УРАЛЬСКИЙ НАУЧНО-ПРАКТИЧЕСКИЙ ЦЕНТР РАДИАЦИОННОЙ МЕДИЦИНЫ
Urals Research Center for Radiation Medicine

INDIRECT ECOLOGICAL EFFECTS IN RADIOACTIVELY CONTAMINATED FRESHWATER ECOSYSTEMS

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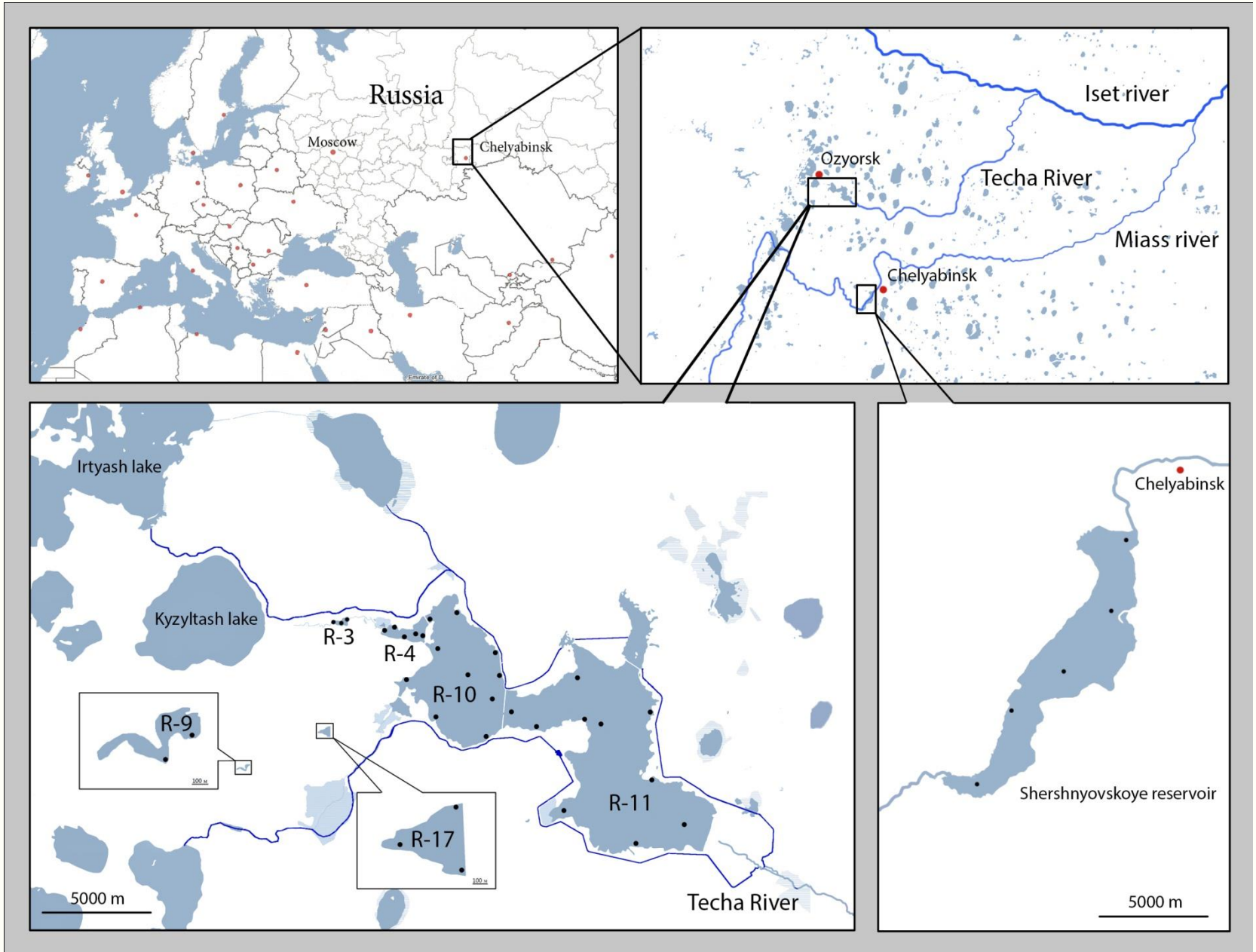
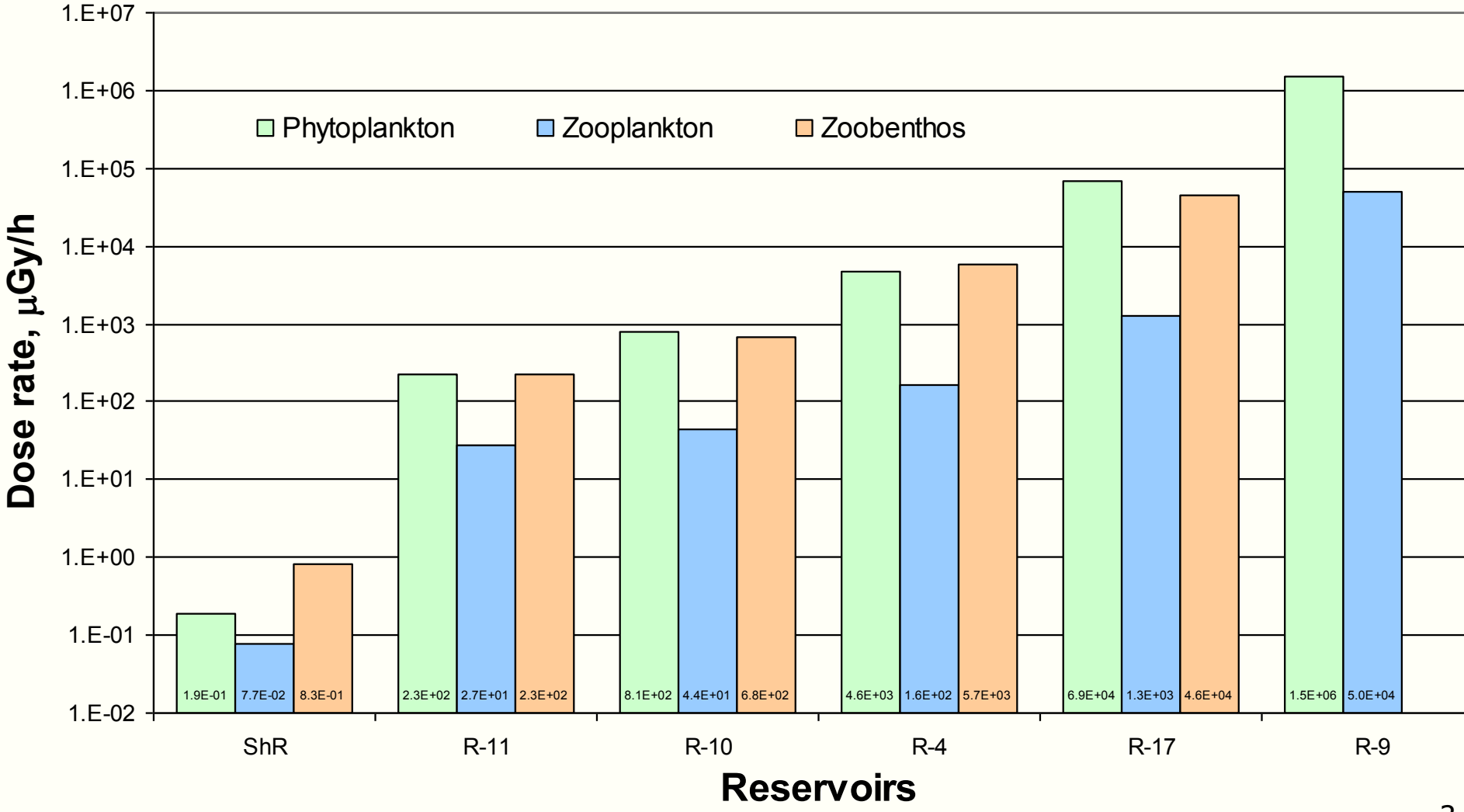
Location of the reference and PA «Mayak» industrial reservoirs. Dots in the figure mark sampling stations



