IJC 2009-2011 Priority: CEC Presence and Effects in the Great Lakes – Toward an Early Warning Surveillance System

UPDATE FOR GREAT LAKES BINATIONAL TOXICS STRATEGY MEETING

December 1, 2010

IJC Multi-board Workgroup on CECs

2007-2009 Report to IJC Findings:

There are significant scientific gaps in our ability to interpret environmental monitoring data, including a lack of understanding of mixtures and cumulative exposures, information on sources, information on uses and life cycles of products, and a lack of regulatory criteria.

Wingspread Conference Conclusions on Toxicant Exposure Research – June 2010

- Lack definitive list of CECs
- Lack full understanding of multiple exposure routes
- Lack understanding of mixtures, and role of environmental stressors, (eg habitat quality, salinity, DO, T) and lifestyle stressors (eg diet) as modulators of CEC impact
- Lack causal-link evidence
- Chemical-by-chemical approach inadequate
- Lack integration between occurrence, exposure, and dose, and thus understanding potential risk

2007-2009 Report to IJC Recommendations

- There should be enhanced binational communication, coordination, and cooperation on the design and implementation of monitoring programs for chemicals of emerging concern that set common objectives.
  - The parties should implement monitoring for chemicals of emerging concern under the current agreement, and provisions for such monitoring should be included in any revised agreement.
  - Coordinated and aligned monitoring programs are needed to:
    - Provide adequate exposure information and provide assessment of management strategies
    - *Provide integrated ecological impact monitoring data (biomarkers, other integrated biological measures) to assess ecosystem impacts*

2007-2009 Report to IJC Recommendations

- Appropriate tools should be developed in order to adequately assess the exposures and impacts of chemicals of emerging concern in the basin.
  - The number of compounds of potential concern is very large, and cannot be addressed solely using a chemical-by-chemical approach.
  - The tools that are required include both chemical analytical techniques, as well as bioassays to assess ecosystem health (i.e., impacts on species and communities).

Current Efforts

- Enhanced CEC Surveillance
  - Muir Howard Screening Project
  - Binational Surveillance Workgroup
  - Air, Fish, Sediments, Mussels, Gull Eggs
- Effects Based Surveillance Projects
  - USFWS/USGS/EPA Early Warning System Project
  - USGS Bird Surveillance
  - NOAA Mussel Watch
- Literature Survey - CEC Effects (UW-Milwaukee)
- Development of Effects Surveillance Strategy (ORD Duluth)
  - First draft February 2010
  - Literature Survey on Effects Surveillance Tools (Battelle)
  - Survey of Current Effects Surveillance Programs (Battelle)
  - SETAC Sessions, November 2010
  - Second Draft under development
  - Expert Consultation – April 2011
  - Report to IJC June 2011

SETAC Sessions

- Symposium - The Great Lakes/Puget Sound Toxic Chemical Surveillance
- Assessing the Impact of Toxic Substances in the Great Lakes

Symposium

- Overview of Current Toxics Programs – Great Lakes/Puget Sound
- Wingspread Effects Research Strategy Summary
- Prioritization Frameworks
  - PBT monitoring
  - Pharmaceuticals in aquatic systems
- Application of Mechanistic toxicology to ERAs
- DNA-based biomonitoring
- Relative Risk Models

