

BACTERIOLOGICAL INDICATORS OF POLLUTION AND SANITARY STATES OF  
DŁUGIE WIGIERSKIE LAKE WATER IN THE PRESENCE OF CORMORANTS  
(*PHALOCROCORAX CARBO*)

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### Summary

The paper comprises the results of a three-year study on the counts of the bacteria which indicate the degree of contamination (total viable count of bacteria on broth-agar at 22 and 37°C) and sanitary state (total coliforms TC, faecal coliforms FC, faecal streptococci (enterococci) FS and anaerobic sulphite-reducing bacterial spores – *Clostridium perfringens*) in the waters of Długie Wigierskie Lake, inhabited by the black cormorant. The analyses were carried out in 1998–2001, on 530 water samples collected at 14 sites selected in certain characteristic parts of the lake, taking into account the places where black cormorants dwelled. The results of the analyses were subjected to statistical elaboration by determining the coefficients of the correlation between the counts of each group of bacteria examined and some physico-chemical parameters of the lake's water. Most of the water samples (60%) taken from Długie Wigierskie Lake could be classified as water purity class one, i.e. very good quality, about 20–30% of the water samples as water purity class two (good quality). Only a small percentage of the water samples revealed a slight degree of contamination and those samples were considered to belong to water purity class three, i.e. waters of acceptable purity. More contaminated water samples were typically obtained near the inflow and outflow of the Dłużanka River, and around Ostrówek Island, as well as along the lake shores close to colonies of the black cormorant. Samples of the water which was microbiologically more contaminated were more often collected in the spring and summer, when the activity of waterfowl and other animals in and around the lake was more intensive. This was indicated by a low FC : FS ratio for most of the samples collected in those two seasons of the year. The low ratio of FC : FS in most water samples suggests that the lake water was polluted mainly by the waterfowl. The bacterial counts were most often positively correlated with the values

of the chemical indicators which typically show contamination of surface waters:  $\text{N-NH}_4$ ,  $\text{N-NO}_2$  and  $\text{P}_{\text{total}}$ .