Estimated dose rate values for hydrobionts, μGy/h (Erica Assessment Tool)

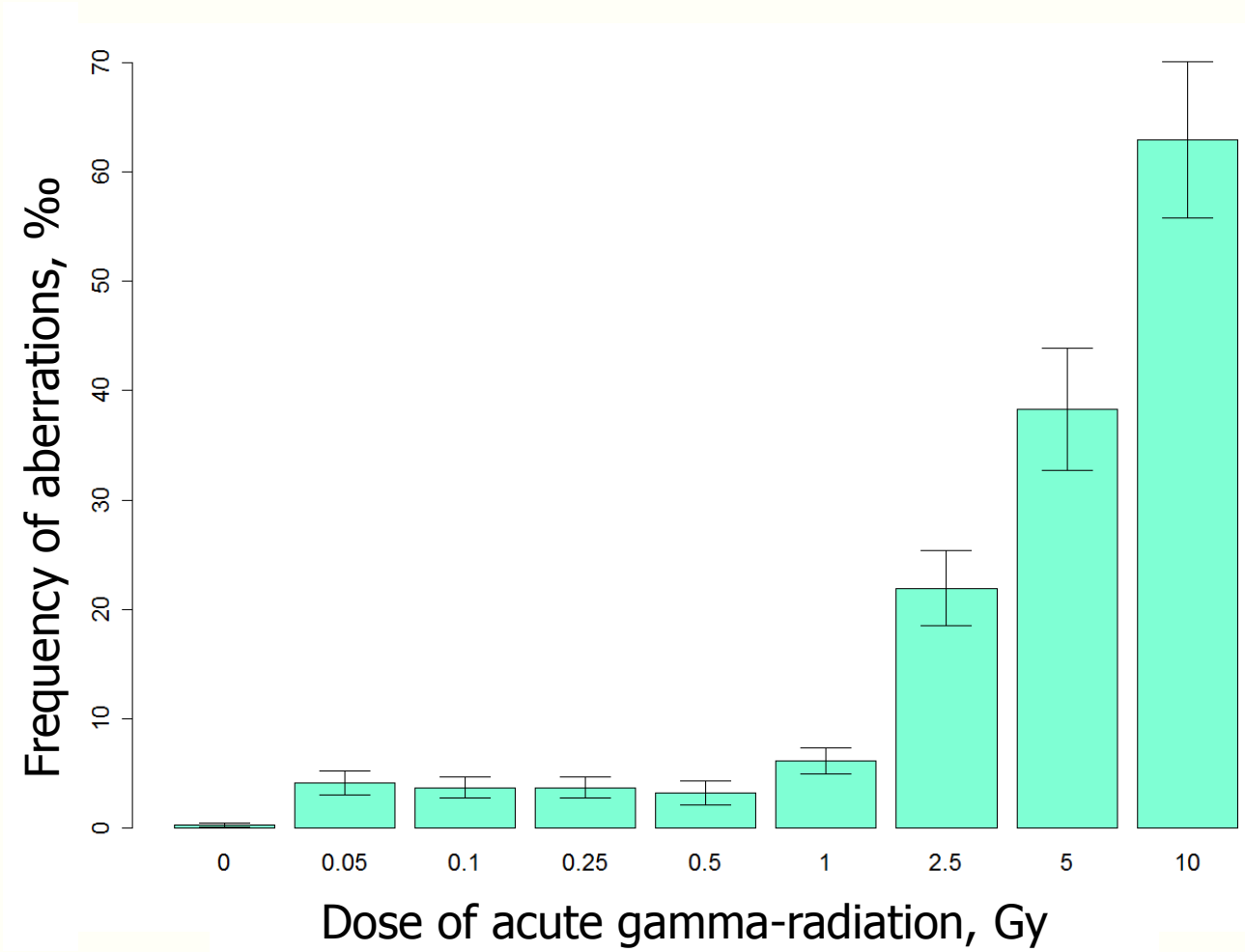


Indirect ecological effects of chronic radiation exposure

1. Adaptation / disadaptation at different levels of biological organization
2. Interaction of radiation with other abiotic factors
3. Changes of biotic relationship in biocenosis

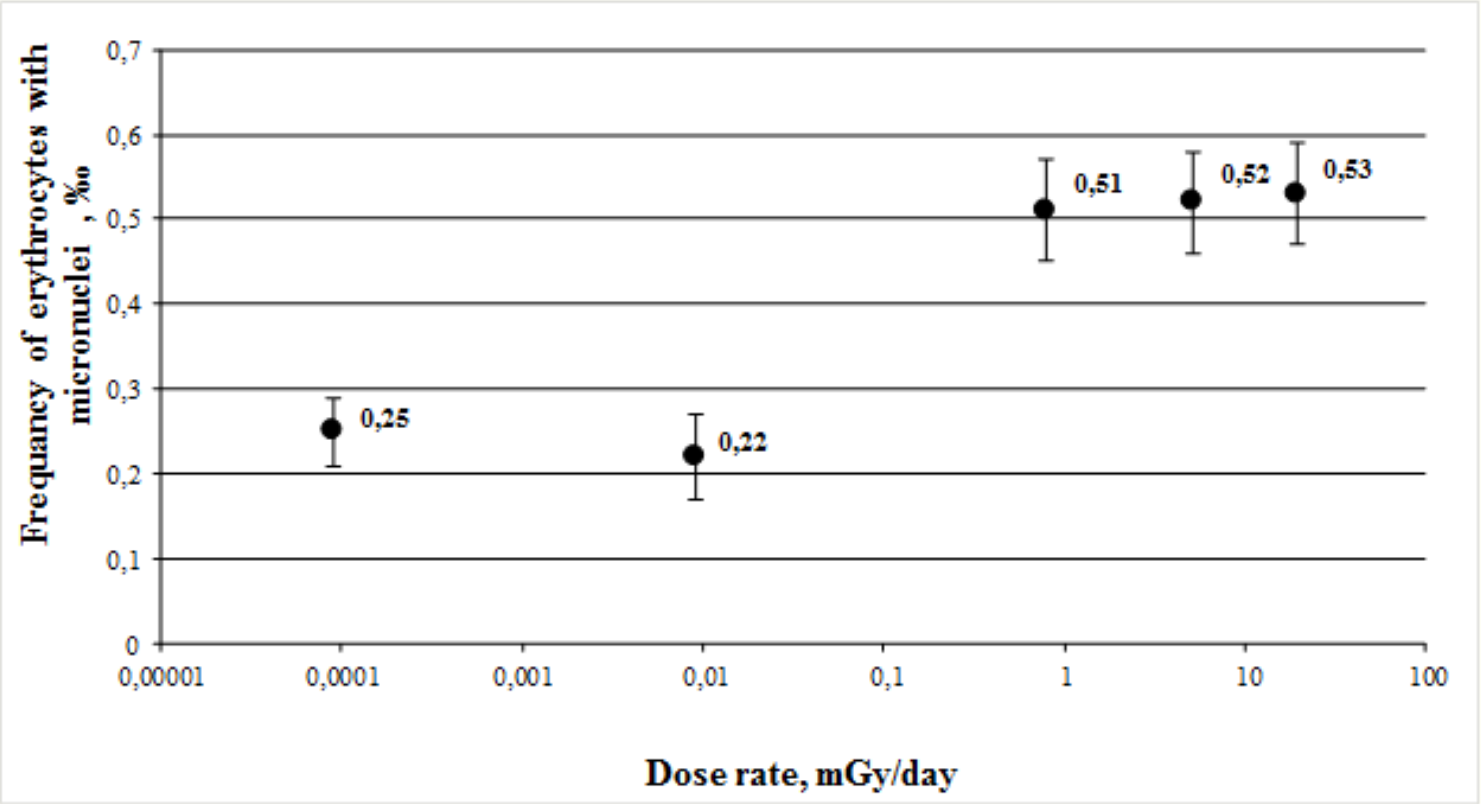
Adaptation / disadaptation at different levels of biological organization

