

Model Application for Developing Fish Consumption Advisories:

Mercury Pilot Project

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Problem – Cost vs. Information

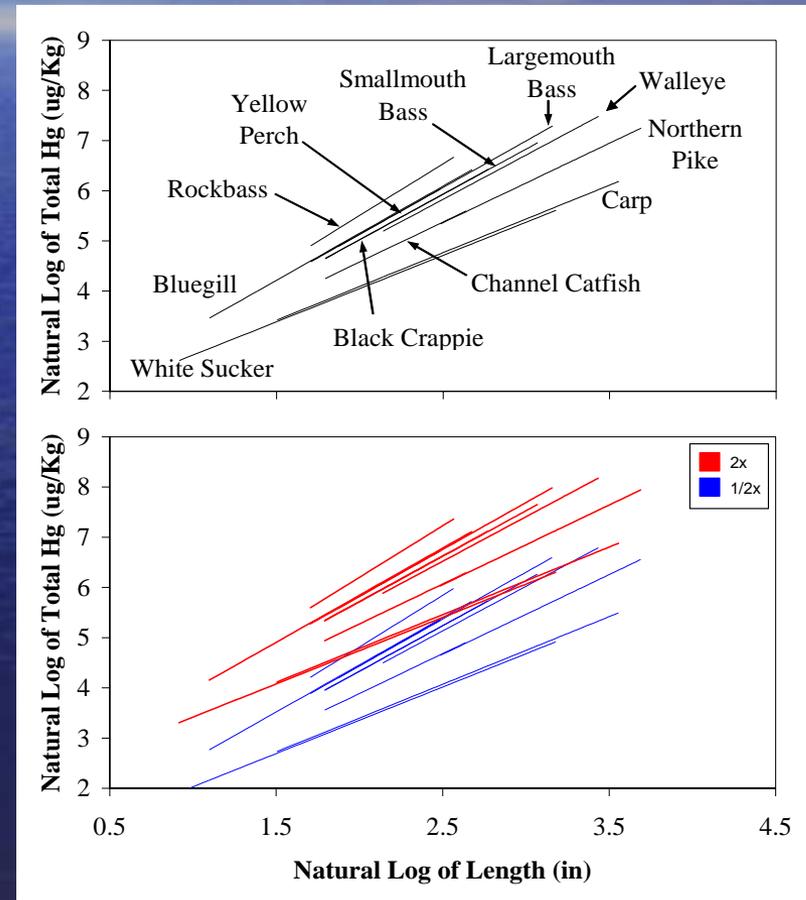
Species	Size Class 1	Size Class 2	Size Class 3
A	?	Sampled	Sampled
B	?	Sampled	?
C	Sampled	?	?
D	?	?	Sampled
E	?	?	?

Fish Hg Model Details

- Regression method (Covariance model)
- Accounts for:
 - Less than detection limit values
 - Differences between samples
 - Species (Hg increases with trophic position)
 - Tissues sampled (skin-off fillet > skin-on > whole)
 - Fish length (larger fish are higher in Hg)
- Calibrated to national dataset

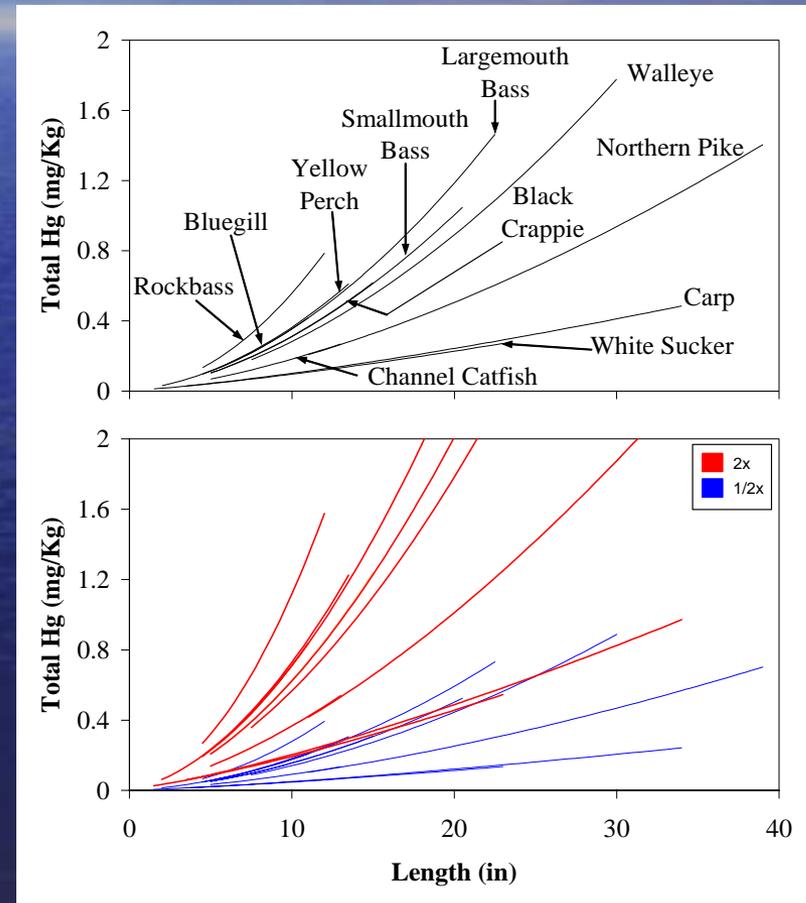
Fish Hg Model (log space)

