



LAKE BURTNIEKS ECOSYSTEM STUDY: MODEL-BASED MANAGEMENT APPROACH

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LAKE BURTNIEKS

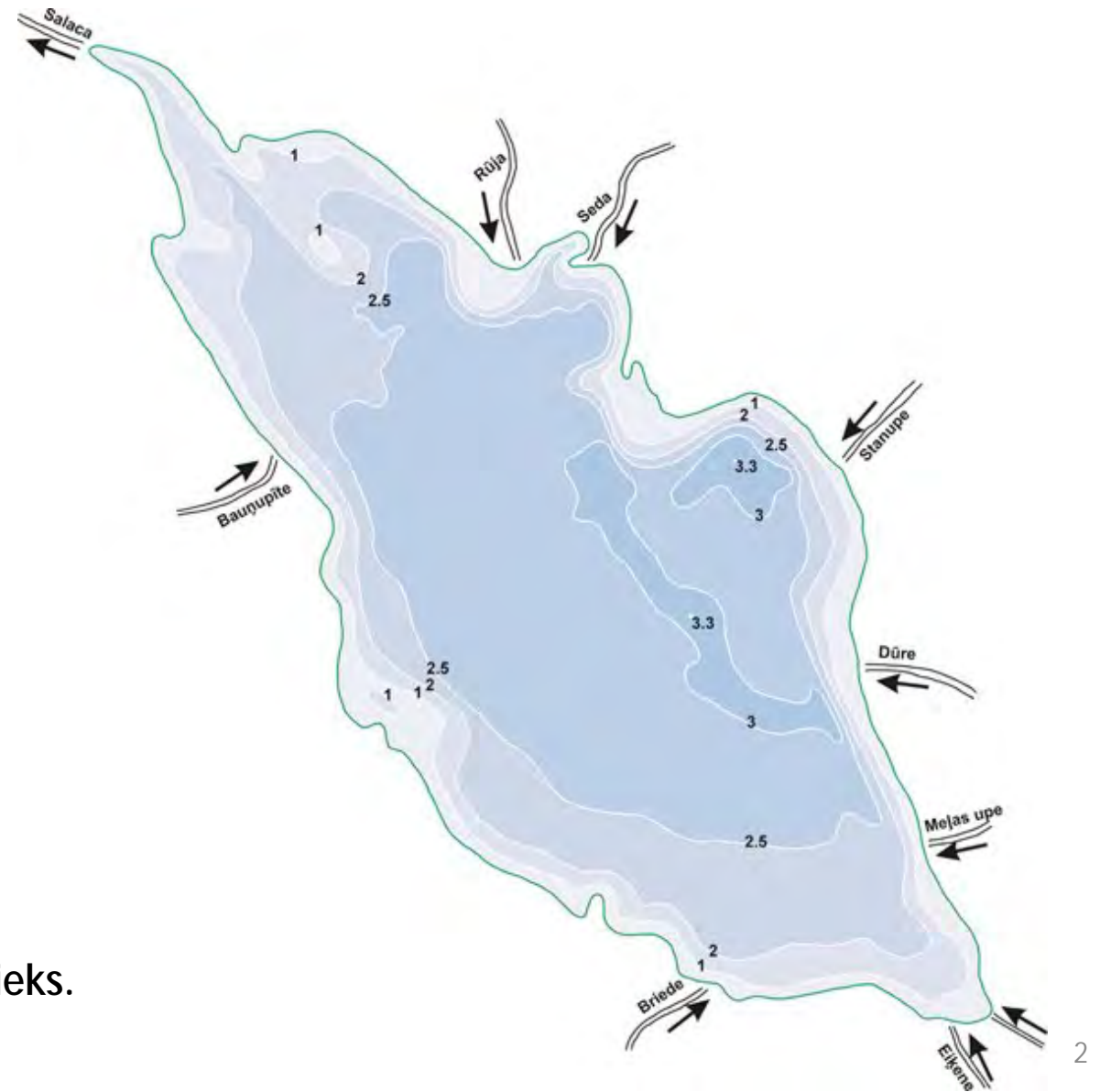
Table 1. Main parameters of Lake Burtnieks

Surface area	39.01 km ²
Mean & max depth	2.2 & 3.3 m
Catchment area	2215 km ²
Inflowing rivers	Seda, Rūja, Briede, etc.
Outflowing rivers	Salaca

The economic significance:

- § 8 boat bases and rentals;
- § 13 guest houses around the lake;
- § 9399 fishing licenses issued in 2016;
- § Income from fishing licenses – 33 546 EUR.

