ADVANTAGES OF PERCH (Perca fluviatilis) MIGRATIONS BETWEEN BRACKISH AND FRESHWATER SITES. EXPERIMENTAL EXPLANATION OF THE PHENOMENON

Introduction
The objective of the study was to explain experimentally the perch Perca fluviatilis migration behaviour from the freshwater Curonian Lagoon to the brackish Baltic Sea, Lithuania (Fig. 1). Perch start to migrate from the Curonian Lagoon after wintering and spawning. Field observations demonstrated better growth in length and weight (Fig. 3, 4) in the sea despite lower water temperature (Fig. 2). Available information suggests that feeding conditions in the Curonian Lagoon are better than in the coastal waters. In mid September, when water temperature drops to 12-13°C, intensive perch migration back to the lagoon starts. It was hypothesized that two factors could beneficially affect perch in the sea: higher water transparency and water salinity. To test the hypothesis of the influence of salinity, YOY perch were reared under equal feeding conditions and temperatures, at 5 and 2 ppt salinity regimes and freshwater as control. The first experiment was performed at 16-22°C (mean water temperature 19.2°C) and the second – at 9-14°C (mean water temperature 12.4°C). The results of first experiment demonstrated the significant beneficial effect of salinity on YOY perch growth at both 5 and 2 ppt salinity conditions (Fig. 5). This effect was insignificant at the lower temperature range (Fig. 6). According to the results of the first experiment, migration to the sea can be a result of the beneficial salinity effect on the growth of perch. The second finding allowing states that after water temperature decreases, the salinity affect becomes insignificant, and migration to the lagoon starts.

Materials and methods
Field study
Material for the perch in situ growth study was collected during 1998–2000, in September when growth in length and accumulation of energy resources reached the yearly maximum. Difference in collecting time between sites was 2-5 days. The growth study focused on perch individuals of 1997-year class, since this generation dominated in both water bodies: individuals of the other age groups were scarce. Fish were caught with gill nets (29, 30, 40, 45 and 50-mm mesh bars) set at 2.0–3.5 m and 2.5–4.5 m in the Curonian Lagoon and in the sea, respectively. All perch were weighed (± 1.0 g) and measured (total length L, ± 0.5 cm). Condition factor (CF) and fatness coefficient (KF) were calculated as follows (Bage nal & Tesch, 1978; Bukelskis & Pikelis, 2000; Tiutiunik, 1961; Tchizhik & Ryzhnikov, 1973). Perch YOY were calculated as follows (Bage nal & Tesch, 1978; Bukelskis & Pikelis, 2000; Tiutiunik, 1961; Tchizhik & Ryzhnikov, 1973).

Laboratory studies
To test the hypothesis of the influence of salinity, YOY perch were reared under equal feeding conditions and temperatures, at 5 and 2 ppt salinity regimes and freshwater as control. The first experiment was performed at 16-22°C (mean water temperature 19.2°C) and the second – at 9-14°C (mean water temperature 12.4°C). The results of first experiment demonstrated the significant beneficial effect of salinity on YOY perch growth at both 5 and 2 ppt salinity conditions (Fig. 5). This effect was insignificant at the lower temperature range (Fig. 6). According to the results of the first experiment, migration to the sea can be a result of the beneficial salinity effect on the growth of perch. The second finding allowing states that after water temperature decreases, the salinity affect becomes insignificant, and migration to the lagoon starts.

Results
Results of the study in situ

1. Study in situ demonstrates beneficial effect of perch seasonal migrations to the brackish coastal waters.
2. Study in vitro in “high” temperature range confirms direct or indirect positive salinity effect on perch YOY.
3. Study in vitro in “low” temperature range demonstrate reducing of water salinity beneficial effect and enable to explain the phenomenon of backward perch migrations to the freshwater in autumn.
4. The obtained results requires further studies to understand mechanisms of water salinity effect on perch.