- **Slopes** – describe potential Hg accumulation rate for each sample type
- **Intercepts** – describe levels of bio-available Hg “before” each sampling event



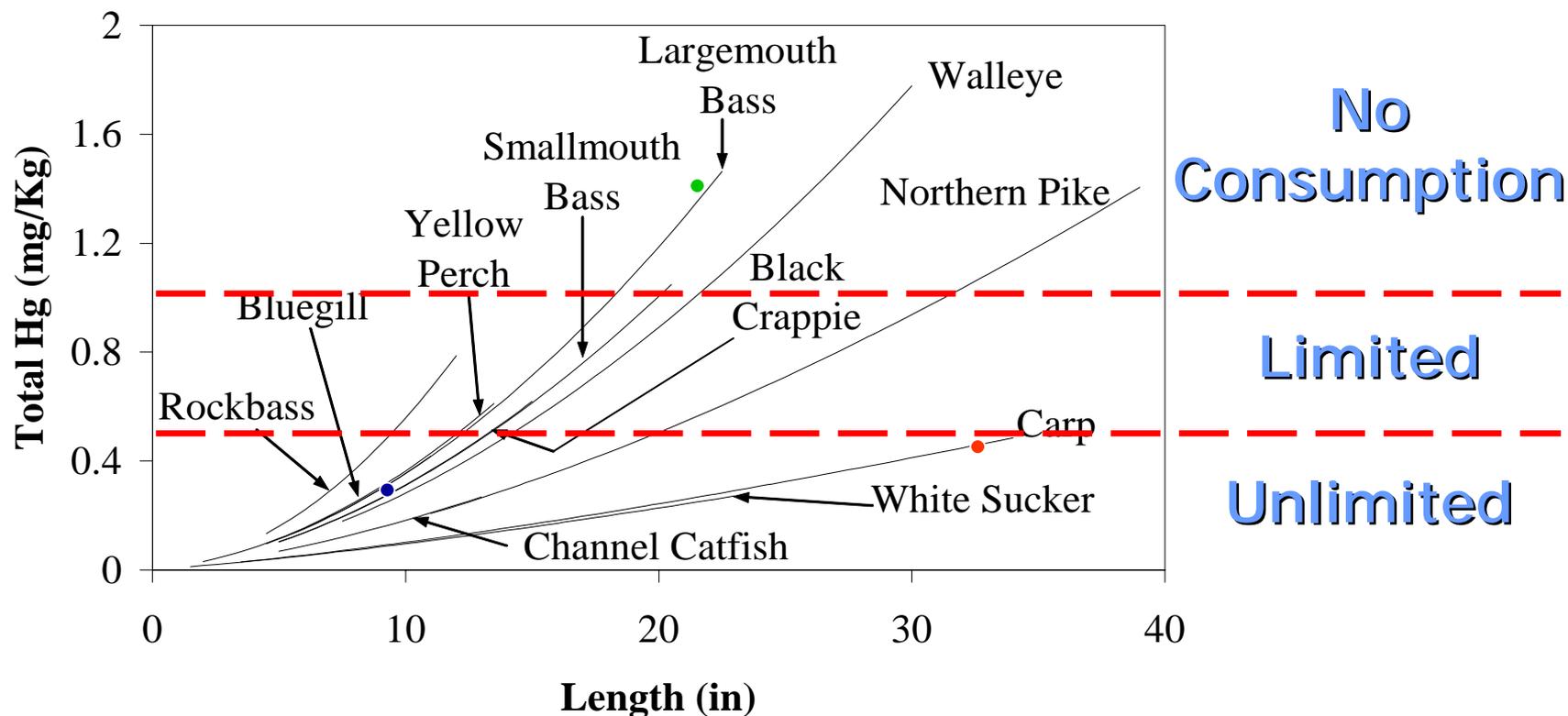
Fish Hg Model (arithmetic space)