Fig.2. Bathymetry of Lake Burtnieks.
Source: ezeri.lv.



HIGHLIGHTS FROM THE HISTORY

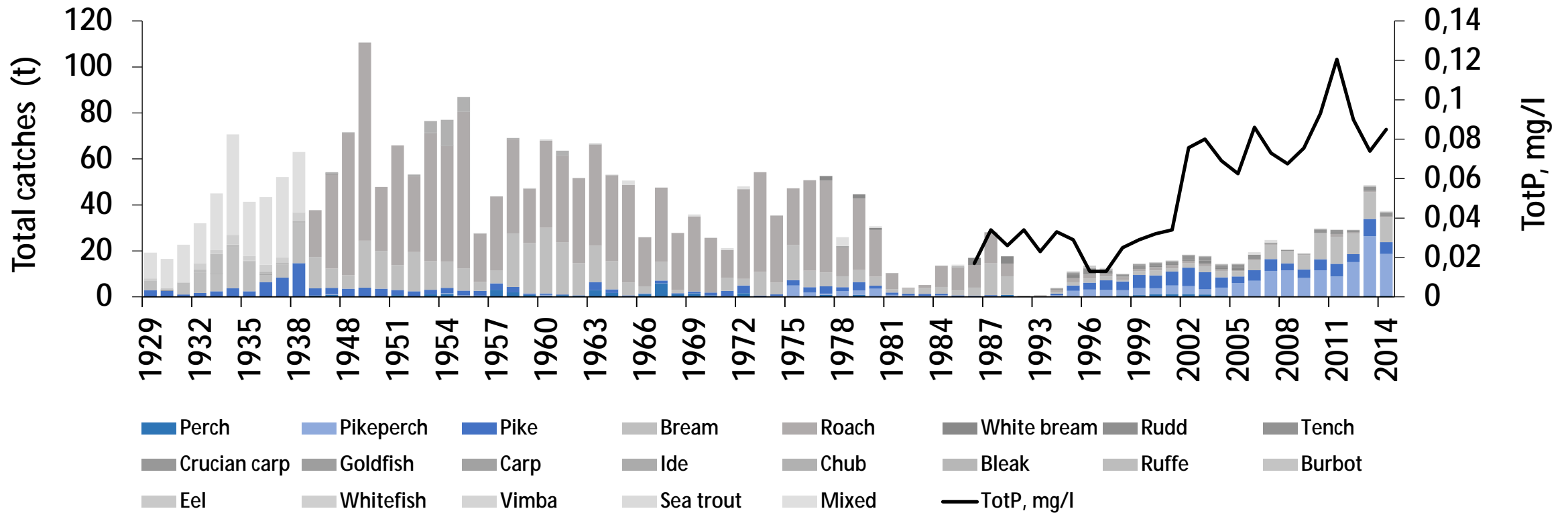


Fig.3. Total catches in Lake Burtnieks (1929-2014) vs total phosphorus concentrations in the water column.

