

## Accepted Manuscript

Effects of Environmental chemicals on Fish Thyroid Function: Implications for Fisheries and Aquaculture in Australia

Dayanthi Nugegoda, Golam Kibria

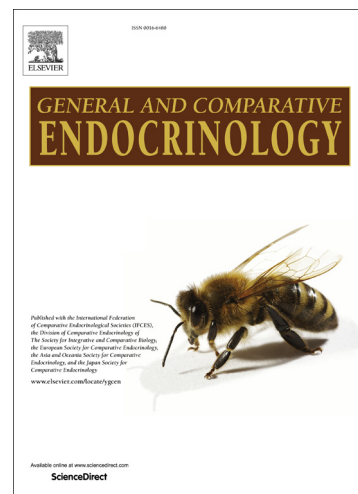
PII: S0016-6480(16)30037-5  
DOI: <http://dx.doi.org/10.1016/j.ygcen.2016.02.021>  
Reference: YGCEN 12319

To appear in: *General and Comparative Endocrinology*

Received Date: 5 May 2015  
Revised Date: 22 February 2016  
Accepted Date: 24 February 2016

Please cite this article as: Nugegoda, D., Kibria, G., Effects of Environmental chemicals on Fish Thyroid Function: Implications for Fisheries and Aquaculture in Australia, *General and Comparative Endocrinology* (2016), doi: <http://dx.doi.org/10.1016/j.ygcen.2016.02.021>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Effects of Environmental chemicals on Fish Thyroid Function: Implications for Fisheries and Aquaculture in Australia.

Dayanthi Nugegoda and Golam Kibria

School of Applied Sciences, RMIT University, Bundoora West Campus, Plenty Road, Melbourne, Australia

Email addresses: [dayanthi.nugegoda@rmit.edu.au](mailto:dayanthi.nugegoda@rmit.edu.au); [kibriagolam0@gmail.com](mailto:kibriagolam0@gmail.com)

#### ABSTRACT

Numerous environmental stressors exert acute or chronic effects on the fish thyroid cascade. Such effects could be mediated via thyroidal alterations, imbalance of plasma T4 and T3 levels or damage to the structure of the thyroidal tissues (thyroid hypertrophy, hyperplasia). The thyroidal system is intricately linked to other endocrine systems in vertebrates including the control of reproduction. Disruption of fish thyroid function by environmental stressors has the potential to result in deleterious effects including the inhibition of sperm production, reduction in egg production, gonad development, ovarian growth, swimming activity, fertilisation and increase in larval mortality. Thyroid hormones play a major role in the development and growth of fish, particularly during their early life stages, thus, thyroid disruption by environmental stressors could inhibit the growth of fish larvae and juveniles in wild fish and cultured species, limit fish seed production and result in a decline in wild fisheries. This review highlights the effects of several environmental toxicants including PBDE, PCBs, PCDD & PCDF, PAH/Oil, phthalates, metals, pesticides, mixed pollutants/chemicals, cyanide; and other stressors including acid (low pH) and ammonia, on fish thyroid function. Environmental sources of chemical stressors and appropriate water quality guidelines to protect the freshwater and marine species for the relevant pollutants are also discussed including (when available) the Australian guidelines (2000) and Canadian water quality guidelines (where Australian guidelines are not available). To date there has been no published research on the effects of anthropogenic environmental pollutants on the thyroid system of any native Australian fish species. However, the detection of high risk chemicals (notably PBDEs, PCBs, PAHs, metals and pesticides) in Australian waterways and Australian fish and shellfish implies that thyroid disruption of Australian wild fish and aquacultured species could occur. It is therefore imperative that the effects of such pollutants on the thyroid system of Australian native fish be investigated.

**Keywords:** Chemical stressors, Fish thyroid, T4, T3, Australian native fish; Fisheries, Aquaculture, PBDE, PCB, PAH, PCDD, Metals, Pesticides, Mixed pollutants

#### Abbreviation

AHR: Aryl hydrocarbon receptor

AMD: Acid mine drainage

ANZECC: Australian and New Zealand Environment and Conservation Council

ARMCANZ: Agriculture and Resource Management Council of Australia and New Zealand

DDT: Dichlorodiphenyltrichloroethane

DEHP: di(2-ethylhexyl) phthalate

EROD: Elevated ethoxyresorufin-O-deethylase

FT4: Free T4

FT3: Free T3

GH: Growth hormone

GSI: Gonadosomatic index

HPT: Hypothalamo-pituitary-thyroid axis

$K_{ow}$ : octanol-water partition coefficient.

Download English Version:

<https://daneshyari.com/en/article/5587808>

Download Persian Version:

<https://daneshyari.com/article/5587808>

[Daneshyari.com](https://daneshyari.com)