waters. The system consists of a retention basin, two wetland treatment cells, an effluent pool, and a discharge stream. Our previous work established contaminants accumulating in dragonfly nymphs throughout and below the wetland system. These studies have been expanded to assess contaminant export from the wetlands as dragonflies emerge from the water and enter terrestrial food webs. In addition to whole-body concentrations in teneral (emerging) dragonflies, we also analyzed exuviae (nymph exoskeleton) shed upon emergence. The latter indicates what proportion of the contaminant load accumulated by the nymph, which was primarily bound to the body surface and shed with the exuviae, compared to that actually leaving the wetlands in the emerging dragonflies. Dragonflies were collected from three sites in the retention basin. Traps were designed to sample both near-shore and pelagic habitats within each section. We collected and identified over 685 dragonflies and their corresponding exuviae to the species level. A total of 16 dragonfly species were collected that belonged to 2 families and 11 genera. Concentrations of 16 elements (Cu, Zn, Mg, Al, Fe, B, V, Cr, Mn, Co, Ni, Cd, Ba, Pb, Se, and As) were determined for each of over 400 individuals employing ICP-MS. Patterns of body burdens of emerging dragonflies and thus export from the system varied by genus and element. Species within a genus sometimes differed in accumulation. Section of the retention basin appeared to more influential on accumulation than habitat type within the section.

MP131 Gene transcription ontogeny of thyroid-axis development in early-life stage fathead minnows (Pimephales promelas)

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The hypothalamic-pituitary-thyroid (HPT) axis plays a critical role in regulation of metabolism, growth, and development in vertebrates. While the function of the HPT axis and thyroid hormone signaling in mammalian and amphibian development is well established, less is known relative to its role in fish. Baseline understanding of HPT-related mRNA expression may aid in predictions as to when early-life stage fish may be most susceptible to thyroid-disrupting compounds. In the present study, a time-course documenting transcription of key genes associated with the HPT axis over the course of early-life stages of fathead minnow (*Pimephales promelas*) development was evaluated. Fathead minnow embryos were sampled at eight time points between fertilization and hatch (5 days post-fertilization), and larvae were sampled approximately every other day, from hatch until 28 days post-hatch. Total RNA was extracted from pooled, whole fish, and mRNA transcription of thyroid-related genes was evaluated using quantitative polymerase chain reaction. Gene transcripts examined included: thyrotropin-releasing hormone receptor-2 (*trhr2*), thyroid stimulating hormone receptor (*tshr*), sodium-iodide symporter (*nis*), thyroid peroxidase (*tpo*), transthyretin (*ttr*), deiodinases 1 and 2 (*dio1* and *dio2*), and thyroid hormone receptors-alpha and -beta (*thra*and *β*). Baseline knowledge of thyroid-related mRNA transcription provided in the present study will aid in the development of adverse outcome pathways detailing impacts of thyroid axis disruption during fish early-life stages, and provide insights into the roles different components of the axis may play during fish development. The contents of this abstract neither constitute nor necessarily reflect USEPA policy.

MP132 Growth and physiological effects in Ankistrodesmus falcatus and Microcystis aeruginosa exposed to mixtures of Nickel and 2,4-D

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Aquatic organisms are exposed to complex mixtures of chemical pollutants. The interaction among them modifies the effect that as single substances produce. Nickel is a metal frequently used in the industry. Herbicides are widely used for weed control, being 2,4-D an auxinic herbicide commonly applied around the world. Phytoplankton is responsible for the production of oxygen and organic compounds through photosynthesis, playing an important role in trophic webs in aquatic environments. It is important to know how the mixture of commonly released chemical pollutant as Ni and 2,4-D affect primary producers. In the present study, the green microalgae *A. falcatus* and the toxigenic cyanobacteria *M. aeruginosa* were exposed to mixtures of different quantities of Ni^{2+} and 2,4-D that were previously determined as the equivalent to the inhibitory concentrations of IC_{10}, IC_{25}, and IC_{50}. Incubation conditions were continuous illumination and shaking, at 27 °C for 96 h. Cell density was daily quantified. At the end of the assay, protein, lipids, carbohydrates and photosynthetic pigments were determined. Also, observations with the scanning (SEM) and transmission electron microscopy (TEM) were done. For *M. aeruginosa* phycobiliproteins and cyanotoxins were quantified. *A. falcatus* exposed to the mixture of chemicals showed a significant decrease in cells density and increased in all the analyzed biomarkers; SEM and TEM images evidenced cell deformations. *M. aeruginosa* exposed to the mixture of chemicals diminished the cell density and increased the concentration of carotenoids, macromolecules, and cyanotoxins; additionally, ultrastructural alterations were observed with TEM analysis. Both organisms exposed to the mixture of Ni and 2,4-D present a higher inhibition of population growth, compared with data from both test organisms exposed separately to each toxicant. For the two phytoplankters, the tested nickel concentrations were lower than the limit established by the Mexican regulation as the allowable content in waste water discharges. Assayed 2,4-D quantities were higher than the environmentally relevant concentration; however, the results of the present study described the interaction among these two pollutants, that are of different chemical nature (organic and inorganic). Moreover, it could be expected that in eutrophic and chemically polluted environments containing mixtures of pollutants, cyanobacteria would be capable of increasing the production of cyanotoxins.

MP133 How much energy does the Great Pond snail Lymnaea stagnalis has and consumes when exposed to cadmium?

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The energy budget of an organism describes the distribution of energy to different organismal processes, mainly maintenance, growth and reproduction. Energy that remains after essential demands are met can be stored as energy reserves that could be later used if the organism is under stress. The purpose of this study was to study the effects of chronic cadmium (Cd) exposure on the energy metabolism of *Lymnaea stagnalis* and the effects of parental Cd exposure on their offspring. We exposed adult snails to Cd concentrations of 25, 50, 100 and 200 µg/L for eight weeks. Egg masses were collected at three different times during the eight weeks. After exposure, adult snails and all the egg masses collected were biochemically analyzed for total proteins, carbohydrates and lipids. Adult snails' lipid fraction was additionally separated into glycol-, neutral and phospholipids, and analyzed. The potential to process energy was estimated as a measurement of the electron transport system (ETS). Adult snails showed a significant increase in proteins and a significant decrease in carbohydrates after Cd exposure, while egg masses showed an increase in carbohydrates and a decrease in proteins with increasing Cd concentrations and longer exposure. Lipids did not vary with Cd exposure but the energy consumed (ETS) increased with increasing Cd concentration. This