FIELD SAMPLING

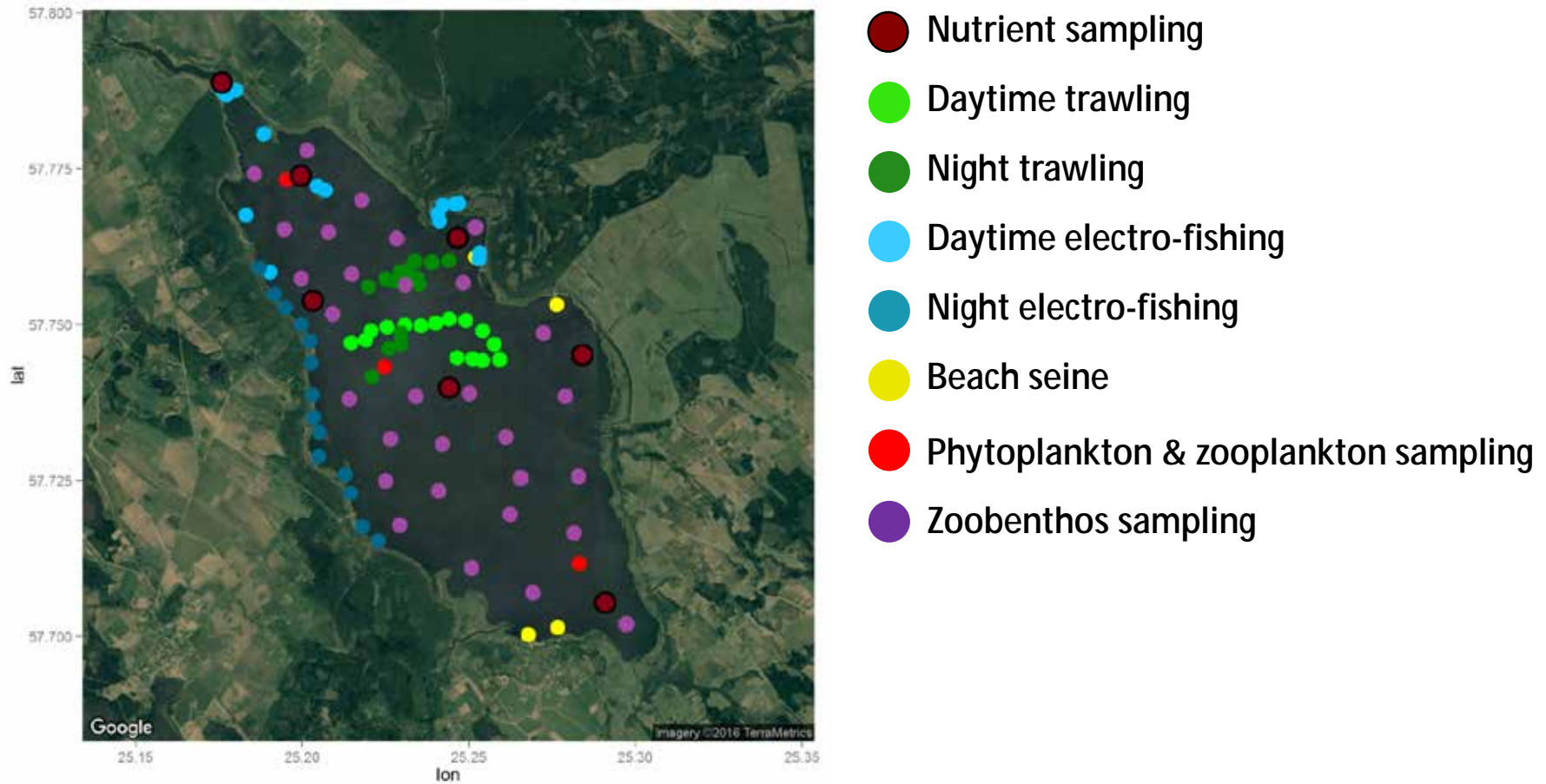


Fig.4. Stations for field sampling campaign in Lake Burtnieks. 2013 – 2014.

