EMERGING CONTAMINANTS OF CONCERN IN THE DELAWARE ESTUARY AND WATERSHED

A. Ronald MacGillivray

Delaware River Basin Commission

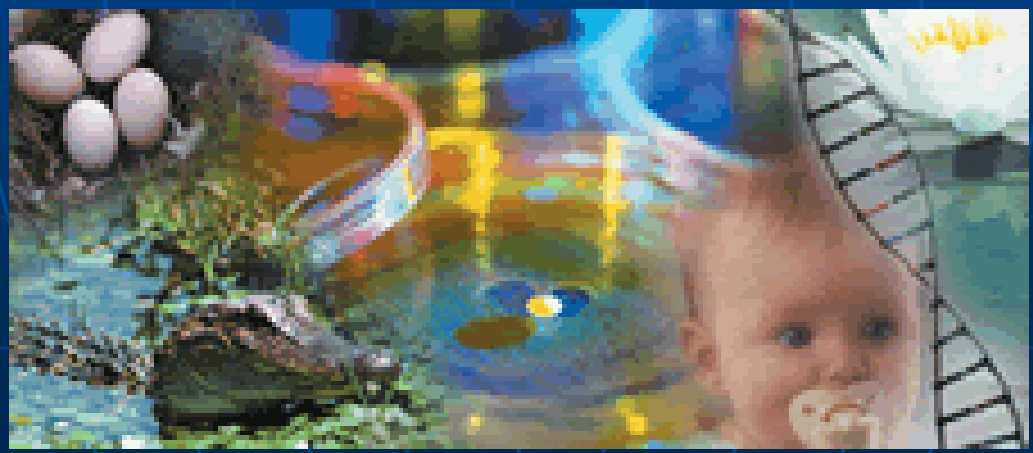
www.drbc.net

DELAWARE ESTUARY SCIENCE CONFERENCE 2007

EMERGING CONTAMINANTS OF CONCERN

Substances that have been detected in humans or other living organisms, have been found to be toxic in some way, or are persistent in the environment

- Not routinely monitored
- Fate and transport not well understood
- Consensus has not been reached concerning toxicity



