

# The KALME project- Activity3-fish, fisheries and aquaculture



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# Activity 3- targets

- 3a- climate change and biodiversity
  - fish and fisheries data base preparation- the lake Burtnieks, the river Salaca;
  - rivers and lakes fish monitoring;
- 3c- climate change bioindication
  - changes of freshwater fish distribution in Latvia;
  - temporal changes of fish migration (the river Salaca salmon)
  - climate change and fish diseases



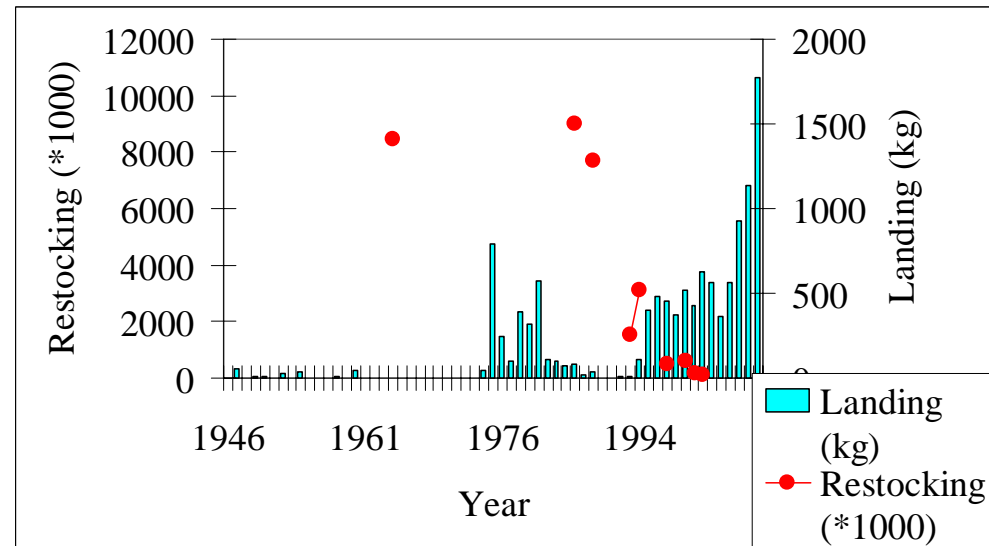
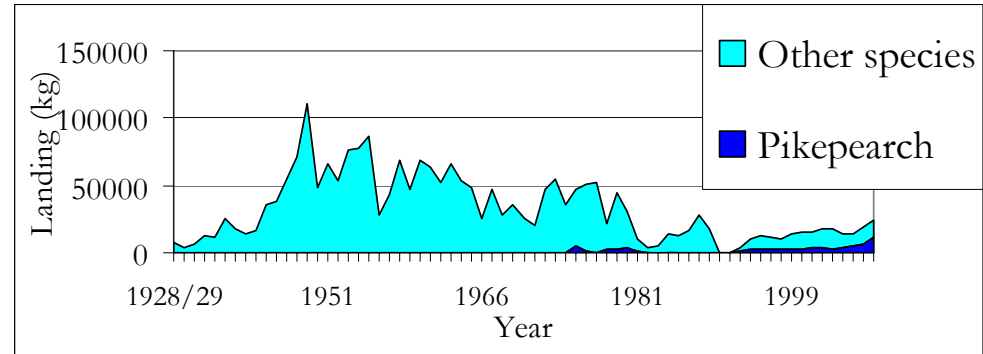
# River's and lake's fish monitoring

- Data sets on fish abundance~ distribution:  
20 lakes and 30 rivers per year;  
140 fishing occasions per year  
Total database includes- 160 rivers and 275 lakes  
Monitoring results would forms the base of fish data in Latvia for further analysis of changes in community's structure- therein for climate change impacts analysis



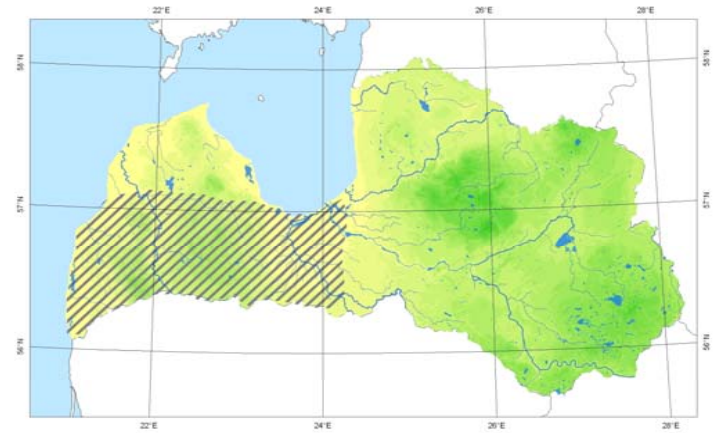
# Activity results and outputs

- Fisheries data set for the years 1928- 2007;
- Possible climate change impact- high status of pikeperch stock in lake Burtnieks- reproduction of this species starts in 80s
- In total- number of lakes with self- sustainable pikeperch populations increased from 20 to 60