ECOSYSTEM STATUS OF LAKE BURTNIEKS

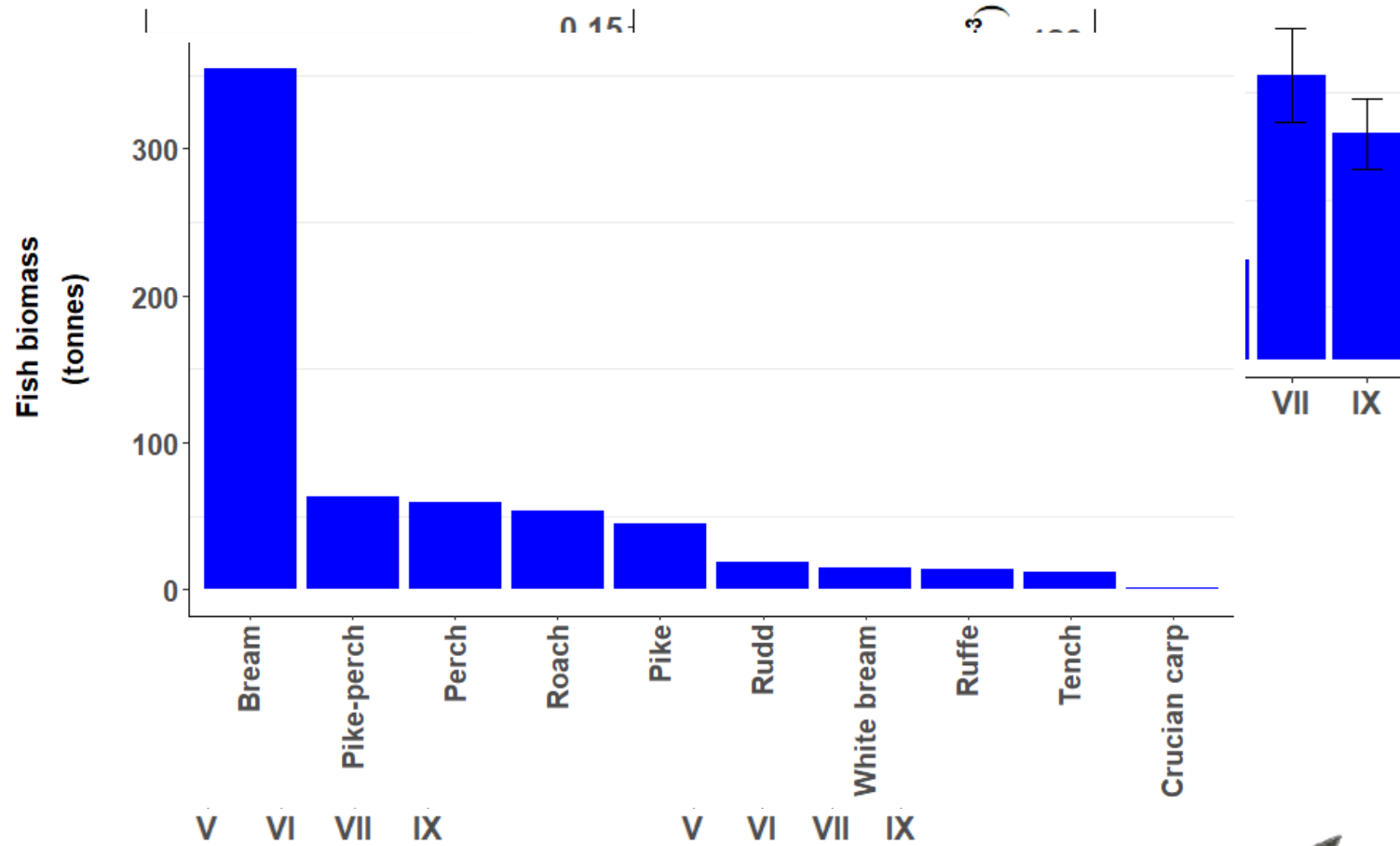
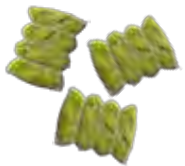
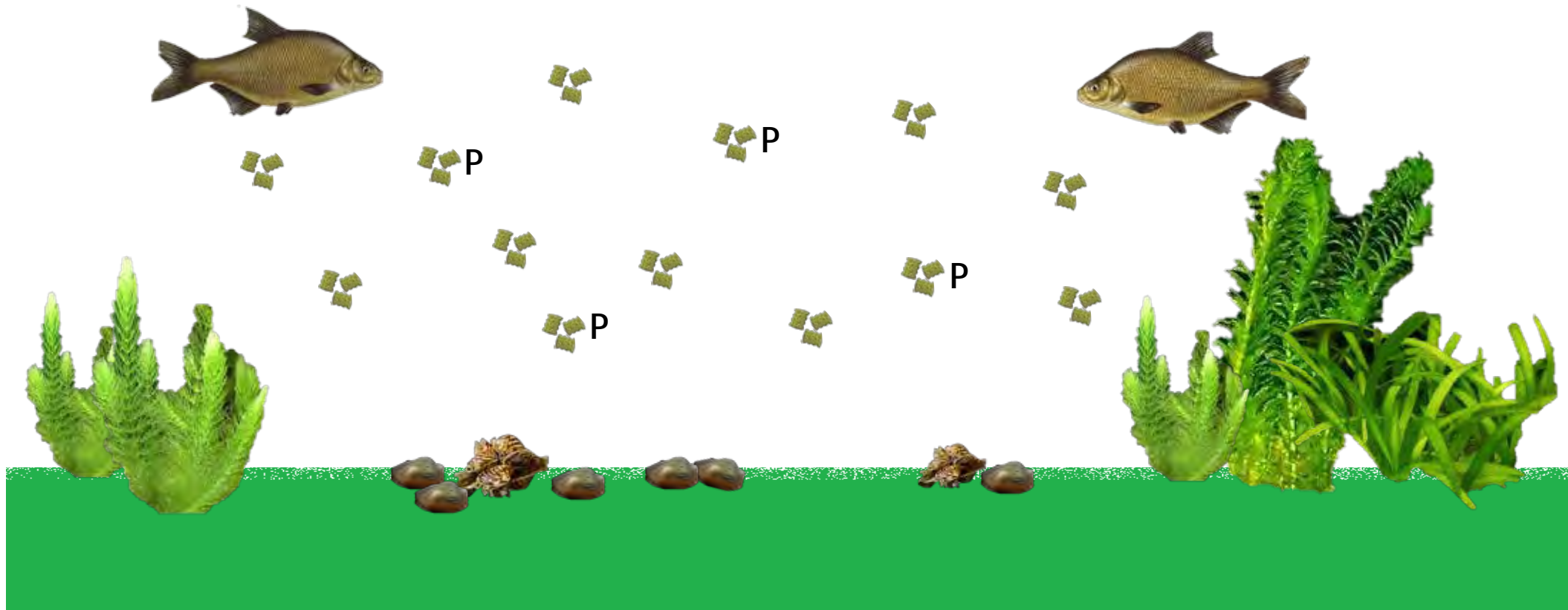


