

## Accumulation of Mercury (*larus cachinnans*) in Bandar Mahshar and Shadegan

Eshagh Hashemi<sup>1\*</sup>, Alireza Safahieh<sup>2</sup>, Mohamad Ali Salari Ali Abadi<sup>3</sup>, Kamal Ghanemi<sup>4</sup>

1. M.Sc. Student, Department of Marine Biology, Khorramshahr University of Marine Science and Technology, Khorramshahr, Iran
2. Assistance Professor, Department of Marine Biology, Khorramshahr University of Marine Sciences and Technology, Khorramshahr, Iran (a.safahieh@kmsu.ac.ir)
3. Assistance Professor, Department of Marine Biology, Khorramshahr University of Marine Sciences and Technology, Khorramshahr, Iran (Salari1346@yahoo.com)
4. Assistance Professor, Department of Marine Chemistry, Khorramshahr University of Marine Sciences and Technology, Khorramshahr, Iran (kamalghanemi@yahoo.com)

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### Extended Abstract

#### Introduction

Despite the limited anthropogenic activity in Arctic regions, the levels of heavy metals are of concern and the Arctic is considered as an important global sink for mercury depletion. Mercury is not readily available to the food Web in its natural form. However, inorganic mercury is converted into organic mercury compounds by microbial processes of anaerobic organisms. MeHg is more lipophilic, highly bio-accumulative and the most toxic form of mercury. The establishment of industrial activities in the coastal zone resulted in production and release of various types of contaminants into the marine environment in the neighboring areas of Khormusa to Bandar Mahshar. The petrochemical complex here could be potentially harmful for marine ecosystem in terms of Hg pollution. Birds are often the most numerous representatives of vertebrates in polar and subpolar regions as ideal bio-indicators of pollution. Marine birds are exposed to a wide range of trophic levels, and those at the top of the food chain are susceptible to bioaccumulation of pollutants. Mercury in the marine environment is examined in the study to understand the extent of Hg contamination in the marine environment and its health. Seabirds are useful as bio-indicators of coastal and marine pollution. Marine birds, defined as the birds that spend a significant proportion of their life in coastal or marine environments, are exposed to a wide range of chemicals and as they mostly occupy higher trophic levels, this makes them susceptible to bioaccumulation of the pollutants. Since different families have variant life history strategies and cycles, behavior and physiology, diet, and habitat uses, their vulnerability is also different. Further, the relative proportion of time marine birds spend near shore, compared to pelagic environments, influences their exposure to the pollution. Bio-monitoring studies are necessary due to long living, staying at the top of food chain, availability and large number of yellow-legged (*larus cachinnans*) in Mahshahr area. Gull yellow leg seabirds around the world are found in Europe, Africa, Asia and the Pacific. Methyl mercury due to its great affinity for fat and protein in the food chain is transmitted rapidly and accumulated in organisms. In the areas fish and other marine species of food group constitutes a major source of organic mercury bioaccumulation of mercury in human tissues. This study was carried out to investigate the level of mercury accumulation in yellow gull and the amount of mercury which is transferred to the upper trophic level in Mahshahr area. Since the birds are fed from the high levels of the food chain, they are often recognized ecology.

#### Material and Methods

Gull yellow (*larus cachinnans*) were collected from the Khormusa and Bandar Mahshar. The collection gull yellow (n=18) was used as samples. The samples were brought to the laboratory right away, birds were dissected immediately. Liver, Breast feather, kidney, muscle, heart, bone and skin were removed from the bodies of the specimens. The feathers were washed in deionized water alternatively to remove loosely adherent external contamination. All samples were wrapped in aluminum foil and stored at minimum -20°C. The seabirds were weighed and size measured. They were, then, dried in a 50 °C oven. The biological samples were digested by a mixture of nitric acid and potassium permanganate in a closed aqueous system in a hot plate. After pressure digestion, the biological sample was supplied with stannous chloride and hydrochloric acid to reduce the Hg in a

\* Corresponding Author: +98 9178393001

E-mail: eshagh.hashemi@gmail.com

sample to atomic Hg. Mercury was measured by Atomic Absorption cold vapor (AAS). The statistical analysis was carried out using SPSS application, version 16. The data normality was tested using a Kolmogorov-Smirnov test. Mercury concentration in samples was tested for mean differences among species using One-Way Analysis of Variance (ANOVA). When significant differences were observed among the species and tissues, Tukey-Kramer test was applied to determine which means were significantly different. Values are given as mean  $\pm$  standard errors and we considered a  $P < 0.05$  to be statistically significant.

### Results and Discussions

In both sexes, the maximum Hg concentration was measured in feather ( $9.70 \pm 1.16$   $\mu\text{g/g}$  in female and  $8.27 \pm 0.32$   $\mu\text{g/g}$  in male). The minimum Hg concentrations were observed in heart muscle ( $0.42 \pm 0.03$  in female and  $0.43 \pm 0.01$   $\mu\text{g/g}$  in male). A significant and positive correlation found between Hg concentration in feather and liver and total weight of the birds ( $P < 0.05$ ).

