

Mercury Externalities Model – An Introduction



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NETL Externalities
Workshop



Elements of an Hg Externalities Model

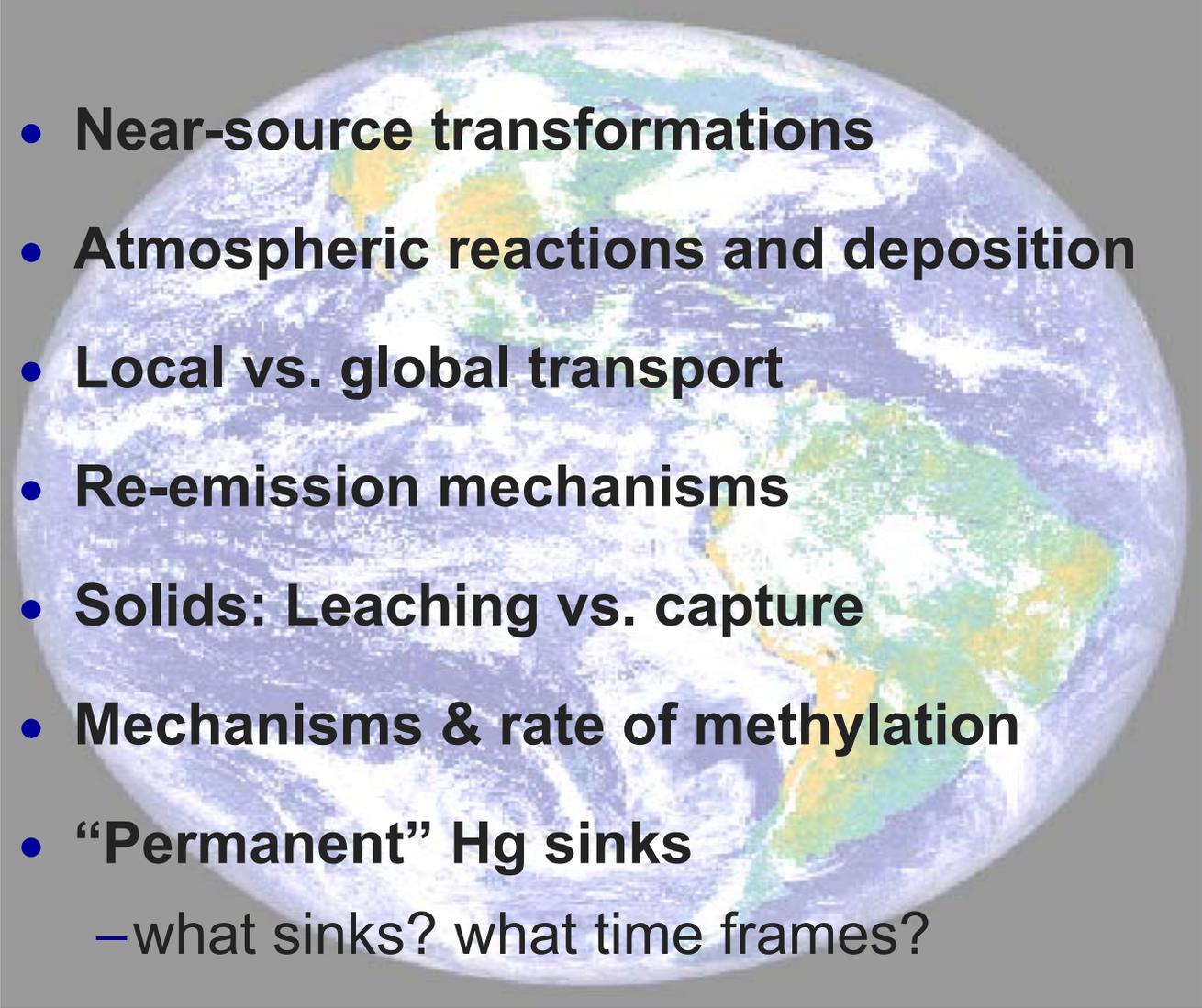
- Quantify emissions
- Transport, deposition, & transformations
- Food chain & human exposure paths
- Health outcomes & ecological damage
- Assign values to outcomes & alternatives



