Vostochnaya Litsa, Varzuga and from the rivers in Rybachy Peninsula) were studied and compared to the Tana scales. Some differences of the freshwater and sea age were found between the rivers. Thus, the main aspects of methods used by Russian and foreign colleagues to analyze Atlantic salmon scales, agree well.

Results of the training:
In the course of training, the scientist from PINRO mastered the modern equipment and software applied to analyze Atlantic salmon scales. 50 scale samples were examined from the Rybachy Peninsula and 23 scale samples from the rivers Rynda, Ponoy, Vostochnaya Litsa, and Kola. The samples from rivers of the Kola Peninsula were the most complicated, scales with repeated spawning marks and prolonged river and estuary period. About 150 scale samples from the Tana River system were studied allowing us to make a comparative analysis of sea and river periods. The scales from farm escapees were also examined in details. During the training we learnt analyze scale samples from various rivers of the world that permitted us to improve our professional skills in the field of the Atlantic salmon age reading and growth analyzes.



Figures 1-2: Left: Juvenile wild salmon scale, caught in May age 3 + years (in the beginning of fourth growth season). Right: Adult wild salmon scale, caught in July in the River Tana age 3/1+: juvenile phase in the middle of the scale (blue line), first summer at sea (red line), first winter at sea (dark green line), second summer at sea (peach line) – this growth indicates the growth increments during the year when salmon ascended into the river. NB – the magnifications on the pictures are different!