The maximum Hg concentration was found in the feathers either in male and females; while the minimum Hg concentration was found in heart muscle. A significant difference was found between males and females in terms of Hg concentration in feather and liver (Fig. 1). Many studies have pointed out that Hg is usually accumulated in the bird feathers. It is suggested that feather and liver could serve as suitable bio-monitor agent for Hg a yellow leg gull. There was no significant difference between Hg concentrations in the birds belonging to different stations. This was true for both male and female birds (Fig. 2). Although the stations of study are far from each other, it is suggested that birds from both stations have a same feeding ground.

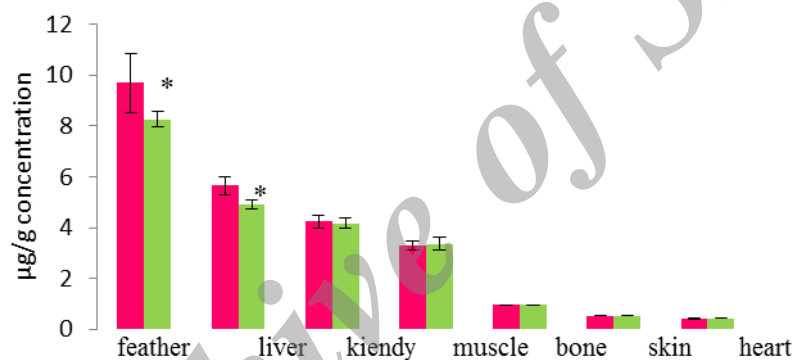


Fig. 1. Concentration of Hg in yellow gulls (male and female) in Mahsahr

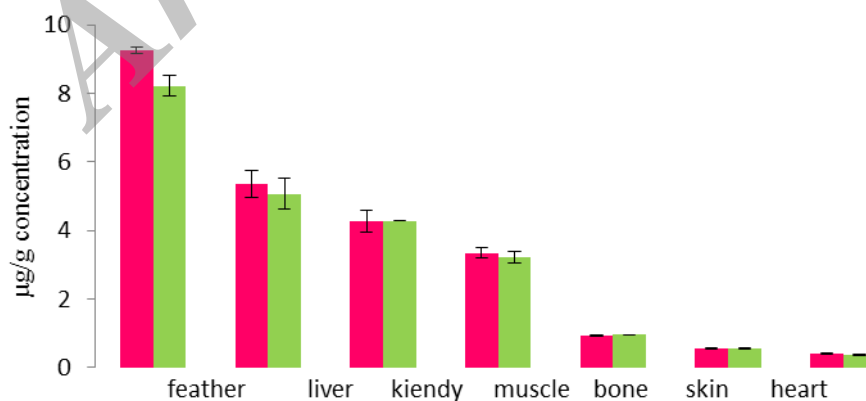


Fig. 2. concentration Hg in yellow gulls (male and female) in Aboukhozayer

Many seabirds can fly in long distances. Therefore, it is possible that Mahshar and Shadegan gulls are gathered in the same feeding ground. Comparison between Hg concentrations in different tissues of yellow

legged gull in this study with some other birds from other parts of the world demonstrated that yellow legged in this study accumulated high concentration of Hg in their tissues. This finding can alarm that management action are required to control pollution in the Mahshar area.

Significant correlation was observed between Hg concentration in different tissues and total body weight of the birds. The correlation coefficient was higher in the case of feather (Fig. 3).

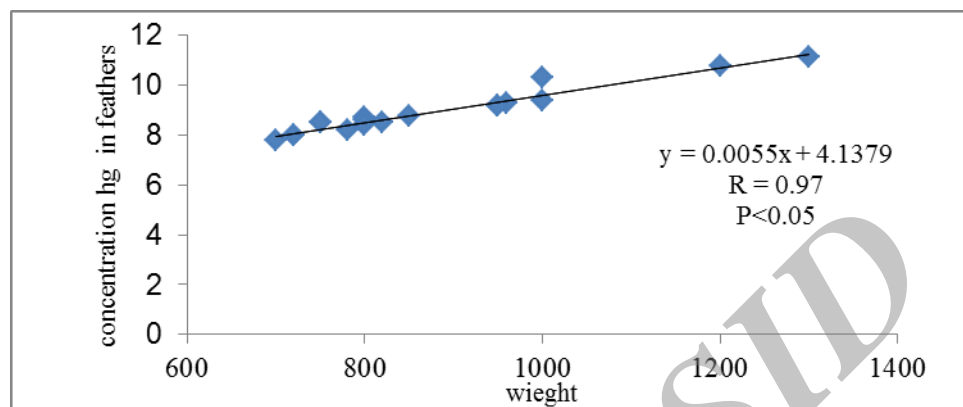


Fig. 3. Corralation between feathers and weight yellow gulls

### Conclusions

Generally, it can be concluded that most of the Hg concentrations are accumulated in feathers and the contain proteins, rich of sulfur amino acid. It is suggested that yellow-legged is appropriate agent for Hg bio-monitoring in Bandar Mahshahr. The study revealed that the feather is the most suitable tissue for Hg monitoring. The comparisons of the results with standard of World Health Organization, found that mercury levels in Yellow-legged is above the mentioned standards.

**Keywords:** bio-monitoring, Meahshar, pollution, Yellow-legged gulls.