Fig. 9. Fish biomass and species composition in Lake Burtnieks at the summer season in 2014. spring-summer season in 2014.



FISH-INDUCED SEDIMENT RESUSPENSION



ECOSYSTEM STATUS OF LAKE BURTNIEKS

Table 2. Ecosystem status classification for shallow brown-water lakes with high water hardness

	Very good	Good	Average	Bad	Poor
Ptot (mg/l)	<0.03	0.03 - 0.055	0.055 – 0.08	0.08 – 0.105	>0.105
Ntot (mg/l)	<0.8	0.08 – 1.3	1.3 – 1.8	1.8 – 2.3	>2.3
Chlorophyll-a (µg/l)	<7	7 - 12	12 - 40	40 - 60	>60
Secchi depth (m)		Not applicable due to intensive water color			
Phytoplankton (mg/l)	<1	1 – 2.5	2.5 - 5	5 - 10	>10

POSSIBLE SOLUTIONS

- Ø External nutrient load reduction;
- Ø Sediment dredging;
- Ø Water column phosphorous adsorption;
- Ø Biomanipulation of fish community.

Picture 3. Biomanipulation of fish community.
Source: externalworksindex.co.uk



MODEL SUGGESTIONS

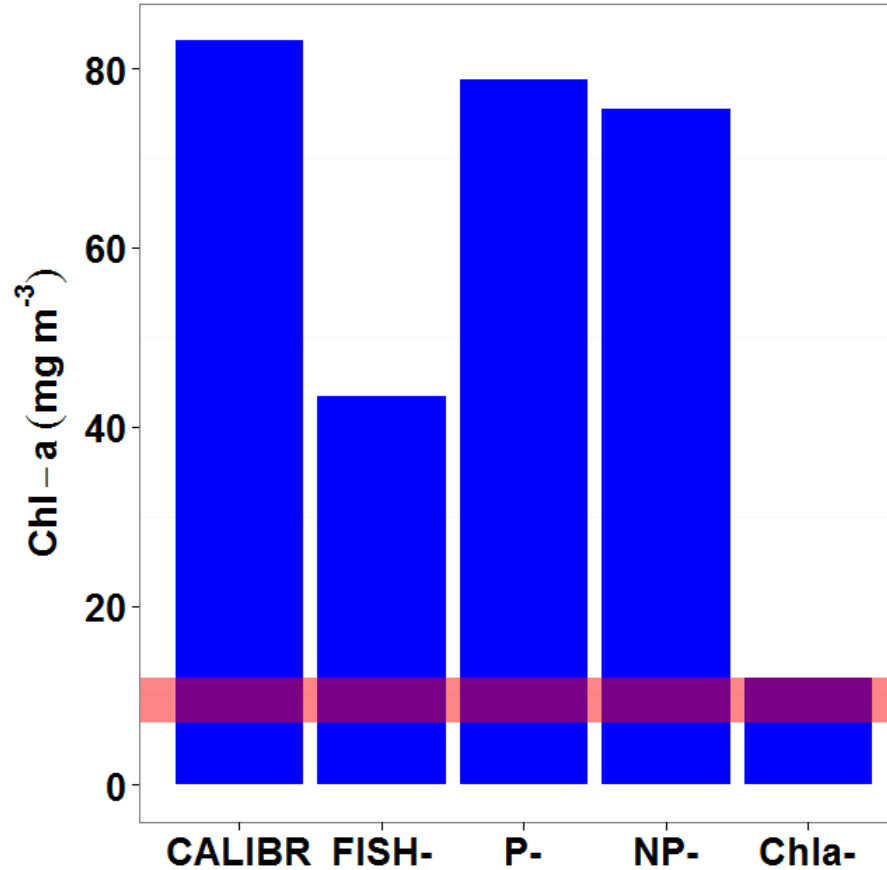
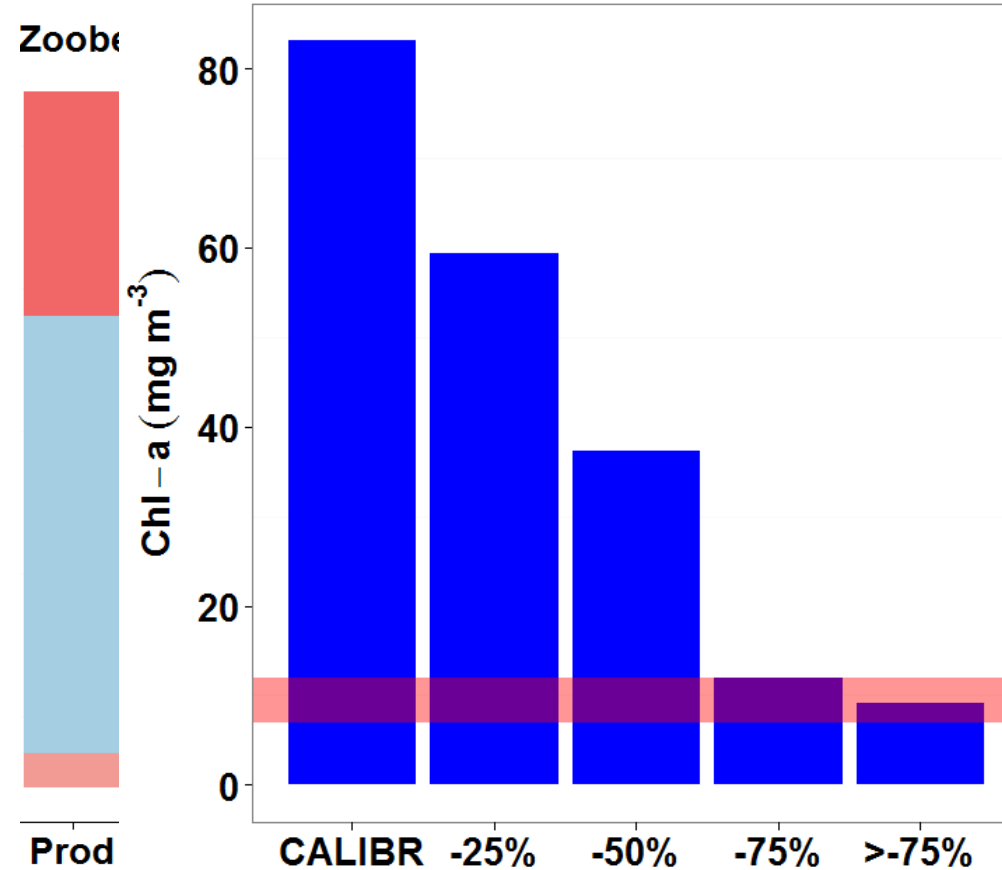


Fig.11. Fish biomass manipulation and nutrient reduction effects on chlorophyll-a summer concentration.



lar Fig.12. Effects on chlorophyll-a summer concentration by gradual reduction of cyprinid fish biomass with parallel nutrient reduction by 30%.

CURRENT ACTION



Picture 4. Demonstration of biomanipulation in Lake Burtnieks.

FUTURE THREATS

Ø Internal nutrient loads– phosphorus diffusion from sediments to the water column;

Ø Climate change:

§ Water temperature increase;

§ Extended vegetation season, including for cyanobacteria blooms;

§ Invasive species from warmer climate zones.



THANK YOU!

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