Extent and Severity of Toxic Contaminants in Chesapeake Bay and the Watershed

Scott Phillips (USGS) and Greg Allen (EPA)
• Contaminants affect fish and wildlife
• CBP Toxics 2000
• Existing conditions/new issues
• EO Strategy
• Summary Report released
  – Extent and severity
  – Biological effects
• Used by EPA and CBP to consider:
  – Goals for reducing contaminants
  – Monitoring and research
Contaminant Groups

- Polychlorinated biphenyls
- Dioxins and Furans
- Polycyclic aromatic hydrocarbons
- Petroleum hydrocarbons
- Pesticides
- Pharmaceuticals
- Household and Personal Care Products
- Polybrominated diphenyl ether Flame Retardants
- Biogenic hormones
- Metals and Metalloids

- Effects on fish and wildlife
Assessment Approach

- Define extent and severity
  - Widespread, localized, or uncertain
  - Information used and limitations
- Extent
  - Widespread: throughout watershed
  - Localized: limited watersheds
- Severity
  - Widespread: impairments listed at many locations
  - Localized: few locations
- Uncertain: lack of monitoring or standards
Extent

• **Widespread:**
  – PCBs, PAHs, Mercury
  – some herbicides (atrazine, simazine, metochlor, and their degradation products)

• **Localized:**
  – Dioxins/furans, petroleum hydrocarbons
  – Insecticides (aldrin, chlordane, dieldrin, DDT/DDE, heptachlor epoxide, mirex)
  – Metals: Al, Cr, Fe, Pb, Mn, Zn

• **Uncertain:** pharmaceuticals, care products, flame retardants, some pesticides, hormones
Severity

**Widespread:** PCBs and mercury

**Localized:**
- dioxins/furans, PAHs, petroleum,
- Insecticides: aldrin, chlordane, dieldrin, DDT/DDE, heptachlor epoxide, mirex
- Metals: Al, Cr, Fe, Pb, Mn, Zn

**Uncertain:**
- pharmaceuticals, care products, flame retardants, biogenic hormones
- herbicides (atrazine, simazine, metochlor, and their degradation products)
Biological Effects

• Degraded fish health
  – Infections and parasites
  – Feminization
  – Reduced reproduction
  – Tumors

• Wildlife: Reproductive impairment in water birds
  – Eggshell thinning (DDE)
  – Embryo lethality (pesticides)
  – Hatching success (PCBs)
Monitoring and Research Gaps

- Monitoring to better define extent
  - Groups with “uncertain” or “localized” occurrence
- Research-Severity
  - Exposure studies
  - Multiple contaminants and stressors
  - Effects of newer contaminants
  - Sources, pathways and exposure
Need for Partnership Goal

- Required in CBP reauthorization
- Widespread extent and severity of contaminants
- Current controls producing minimal reductions
- Effects other CBP goals (fish, habitat, water quality) and human health
- Benefit from coordination
**Concepts for goals/strategies**

**Reduction Goals and Strategies**
- PCBs → Multi-component strategy
- Mercury → Track national air regs.
- Dioxin, Petroleum, Insecticides, Metals → Local impairments

**Additional Information and Analysis Needed**
- PAHs → Are goals warranted based on extent and effects?

**Research and/or Monitoring**
- Pesticides
- Herbicides
- Pharmaceuticals
- Hshld/Personal Care
- Flame Retardants
- Biogenic Hormones → Monitoring for occurrence

**Research for sublethal effects and mixtures**

*DRAFT For discussion purposes only. Final goal decisions TBD*
PCBs are widespread in extent and severity …

Possible PCB Goal Structures
- Concentrations in fish tissue
- Pounds of PCBs remediated
- Number of transformers decommissioned
- Site cleanups completed

Possible PCB Reduction Strategies
- Optimize reductions from nutrient/sediment TMDL
- Partner voluntary removal of PCB fluids
- Coordination with regulatory programs
- Contaminated sediment remediation

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Next Steps

• Next steps
  – CBP consider toxic contaminants in future efforts
  – Balance focus on nutrients/sediment
  – WQ GIT, MB, PSC, EC

• Opportunities
  – Support inclusion of toxic contaminant goal at upcoming CBP discussions/decisions
  – Help to develop goals and strategies
  – Enhance science to address gaps in monitoring and research