1. Subcellular level: changes of chromosome aberrations frequency in the meristem cells of onion root after acute gamma-radiation



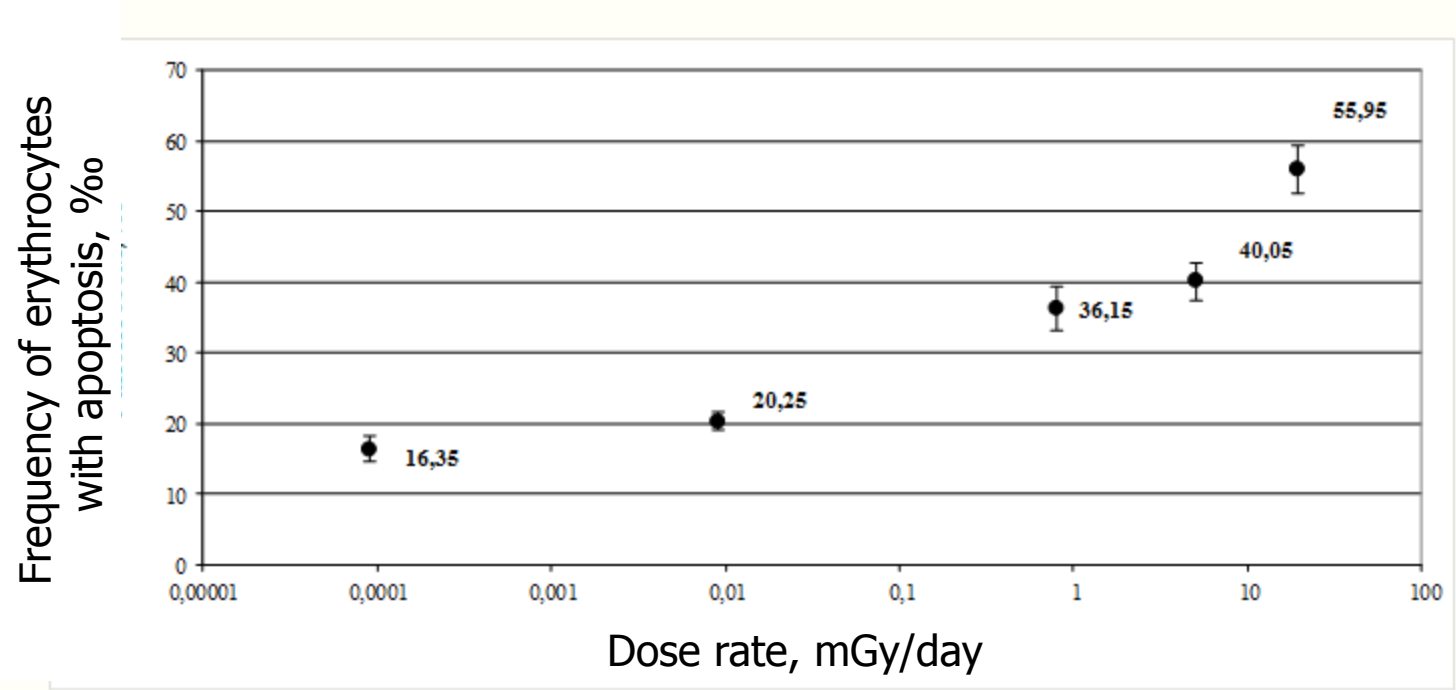
Adaptation / disadaptation at different levels of biological organization

1. Subcellular level: changes in frequency of peripheral blood erythrocytes with chromosome aberration s in fish from radioactively contaminated reservoirs



