

Mercury (Hg), lead (Pb), cadmium (Cd), selenium (Se), and arsenic (As) in liver, kidney, and feathers of gulls: A Review

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Mercury (Hg), lead (Pb), cadmium (Cd), selenium (Se), and arsenic (As) are metals or metalloids of high concern because of their effects on the environment and, specially, their potential toxicity on the animals inhabiting there. Due to their relevance, these elements have been object of several biomonitoring studies in different animal species around the world. Birds are widespread and, as species, are able to supply specific and relevant information about the regions where they live, being useful as bioindicators, as long as they are not birds with a strong migratory character. The main goal of this review is to summarize data collected from different studies using seabirds, paying special attention to gulls, in order to be helpful for coming studies and regulatory affairs. Several tissues have been used to evaluate Hg, Cd, Pb, Se, and As concentrations in seabirds, being focused the present review in those analyzing the liver, kidneys, and feathers. The most frequently analyzed tissue for Hg was the liver, followed by feathers, and finally kidney. For Cd levels, most of the studies were carried out in the liver, followed by feathers and kidneys. Pb, Se, and As levels were determined to a lesser extent. Feathers should be taken carefully as indicator of accumulation of pollutants, since procedure during analysis may lead to controversial results. Some authors reported that interspecific differences in the exposure of elements are determined by multiple factors, including properties of the contaminant, species, feeding habits, migratory status, sex, and age. The present review provides a comprehensive overview of the analyzed elements? occurrence in different species of seabirds, including gulls. Therefore, it can be a useful database providing for Hg, Pb, Cd, Se, and As levels in different tissues of seabirds. © Springer Nature Switzerland AG 2018.

Age

As

Bioaccumulation

Bioindicator

Biomagnification

Biomonitoring

Cd

Feathers

Food chain

Gender

Gull

Habitat

Hg

Kidney

Larus spp

Liver

Marine pollution

Metal

Metalloid

Pb

Reproductive

Se

Seabirds

Wild bird

arsenic

cadmium

heavy metal

lead

mercury

selenium

animal

bird

Charadriiformes

chemistry

environmental monitoring

feather

liver

metabolism

pollutant

Animals

Arsenic

Birds

Cadmium

Charadriiformes

Environmental Monitoring

Environmental Pollutants

Feathers

Lead

Liver

Mercury

Metals, Heavy

Selenium