

4th European Large Lakes Symposium

Ecosystem Services and Management in a Changing World



August 24-28, 2015, Joensuu, Finland



Histopathological alterations in feral fish of Lake Onego - a baseline study for environmental monitoring purposes

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The use of histopathology in various fish species as a biomarker in monitoring programmes to assess the biological effect of anthropogenic load, environmental quality or occurrence of adverse ecological consequences is well established. Although Lake Onego ecosystem state has repeatedly been estimated using different groups of organisms, information on histopathological alterations in fish inhabited this water body is scarce. In order to obtain an overview and assess the specificity and prevalence of histopathological changes in Onego Lake fish, gills, liver and kidney of two native species (perch and roach) were histologically analyzed. Fish were collected in August 2013 and 2014 from several sites which considered as undisturbed locations and distributed over different parts of the Lake. As a result a variety of the lesions, which can be classified into 5 groups (circulatory disturbances, progressive, regressive and inflammatory alterations and neoplastic changes) were found. A high prevalence of non-specific and early toxicopathic non-neoplastic lesions was recorded. In contrast, pre-neoplastic and neoplastic lesions were observed only in rare occasions. Several cases of unspecified parasite invasions were also diagnosed. Studied fish displayed a range of pathologies similar to those seen in species from water bodies with high anthropogenic load such as Vygozero reservoir and urban tributaries of Lake Onego. Thus, a comparison with this data on other fish species revealed that the observed alterations may indicate effects of environmental stressors. The study has been financially supported by the Russian Science Foundation (No 14-17-00766).