Adaptation / disadaptation at different levels of biological organization

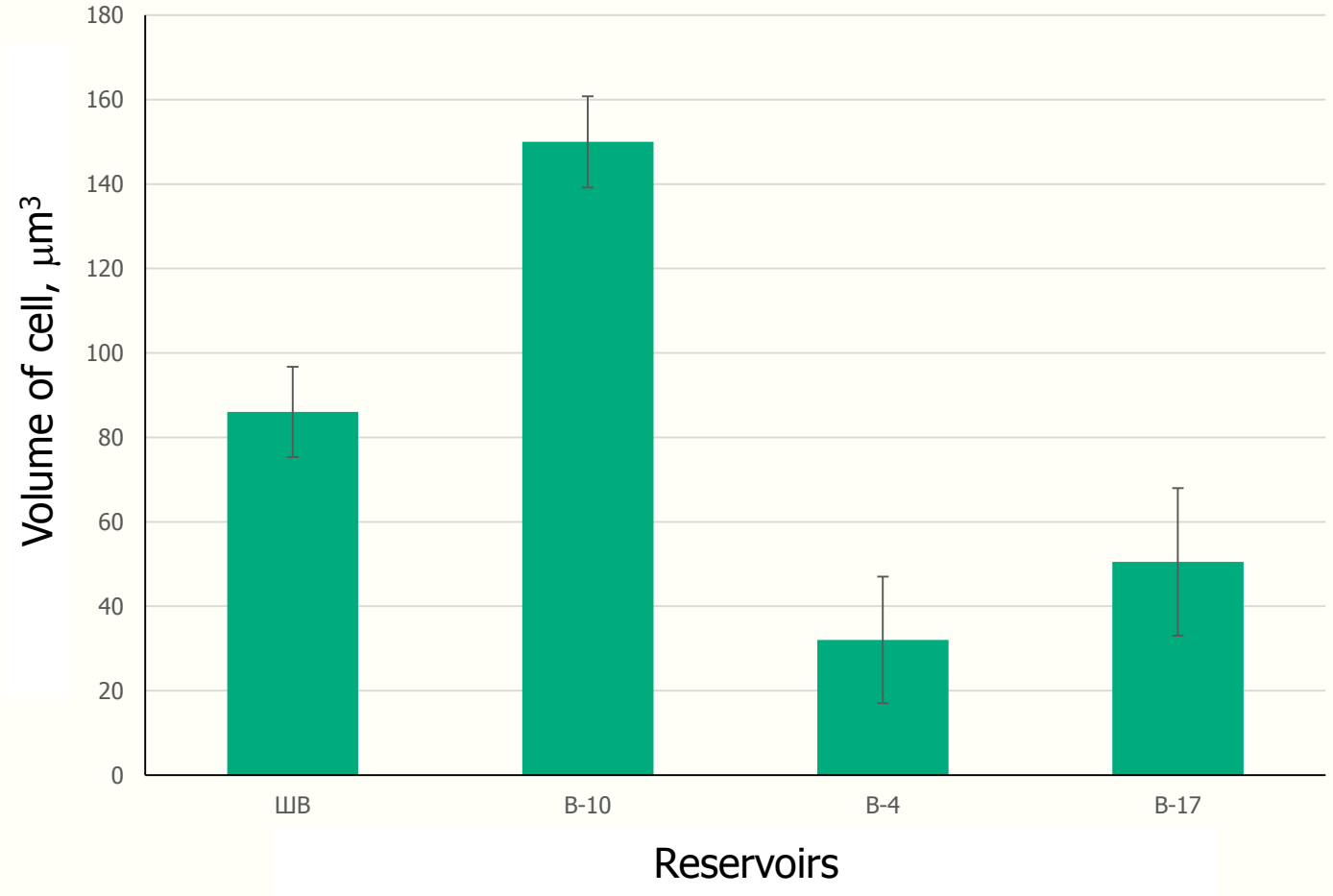
2. Cellular level: changes of frequency of apoptosis in peripheral blood erythrocytes of fish from radioactively contaminated reservoirs



3. Organism systems level: increase in the portion of erythropoietic dividing cells in fish from radioactively contaminated reservoirs

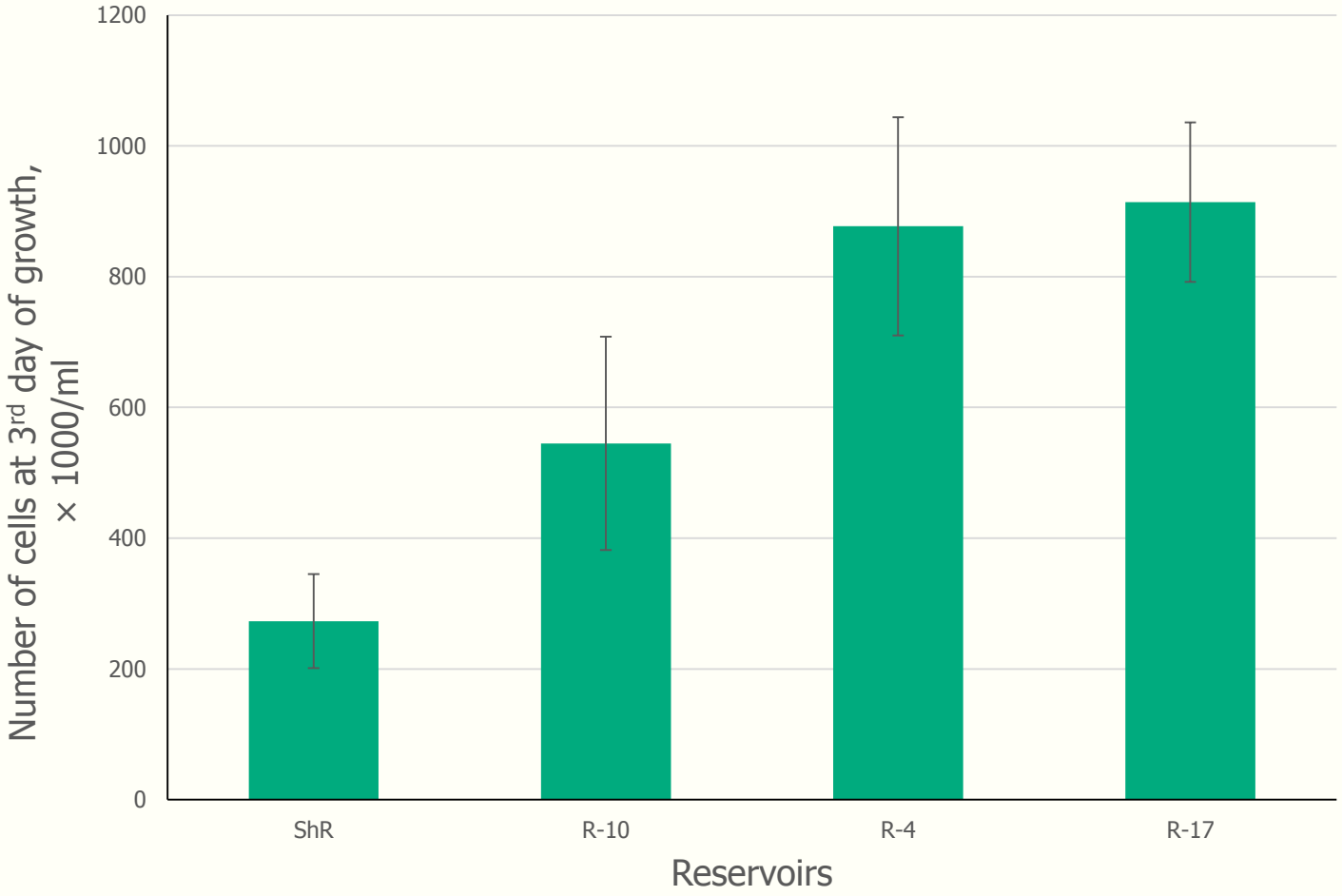
Adaptation / disadaptation at different levels of biological organization

4. Population level: change in cells volume of green algae culture (*Scenedesmus quadricauda*) isolated from radioactively contaminated reservoirs