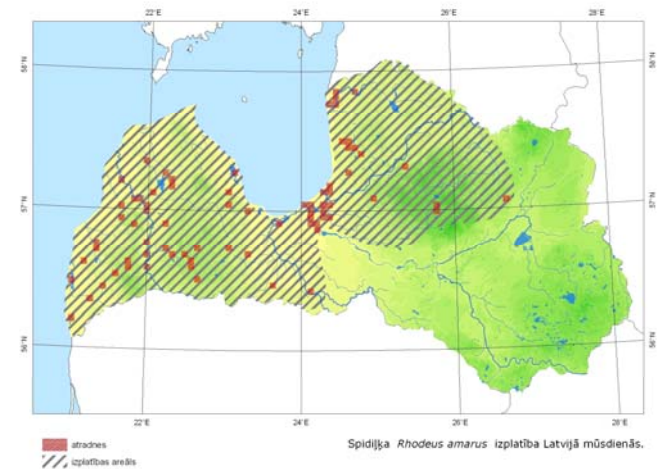


# Example of changes in species distribution- *Rhodeus sericeus*

- Distribution of warmwater species bitterling- changes about to 100 km to NE
  - Till now species not found in Estonia
- 1st figure- distribution of species in 20s
- 2nd figure- distribution now



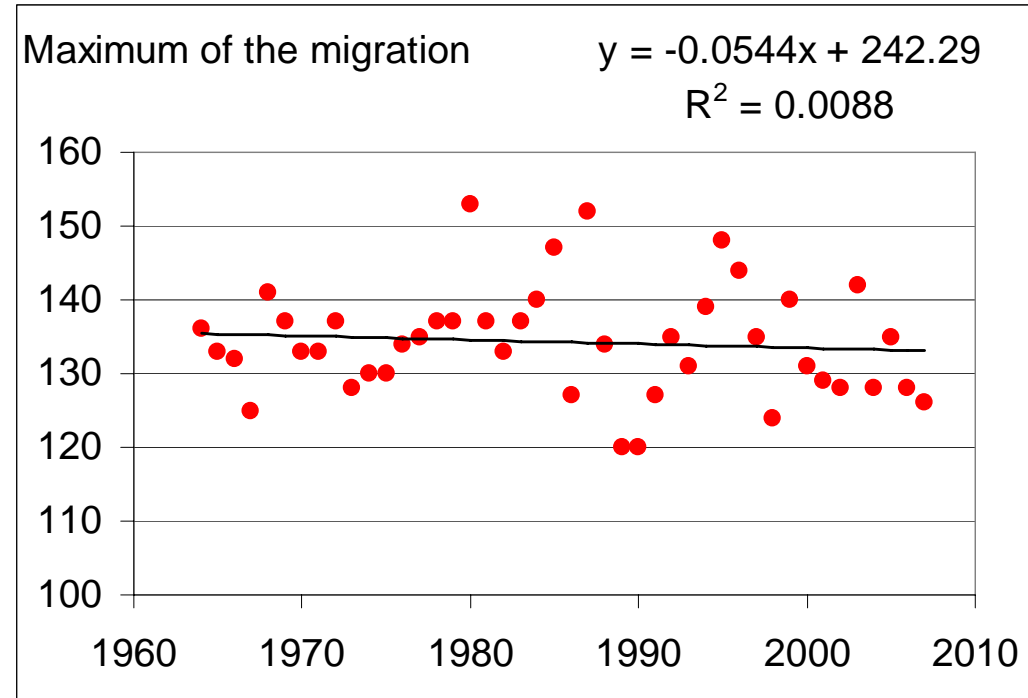
Spidijsa *Rhodeus amarus* izplatība Latvijā 1925. gadā (pēc Schneider, G. 1925)



Spidijsa *Rhodeus amarus* izplatība Latvijā mūsdienās.

# Temporal changes of salmon smolt migration (the river Salaca)

- No significant trend for time period 1964- 2007
- Significant correlation between beginning and maximum of smolt migration in JD and – temperature Sums in winter ( $r=0.58$ ;  $r=0.48$ )
- ANOVA demonstrated significantly (in average) earlier smolt migration beginning after 1989- possible effect of increasing on mild winter's frequency in region. From late 80s smolt migration starts at least 5 days earlier



# Aquaculture and fish diseases

- Total dependence of aquaculture in Latvia from the natural hydrological regime: 39 from 43 farms take water from surface freshwaters therefore temperature regime of farming totally depends from seasonal and multi-annual dynamics of natural environmental factors
- Most of fish diseases are strongly influenced by changes in seasonal water temperature. For example, invasion of common carp by *Aeromonas hydrophila* now are well known in hatcheries and small waterbodies used for aquaculture as before.