

ABSTRACT TITLE

Please limit your Abstract title to approx 10 Words

Fish Health In Claisebrook Cove

ABSTRACT SUMMARY

MAXIMUM 200 words, no paragraphs, no dot points, no numbering

Black bream are an important ecological, recreation and commercial icon of the Swan River estuary running through Perth, Western Australia. Sediments in the estuary adjacent to Claisebrook Cove have been identified as a contamination hotspot, having particularly elevated PAH concentrations. Historical information suggests that these contaminants might be associated with past industrial usage of the area. The health status of fish inhabiting this contaminated environment has been evaluated by physiological indices and biochemical markers. Black bream from Claisebrook Cove had larger livers and male fish had smaller gonads relative to fish from Burswood Lake (a reference site). Claisebrook Cove black bream had higher hepatic detoxification activity indicating increased exposure to organic contaminants, which was confirmed by elevated biliary PAH metabolites. Fish from Claisebrook Cove had higher serum sorbitol dehydrogenase (sSDH) concentrations than those from the reference site, suggesting that liver integrity in the Claisebrook Cove fish was compromised. There was no difference in the amount of oxidative DNA damage occurring in fish from Claisebrook Cove compared to those from Burswood Lake. The suite of biomarkers of fish health has confirmed that the health status of the black bream captured in the contaminated environment that is Claisebrook Cove is compromised.

EXTENDED ABSTRACT (Optional)

MAXIMUM 4 pages. Please start all paragraphs on a new line after a line of space.

Giving an extended abstract gives those evaluating the suitability of your paper a better understanding of your work.

The Swan River, Western Australia, is a typical urban Australian estuary subject to a wide range of contaminants from a variety of sources, both current and historical. Stormwater runoff typically contributes some level of hydrocarbons from transport corridors, herbicides from agriculture, residential and public gardens, and other organic compounds e.g., polycyclic aromatic hydrocarbons (PAHs) adsorbed to fine particulate matter and significant concentrations of metals in runoff. A recent assessment of contaminants in the sediments of the Swan River (Nice 2009) identified Claisebrook Cove as an area with high levels of organochlorine (OC) pesticides, dieldrin and p,p'-DDE, and the metals, zinc, lead and copper. Additionally, out of 20 sites investigated, Claisebrook Cove sediments consistently had the highest concentrations of all polycyclic aromatic hydrocarbons (PAHs), all OC pesticides (except one) and among the highest for the metals targeted by the contaminant assessment. Recommendations were made for a comprehensive investigation at Claisebrook Cove, including sediment toxicity tests, in-situ bioaccumulation studies, assessment of sediment chemistry and assessment of fish health in the Cove. This report presents the results of the assessment of the health of fish collected from Claisebrook Cove in 2009.

Black bream are an iconic Swan River species and an important recreational fish. The Swan River is a classic urban estuary and organisms inhabiting the river system are likely to be exposed to a range of contaminants typical of this type of waterway. Biomarkers of fish health have been measured in adult black bream collected in Claisebrook Cove, and compared to the same parameters measured in black bream from a reference site, Burswood Lake. The reference site is located on the opposite side of the river, and is not under the influence of historical or current contaminant inputs. The biomarkers measured include: the activity of liver detoxification as measured by ethoxyresorufin-O-deethylase (EROD) activity; metabolism of polycyclic aromatic hydrocarbons (PAHs) via the quantification of biliary PAH metabolites; liver integrity and function via the measurement of serum sorbitol dehydrogenase (SDH); the oxidative DNA damage as measured by the abundance of 8-oxo-dG in the serum; and physiological indices condition factor (CF), liver somatic index (LSI) and gonadosomatic index (GSI).

This study shows that black bream collected from Claisebrook Cove are exposed to stressors which may impact on their overall health. Historical information suggests that the contaminants in Claisebrook Cove might be associated with past industrial usage of the area. Black bream from Claisebrook Cove had larger livers (which suggests a higher investment in detoxification) and male fish had smaller gonads relative to fish from Burswood Lake. Claisebrook Cove black bream had higher hepatic EROD detoxification levels indicating increased exposure to organic contaminants (e.g., PAHs or dioxins), which was confirmed by elevated biliary PAH metabolites. While fish from Claisebrook Cove had higher serum sorbitol dehydrogenase (SDH) concentrations than those from Burswood Lake (potentially indicating liver cellular damage in these fish), comparison with hatchery reared fish suggests that such sSDH levels were within the expected range of this biomarker in

healthy individuals of this species. There was no difference in the amount of oxidative DNA damage occurring in fish from Claisebrook Cove compared to those from Burswood Lake.

As complementary information to the fish biomarkers, the oxidative DNA damage in the mussel *Xenostrobus* sp. in Claisebrook Cove was measured. This prey has been observed in our laboratory as a major food source of the black bream in the Swan River. Mussels are commonly used as sentinels for marine and estuarine contamination as they accumulate dissolved and suspended sediment bound contaminants. Mussels collected from Claisebrook Cove had much higher levels of DNA damage than those from two other sites on the Swan River. It is possible that this damage is due to exposure to metals, dieldrin and/or the DDT metabolite p,p'-DDE, which were measured in mussel tissue as part of a parallel study. Given the high rate of consumption of these mussels by black bream there are potential implications for the future health of the resident fish populations.

Comparison with the results of previous work on black bream from Claisebrook Cove (unpubl.data) and its immediate vicinity demonstrates that there has been no change in the levels of some key biomarkers measured in the past 3 years. This suggests that the sources of contamination causing the increases in EROD activity and SDH in 2006 remain in the environment.

It is suggested that the suite of analyses performed in this study in assessing the fish health constitute a rigorous method of assessment of localised fish populations in the Swan River and other urban estuaries. It is recommended that the results form the basis of further examination of the health of the Claisebrook Cove black bream via an extended study including repeat sampling of the population over at least 12 months. Since biomarkers can vary seasonally and have seasonal importance (particularly with regard to reproductive cycles) repeat sampling (including mark and recapture) would provide valuable information as to whether the fish are resident in the Cove or transient, whether they are exposed to consistent concentrations of contaminants and whether the bioavailability of contaminants is decreasing or increasing through the seasons.

Nice, H. E., 2009. A baseline study of contaminants in the sediments of the Swan and Canning estuaries. Water Science Technical Series report no. 6, Department of Water, Western Australia.