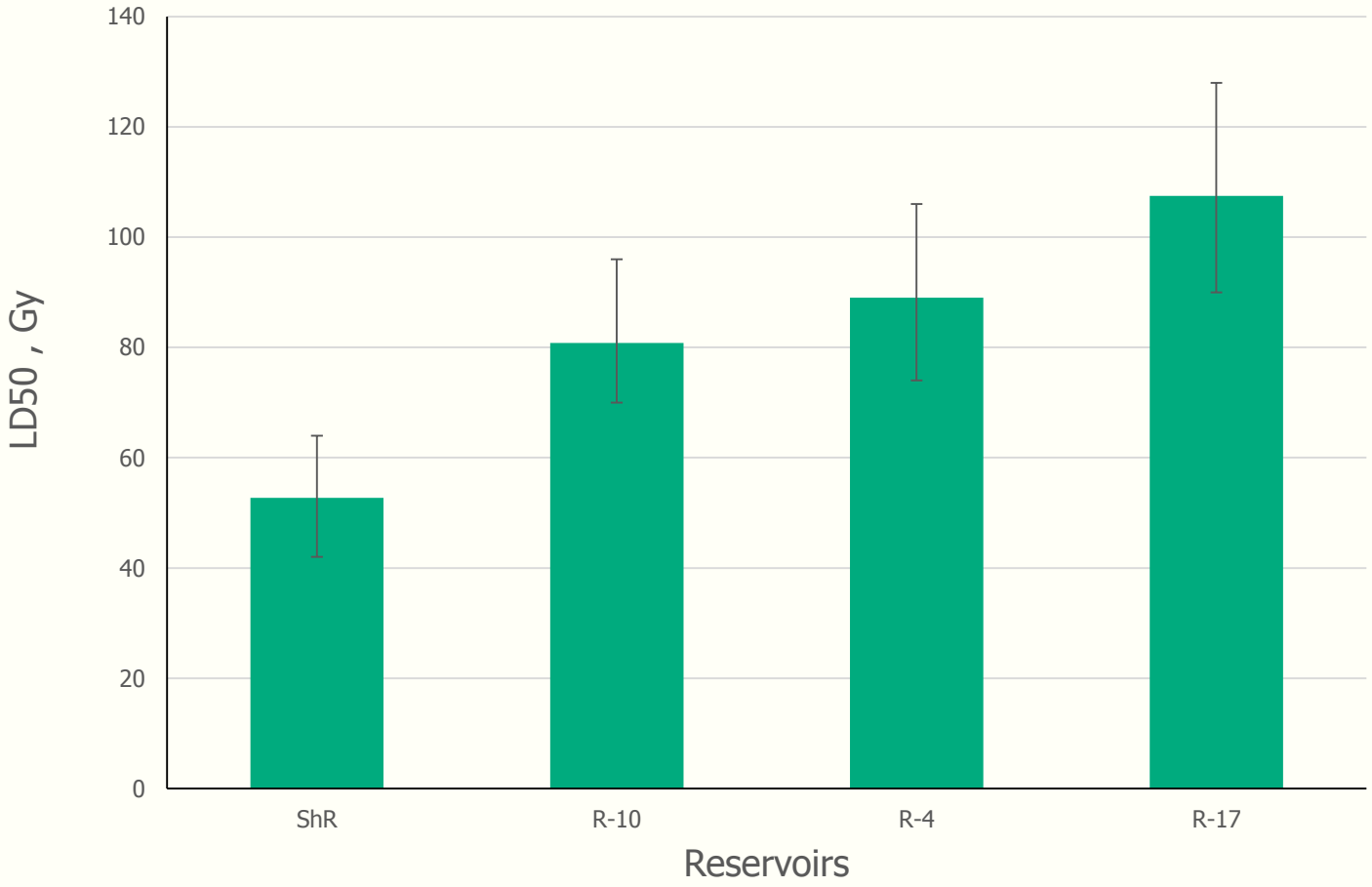
Adaptation / disadaptation at different levels of biological organization

4. Population level: shortening of cell cycle duration (increase in growth rate) of green algae culture (*Scenedesmus quadricauda*) isolated from radioactively contaminated reservoirs



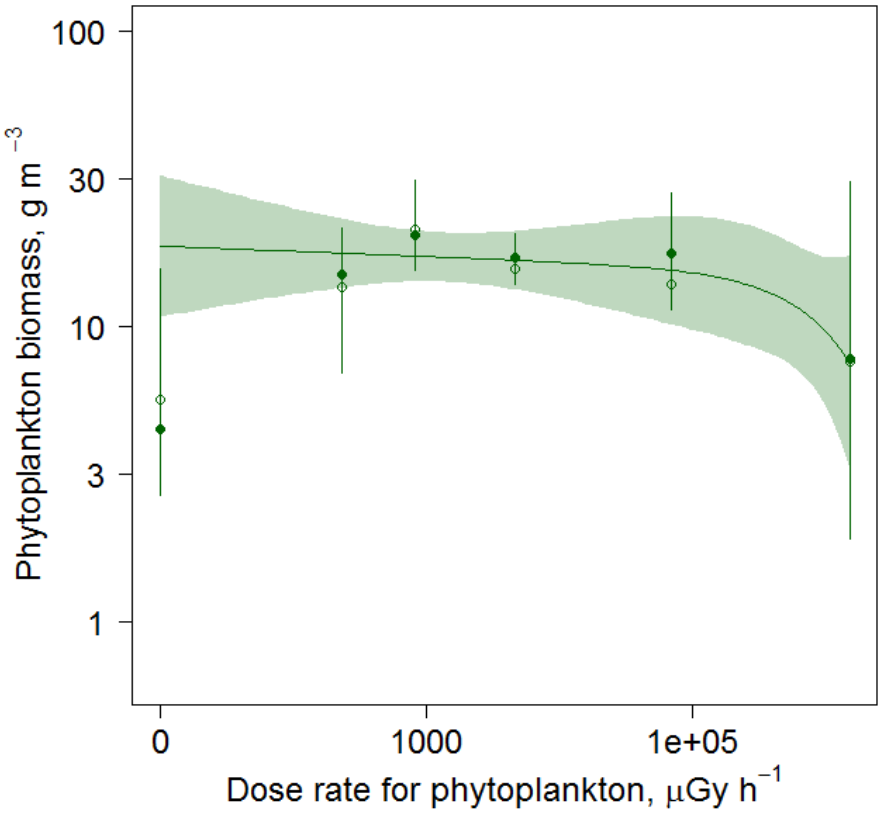
Adaptation / disadaptation at different levels of biological organization