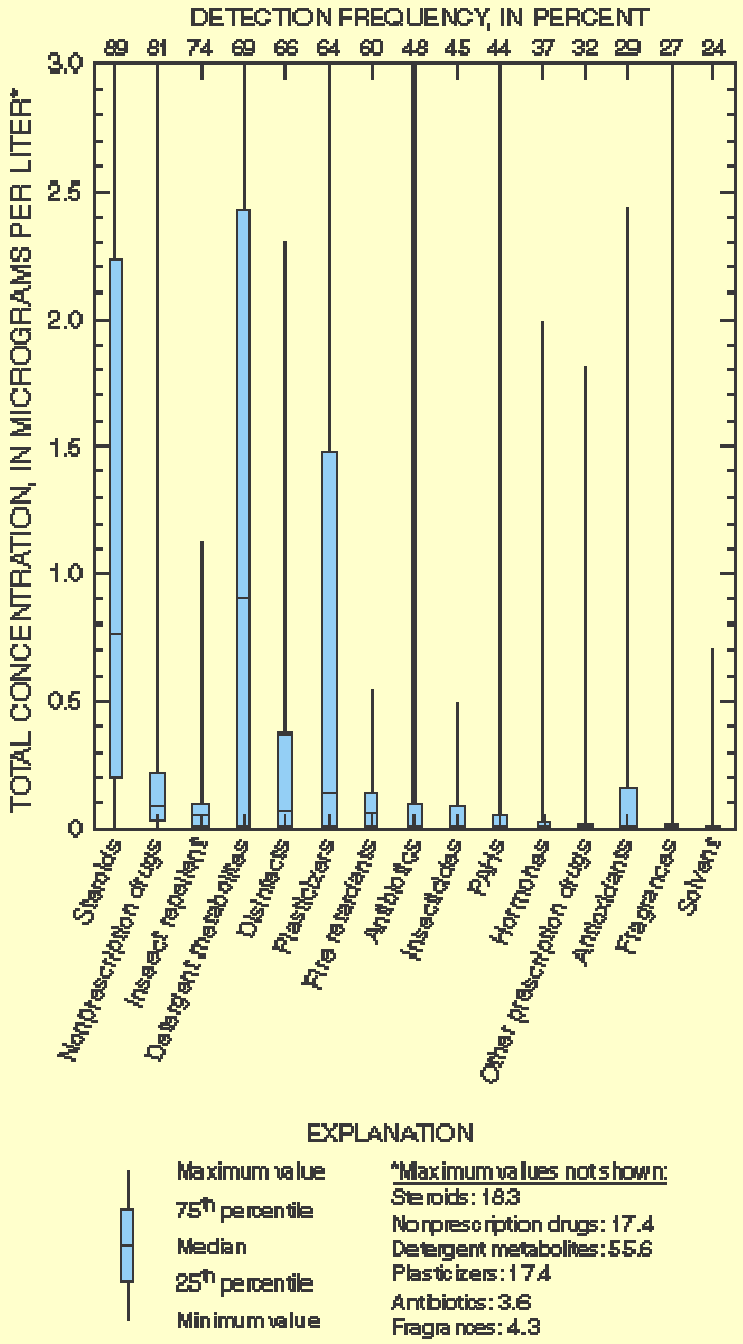
USGS Target List Criteria

- Quantities in use
- Anticipated environmental behavior
- Pathways for release
- Health significance
- Ability to measure compound
- Potential indicator/tracker
- Stakeholder priorities

USGS National Survey

- Steroids, nonprescription drugs, and an insect repellent were the three chemical groups most commonly detected in susceptible streams.
- Detergent metabolites, steroids, and plasticizers generally were found at the highest concentrations.

Kolpin et al., ES&T, 2002



Activities with Basin Component

- USGS
  - Surface water
    - Assunpink Creek
    - Delaware River
  - Groundwater
  - Sources of Drinking Water
  - WWTP
- USEPA
  - Fish tissue study
  - 2006 Target National Sewage Sludge Survey
  - Literature database
  - Contaminated Candidate List (CCL)
  - Interagency Task Group

Activities with Basin Component

- Basin States
  - Delaware
  - New Jersey
  - New York
  - Pennsylvania

- Others
  - Dr. Rominder Suri, Villanova U.
  - Dr. Jeffrey Ashley, Philadelphia U.
  - *Ph*ate model
  - Toschik et al.,
    - U Md, USGS, USFWS
  - PWD
  - City of Wilmington

DRBC Monitoring

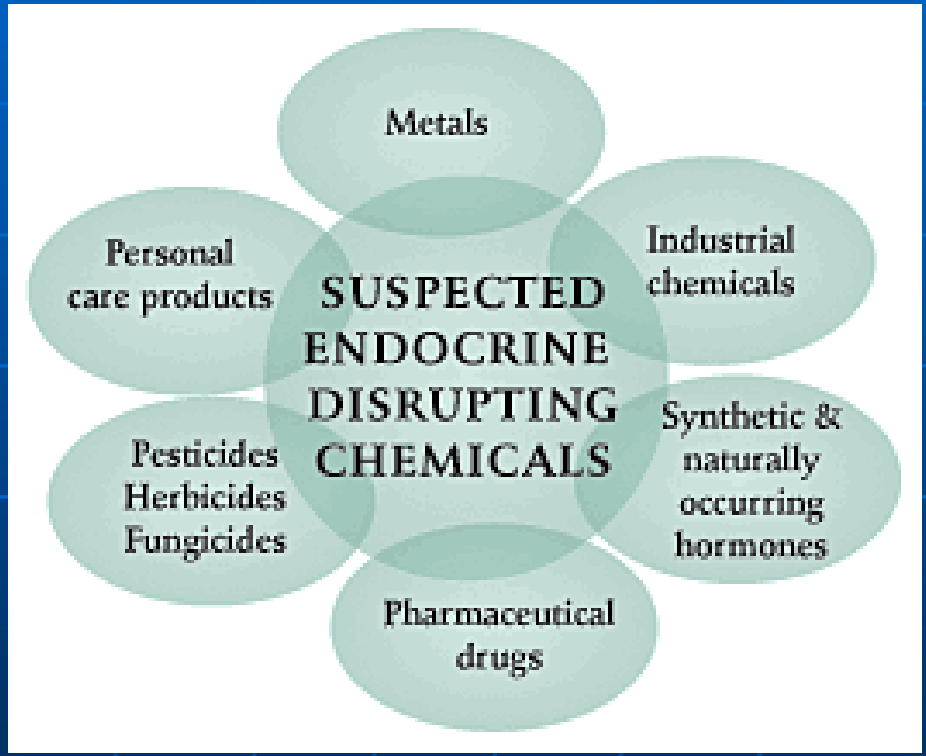
- Fish tissue analysis
- PBDE, PFOA/PFOS and dioxins/furans along with priority pollutants, PCB, cl-pesticides and metals
- 2004, 2005, 2006 samples

