Young-of-the-year Baltic flounder otolith chemistry analysis from 2014 to 2017 at Baltic Sea sites in Sweden and Latvia.

Website: https://www.bco-dmo.org/dataset/775428
Data Type: Other Field Results
Version: 1
Version Date: 2019-08-15

Project
» Collaborative Research: Consequences of sub-lethal hypoxia exposure for teleosts tracked with biogeochemical markers: a trans-basin comparison (OtolithHypoxia)

Contributors	Affiliation	Role
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Abstract
Young-of-the-year (YOY) flounder were collected by beach seines in Latvian and Swedish territorial waters of the Baltic Sea.. Fish were stored frozen until they were processed. This dataset is comprised of transect data for young-of-the-year Baltic Sea flounder, Platichthys flesus and P. solemdali. The corresponding collection data (date of capture, Fish-ID, length, etc.) is found in the Flounder YOY collections (https://www.bco-dmo.org/dataset/775412).

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Coverage

Temporal Extent: 2016-02-04 - 2017-06-02

Dataset Description

Young-of-the-year (YOY) flounder were collected by beach seines in Latvian and Swedish territorial waters of the Baltic Sea.. Fish were stored frozen until they were processed. This dataset is comprised of transect data for young-of-the-year Baltic Sea flounder, Platichthys flesus and P. solemdali. The corresponding collection data (date of capture, Fish-ID, length, etc.) is found in the Flounder YOY collections (https://www.bco-dmo.org/dataset/775412).

Each row is a replicate analysis of the analytes. Each analyte is in its own column. The transects run from the otolith core (denoted as zero) to the outer edge. For example, the transect for the first fish, Otolith_ID = KolkaEarly4-25, has 49 sequential data points collected at distances from the core noted in the Distance column.

Methods & Sampling

Young-of-the-year (YOY) flounder were collected by beach seines at Baltic Sea sites in Sweden and Latvia. Fish were stored frozen until they were processed. Processing consisted of measuring total lengths and extracting their sagittal otoliths. The otoliths were cleaned, dried, mounted on glass slides, and then polished to expose the core. Chemical analyses were conducted by laser ablation-inductively coupled plasma mass spectrometry (LA-ICPMS) at the SUNY College of Environmental Science and Forestry. A USGS carbonate standard (MACS-3) was used to calibrate and correct for instrument drift. Spot size was 35 microns, and transects were run from core to outer edge at 5 microns/second.

Data Processing Description

BCO-DMO Processing Notes:
- reformatted dates into yyyy-mm-dd format
- removed empty rows
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions

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Parameters

Parameter	Description	Units
otolith_id	This ID links to the collection data for an individual fish	unitless
country	This is the country in whose territorial waters the fish were collected.	unitless
date_of_analysis	The date of the otolith chemistry analysis	unitless
time	Time of each analysis	unitless
distance_from_core	The distance in microns of the analysis away from the otolith core. Core is indicated by Distance = 0.	micrometers (um)
ca_43	Calcium	parts per million(ppm)
mn_55	Manganese	perts per million (ppm)
i_127	Iodine	parts per million (ppm)
ba_138	Barium	parts per million (ppm)
sr_88	Strontium	parts per million (ppm)
mg_24	Magnesium	parts per million (ppm)
mg_26	Magnesium-26 isotope. Likely unusable due to polyatomic interferences	parts per million (ppm)
pb_208	Lead	parts per million (ppm)
zn_64	Zinc	parts per million (ppm)
cu_63	Copper-63	parts per million (ppm)
cu_65	Copper-65	parts per million (ppm)

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Instruments

Dataset-specific Instrument Name	PerkinElmer DRC-e quadrupole ICP mass spectrometer
Generic Instrument Name	Mass Spectrometer
Dataset-specific Description	New Wave (ESI) 193-nm Solid State Laser Ablation Unit coupled to a PerkinElmer DRC-e quadrupole ICP mass spectrometer.
Generic Instrument Description	General term for instruments used to measure the mass-to-charge ratio of ions; generally used to find the composition of a sample by generating a mass spectrum representing the masses of sample components.

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Project Information

Collaborative Research: Consequences of sub-lethal hypoxia exposure for teleosts tracked with biogeochemical markers: a trans-basin comparison (OtolithHypoxia)

Coverage: Northern Gulf of Mexico, Baltic Sea, and Lake Erie

Description from NSF award abstract:
Hypoxia occurs when dissolved oxygen concentrations in aquatic habitats drop below levels required by living organisms. The increased frequency, duration and intensity of hypoxia events worldwide have led to impaired health and functioning of marine and freshwater ecosystems. Although the potential impacts of hypoxic exposure are severe, there is little known about the consequences of systemic, sub-lethal exposure to hypoxic events for populations and communities of fishes. The objective of this project is to determine whether sub-lethal exposure to hypoxia during early life stages leads to poor growth and hence increased mortality. This project will use "environmental fingerprint" methods in fish ear stones (otoliths) retrospectively to identify periods of hypoxia exposure. The project will compare consequences of hypoxia exposure in different fish species from the Gulf of Mexico, the Baltic Sea, and Lake Erie, thus examining the largest anthropogenic hypoxic regions in the world spanning freshwater, estuarine, and marine ecosystems.

This project will employ long-term, permanent markers incorporated into fish otoliths to identify life-long patterns of sub-lethal hypoxia exposure far beyond time spans currently achievable using molecular markers. This work will capitalize on patterns of geochemical proxies such as Mn/Ca and I/Ca incorporated into otoliths and analyzed using laser ablation inductively coupled plasma mass spectrometry to identify patterns of sub-lethal hypoxia exposure. The investigators will then determine whether exposure results in differential growth and survival patterns compared to non-exposed fish by tracking cohorts over time and identifying characteristics of survivors. Because this work involves multiple species in multiple hypoxic regions, it will allow cross-system comparisons among unique ecosystems. The results from this project will thus provide unprecedented insight into effects of hypoxia exposure in three major basins using novel biogeochemical proxies, thereby paving the way for a fuller understanding of the impacts of "dead zones" on coastal resources.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1433759

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