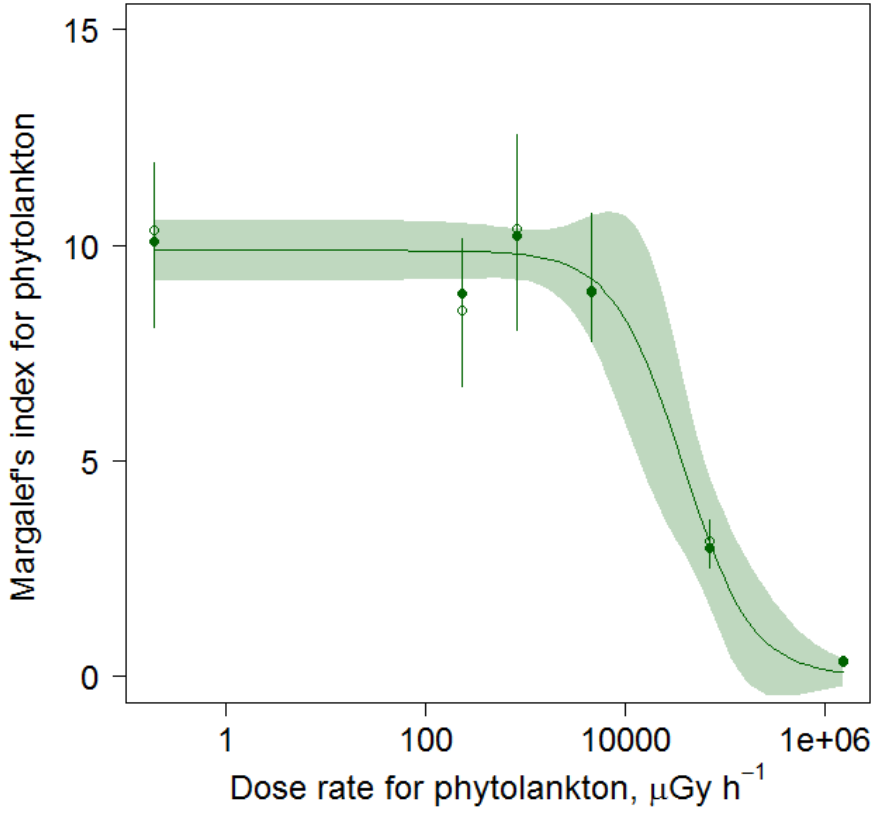
4. Population level: increase of radioresistance of green algae cultures (*Scenedesmus quadricauda*) isolated from radioactively contaminated reservoirs.



Adaptation / disadaptation at different levels of biological organization

5. Level of communities: preservation of phytoplankton biomass while reducing species diversity

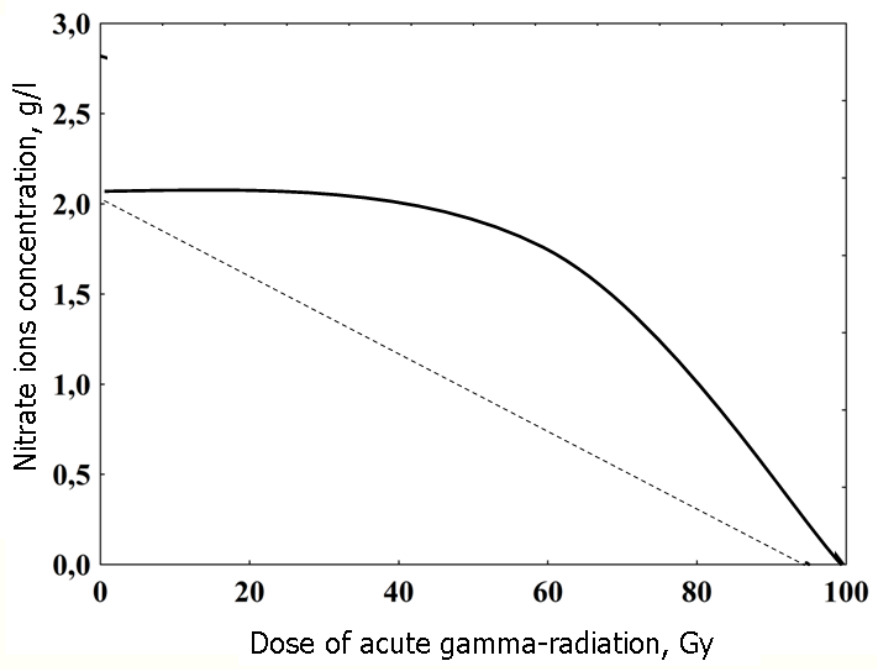




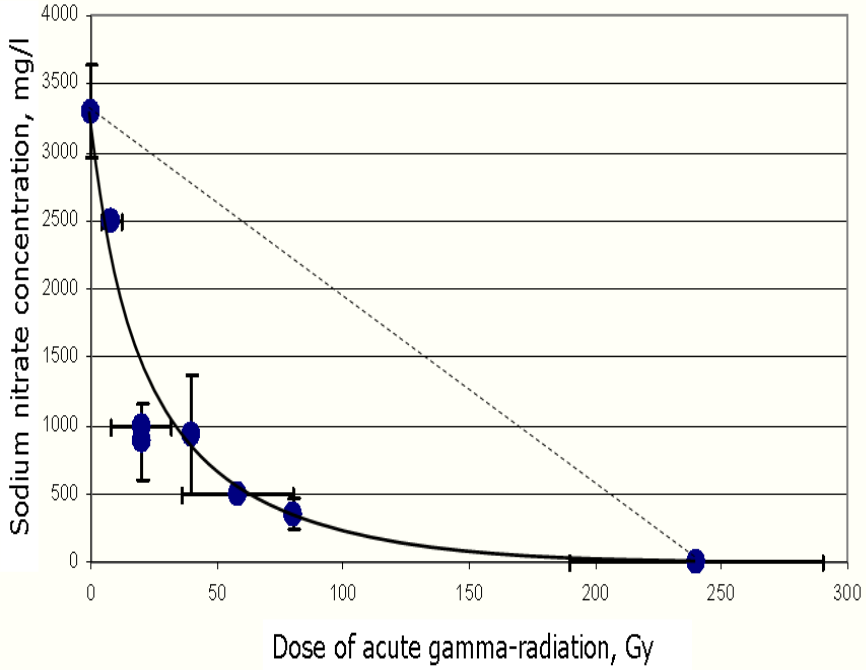
Interaction of radiation with abiotic factors

1. Three variants of the interaction of factors: additive effect; antagonism; synergism.

Isobologram (ED_{50}) of the combined effect of the nitrates and acute gamma exposure on the growth of the algae Scenedesmus quadricauda

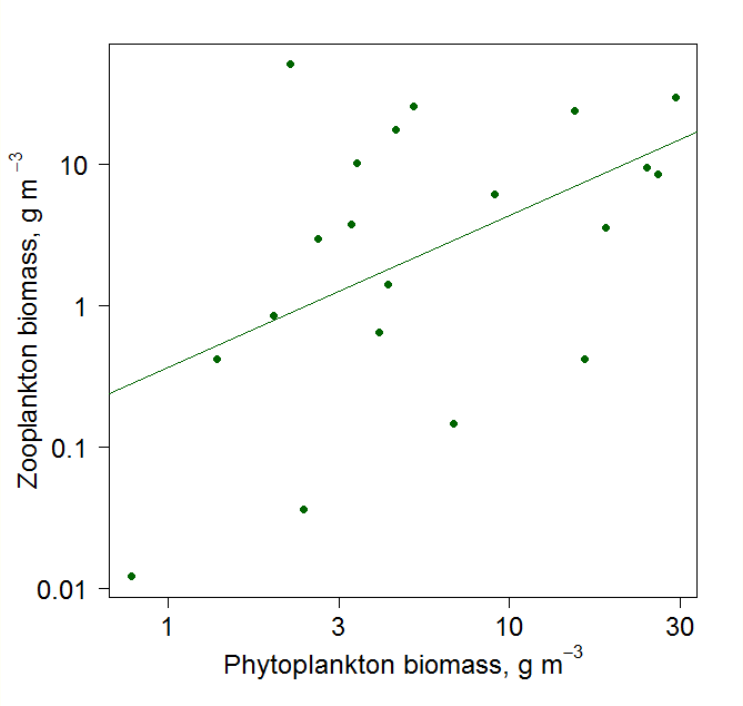


Isobologram (LD_{50}) of the combined effect of the sodium nitrate and acute gamma exposure on a 30-day survival of the oligochaetes (T. tubifex)