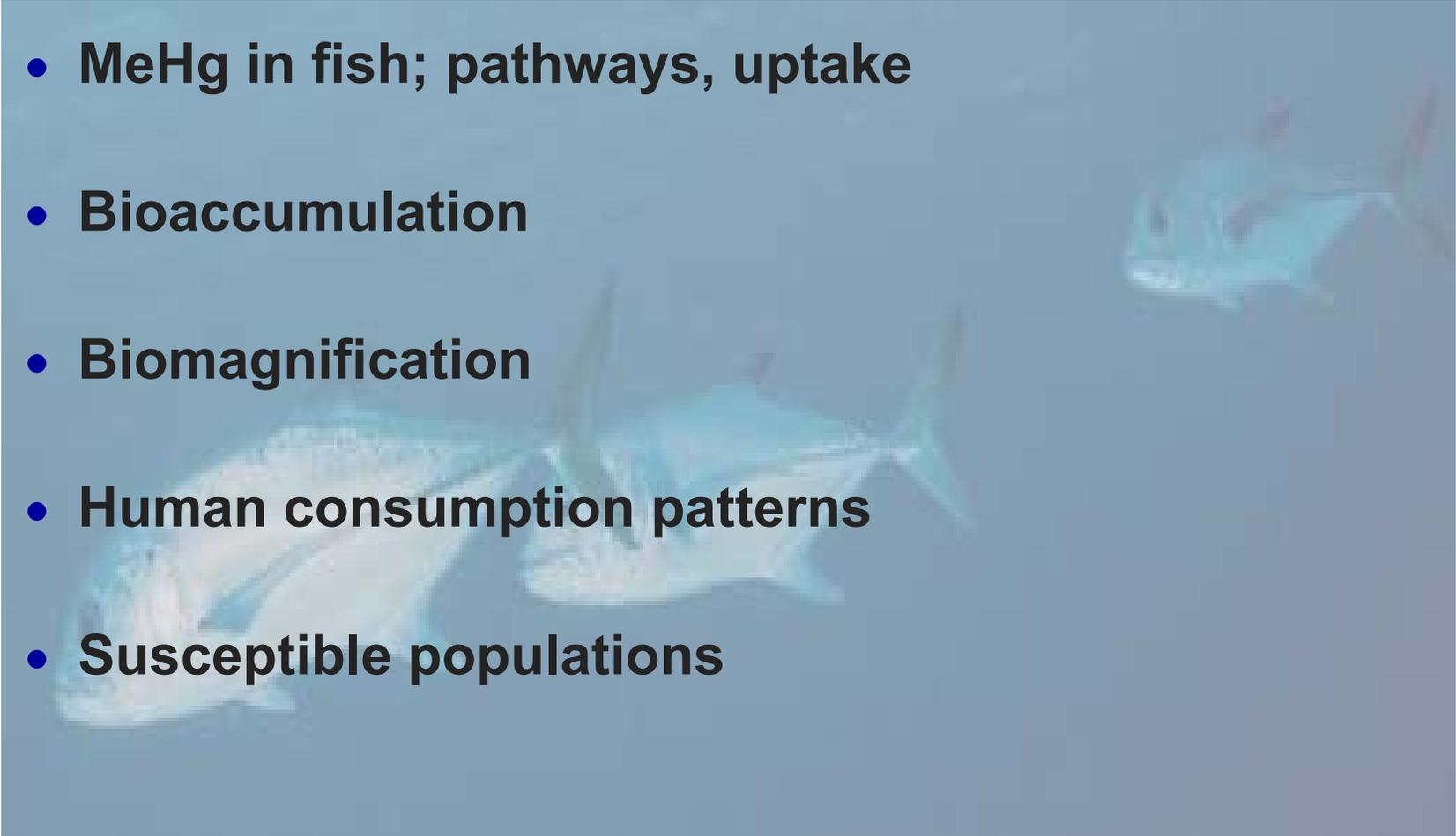
Issues: Quantification of Emissions

- Global vs. domestic
- Natural
- Anthropogenic (new)
- Anthropogenic (Re-emitted)
- Speciation (Hg^0 , Hg^{2+} , Hg_p)
- Air vs. water vs. land

Issues: Transport & Transformation

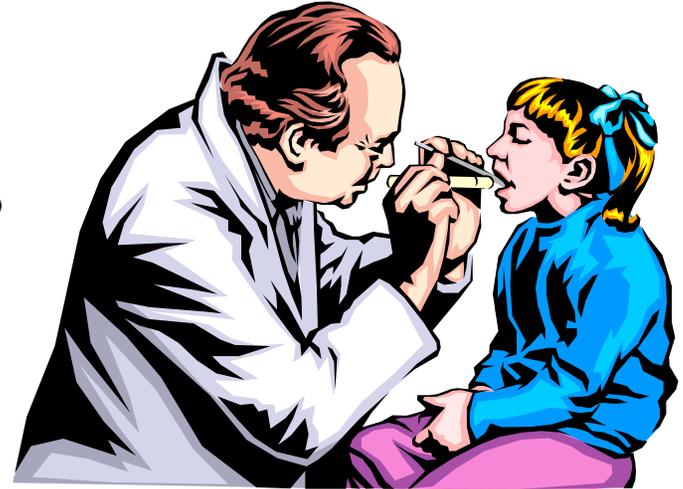
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- **Near-source transformations**
 - **Atmospheric reactions and deposition**
 - **Local vs. global transport**
 - **Re-emission mechanisms**
 - **Solids: Leaching vs. capture**
 - **Mechanisms & rate of methylation**
 - **“Permanent” Hg sinks**
 - what sinks? what time frames?