USGS – Assunpink Creek
Alvarez *et al.*
Chemosphere 61 (2005) 610-622

- Compared standard depth and width WC sampling to passive in situ sampler
- 96 target analytes
- Detected pharmaceuticals, herbicides, flame retardants, plasticizers, alkyl phenols, insecticides, personal care and consumer products

Endocrine Disruptors

- An endocrine disruptor is an exogenous substance or mixture that alters function(s) of the endocrine system and consequently causes adverse health effects in an intact organism, its progeny, or (sub)populations. (WHO, 2002)



Toxicity Testing

- If a substance is a suspected endocrine disruptor, toxicity endpoints and test organisms must be able to display such effects.
  - acute and chronic toxicity test
  - aquatic - fish, daphnid, algae
  - sediment- oligochaete, midge and mudsnail
    - clofibric acid – acute toxicity to daphnid
    - carbamazepine – chronic toxicity to midge

EPA
Endocrine Disruptor Screening Program

- Tier 1 Screening Assays

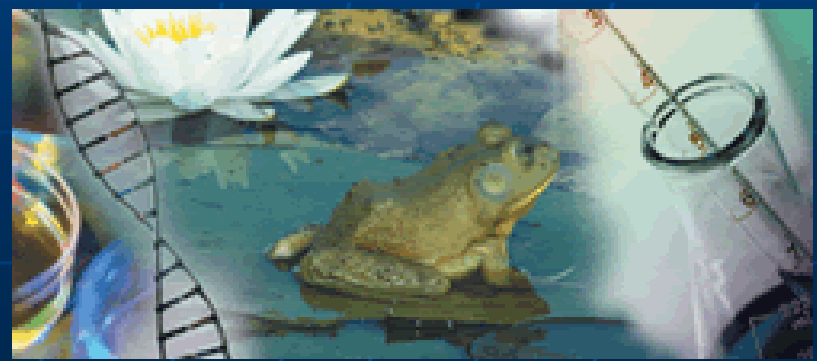
(In final validation peer review stage)

  - Fish screen
  - Pubertal female assay (rat)
  - Pubertal male assay (rat)
  - Uterotrophic assay (rat)

- Tier 2 Testing Assays

(none in final development)

  - Amphibian development, reproduction
  - Avian 2-generation



Transition From Unregulated to Regulated Compound and Criteria Development
EPA Ambient Aquatic Life Water Quality Criteria 2006

	freshwater µg/L	freshwater µg/L	saltwater µg/L	saltwater µg/L
	acute	chronic	acute	chronic
diazinon	0.17	0.17	0.82	0.82
nonyl phenol	28	6.6	7.0	1.7

DRBC Moving Forward

- Identify
  - monitoring
- Understand
  - fate and effects
- Prioritize
  - develop Delaware River Basin target list

- Compilation of within basin data on ECOC
- Identification of data gaps
- Adapting monitoring to current priorities
- Partnering on ECOC initiatives