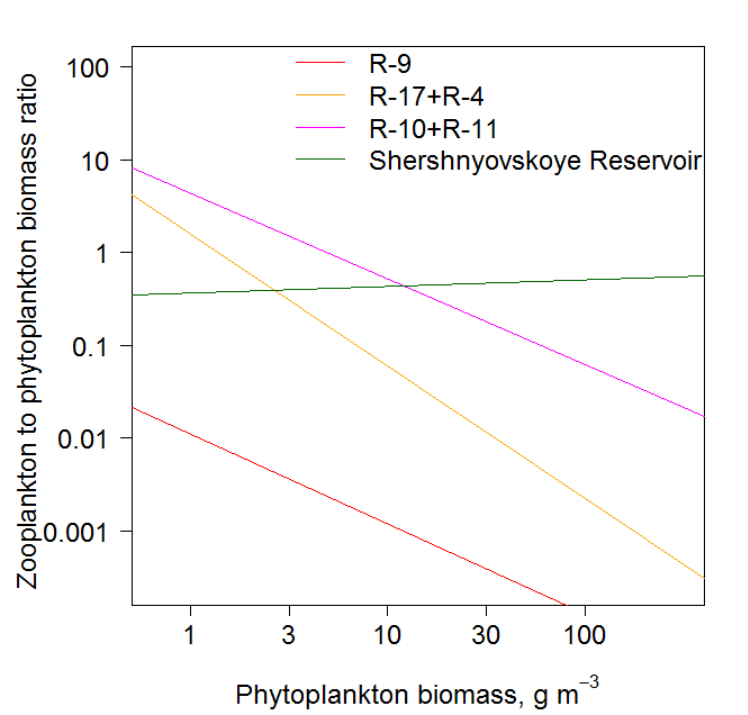


Changes of biotic relationship in biocenosis

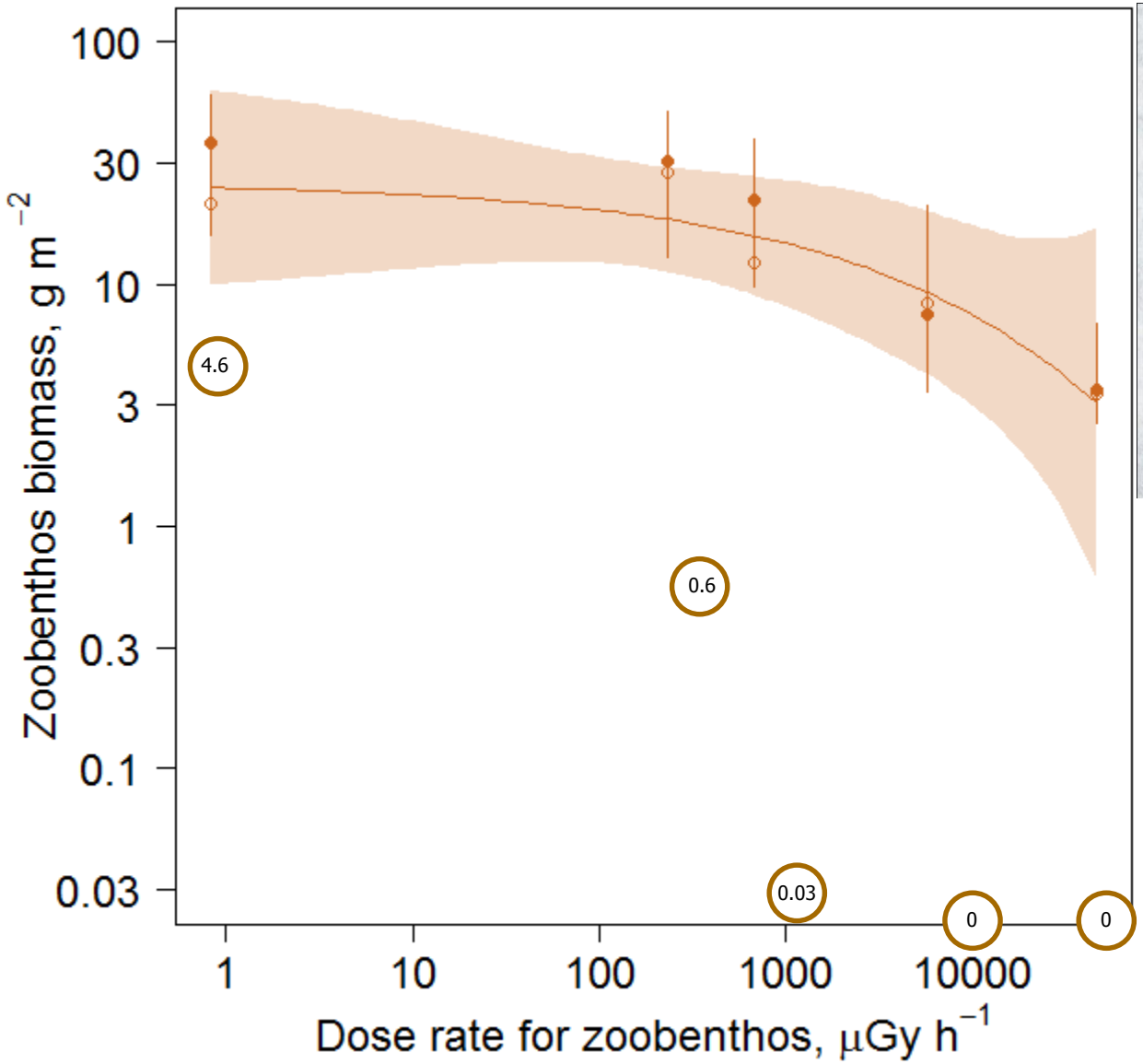
Dependency of zooplankton biomass on phytoplankton biomass in comparison reservoir



Biotic (trophic) interactions of primary producers and primary consumers (phytoplankton-zooplankton) in the studied reservoirs