Issues: Food Chain & Human Exposure

- MeHg in fish; pathways, uptake
 - Bioaccumulation
 - Biomagnification
 - Human consumption patterns
 - Susceptible populations
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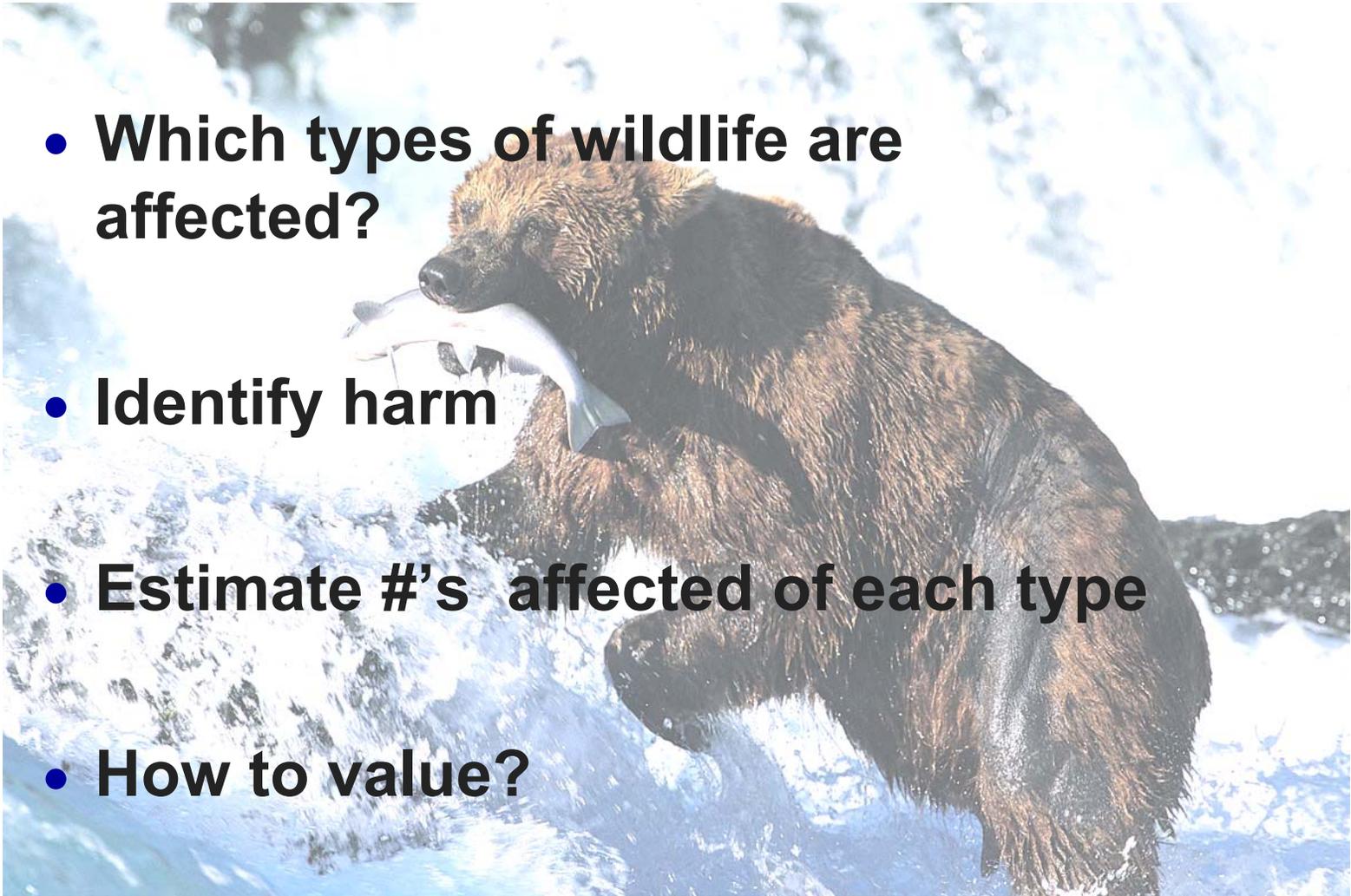
Issues: Human Health Damage

- **What “outcomes” to measure?**
 - Motor development of fetus
 - Heart attacks? Mechanism(s)?
 - How to measure outcomes?
- **Dose-response relationships**
- **Benefits vs. disbenefits of alternative consumption**
 - Is eating fish good or bad? Which fish?
 - Health effects of alternative diets
- **Effects of alternatives to Hg emissions**
 - Higher energy prices



Issues: Damage to Wildlife & Ecosystems

- Which types of wildlife are affected?
- Identify harm
- Estimate #'s affected of each type
- How to value?



Issues: Valuation of Damage

- **Applicability of existing externality models**
- **Methods for assigning values to outcomes**
- **Consideration of alternatives and their consequences (how far do we “chase” externalities?)**



Current Focus / Research Needs

- Thresholds?
- Fetal motor development
- Heart attack
- Valuation
- Identify biological mechanisms for Hg damage at ambient levels