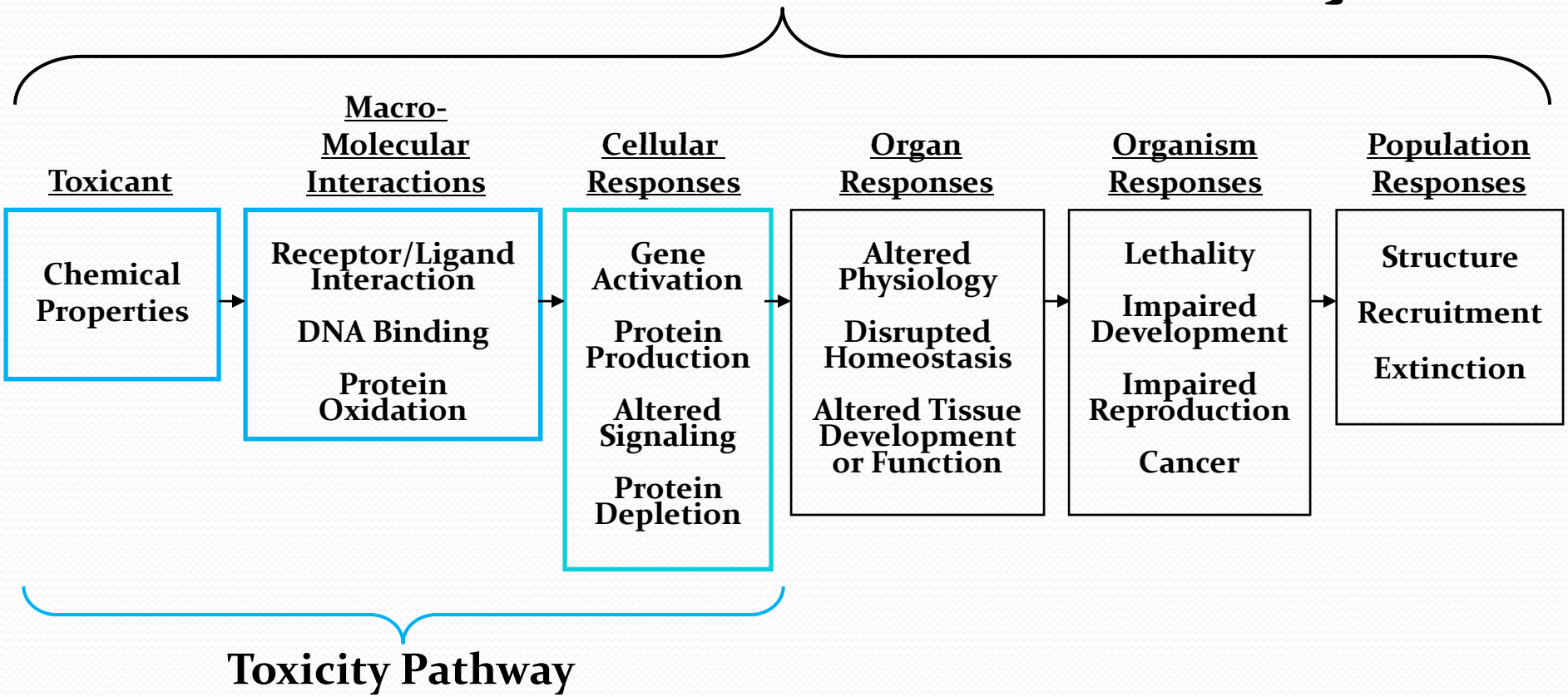
Technical Session

- Effects Monitoring Programs – Canada, Puget Sound
- Sediment Quality Triad Assessment – Chesapeake Bay
- Effects based Biomonitoring Tools (Major Categories of Methods / Organizing Themes):
  - Traditional survival, growth, development, reproduction endpoints
  - Methods focused on organ-based system responses
  - Biochemical markers/enzyme activity/protein-based measurements
  - "Omic" technologies/gene and protein expression
  - Genotoxicity/mutagenicity
  - Behavioral endpoints
- Adverse Outcome Pathway Model

Adverse Outcome Pathway (AOP)

- …a conceptual framework that portrays existing knowledge concerning the linkage between a direct molecular initiating event and an adverse outcome, at a level of biological organization relevant to risk assessment…*

Adverse Outcome Pathway



Next Steps

- Revise Draft Strategy to incorporate ideas out of Symposium and Technical Sessions
- Hold Experts Consultation – April 2011, Chicago
  - Design Surveillance System
    - What are we assessing
    - Where are we assessing (AOCs?, POTWS?, Industrial Sector Effluents?)
    - Which tools should be deployed?
    - Which tools should be developed?
    - How should system be organized?
- Revise Strategy and submit report to IJC – June 2011