Dependency of zoobenthos biomass on dose rate



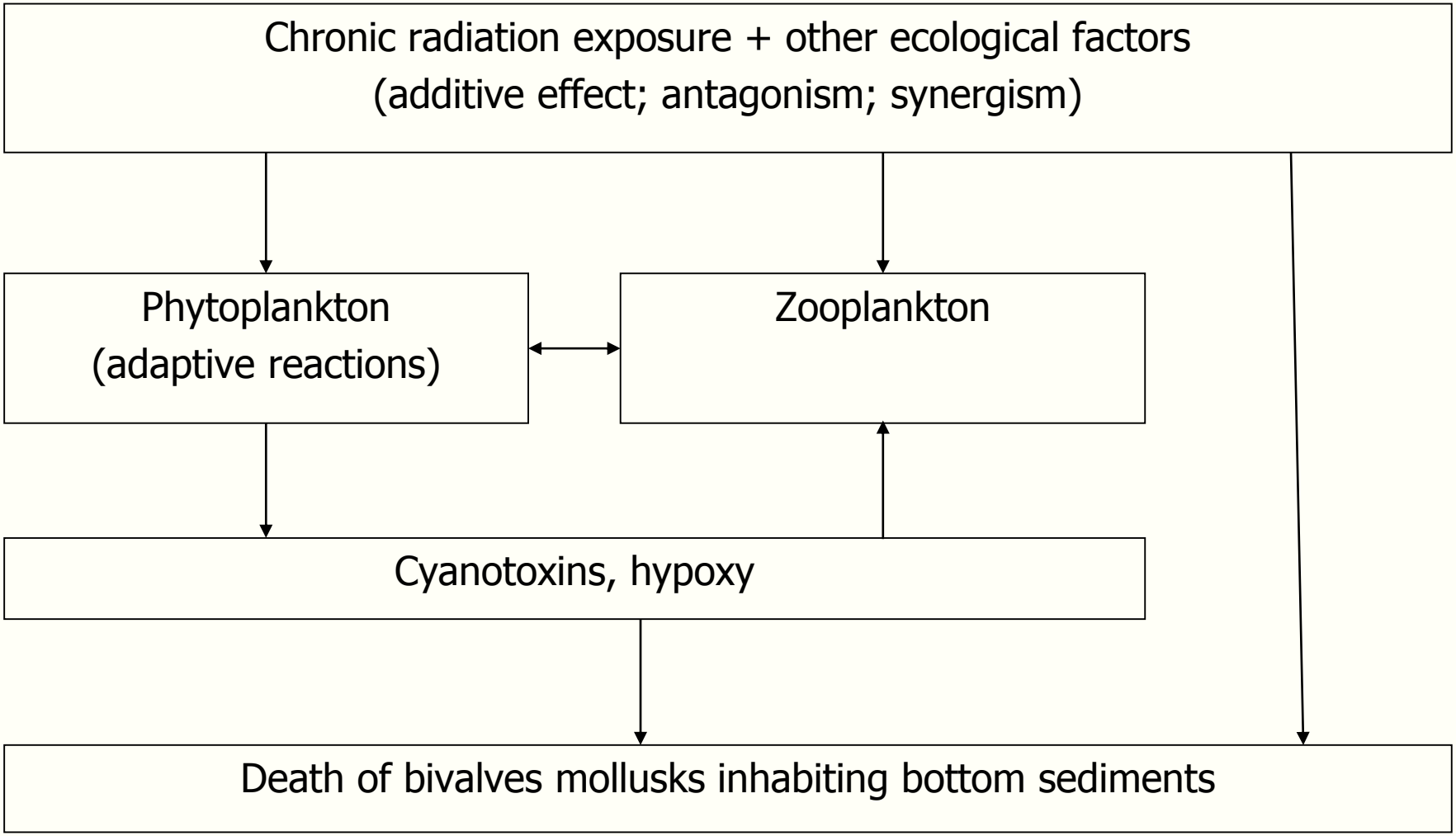
- Mean; ● - Median

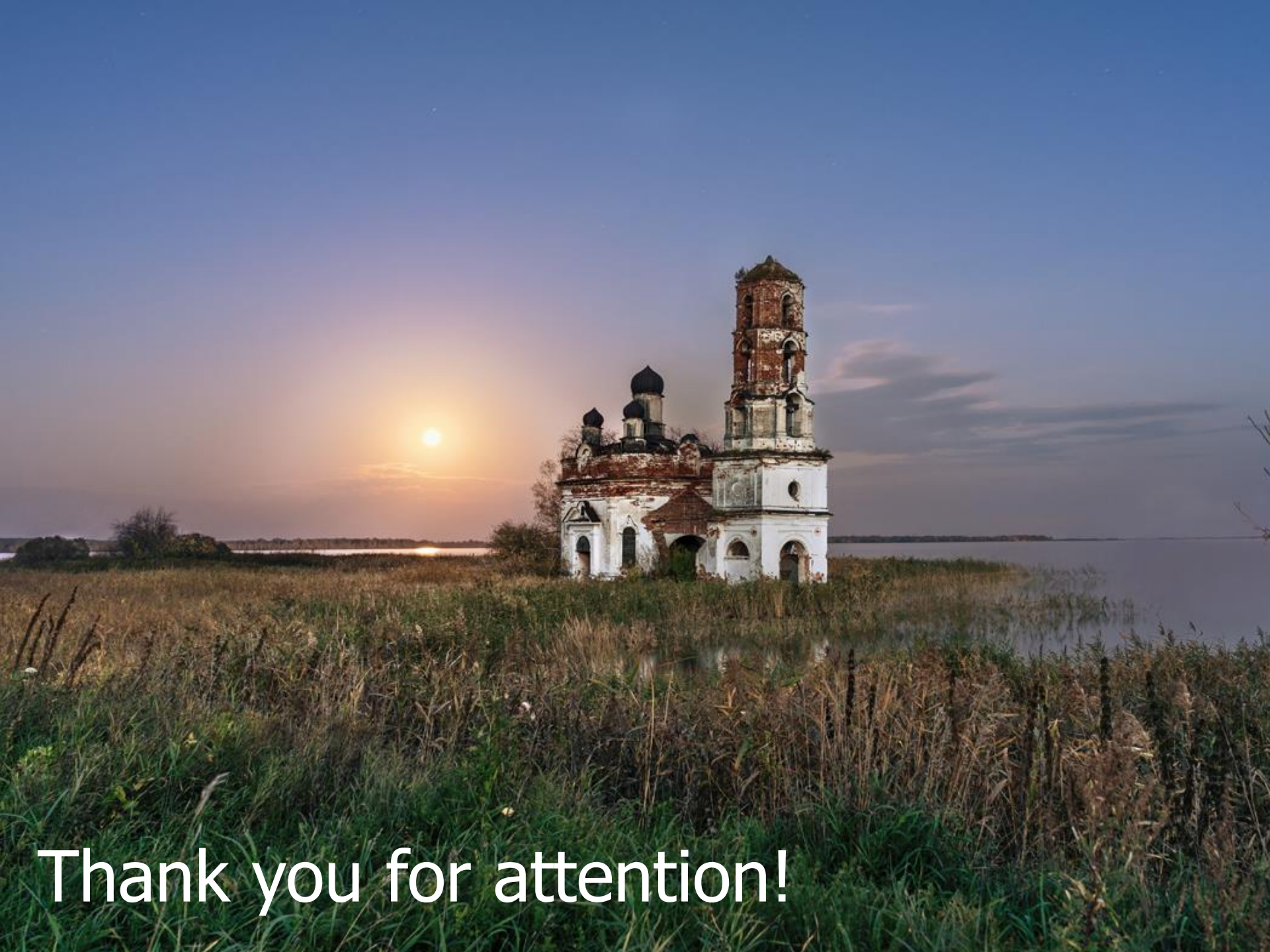
- 0.25 – 0.75 quantiles

- Regression line

- Bivalves biomass

Realization of indirect effects of chronic radiation exposure




Thank you for attention!