- **Slopes** – become exponents describing curvature
- **Intercepts** – become multiplication factors
- **Error** – has a log-normal distribution



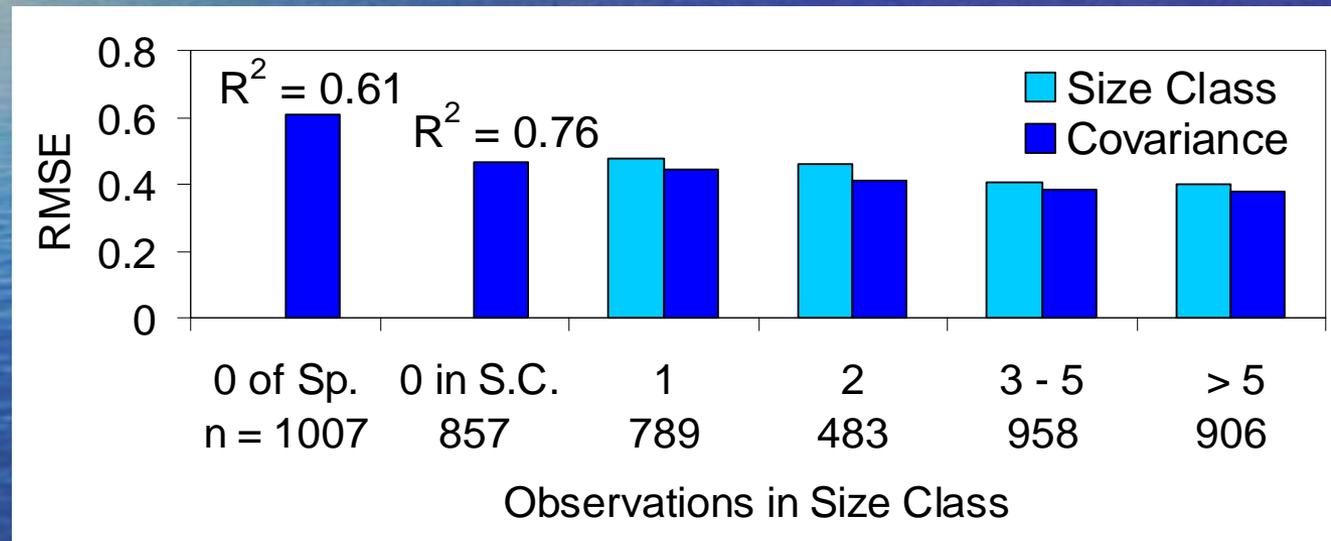
Consumption Advisory

Species	Size 1	Size 2	Size 3
A	?	Sampled	Sampled
B	?	Sampled	?
C	Sampled	?	?
D	?	?	Sampled
E	?	?	?



Accuracy Assessment

- Calibrated to NLFWA data (n = 31,813)
- 5000 random jackknife predictions



Information quality & quantity is better

Monitoring Program Economics

- Costs:
 - Sampling
 - Travel
 - Labor
 - Analytical
- Benefits:
 - Information Quality
 - Information Quantity



Program efficiency:
Information per unit cost

*Sample types is number of species × size classes × tissue types

Analytical Cost Reduction

Size classes	3
Species	5
Sites	50
Years	5
Replicates per size class/event	4
Cost/Sample	\$100
Size class model (3000 parameters)	\$1,500,000
Covariance Model (250 parameters)	\$100,000

Project Website

USGS science for a changing world
The National Map
NIEHS

EMMMA
 Environmental Mercury Mapping, Modeling, & Analysis

Overview Download Hg Datasets Fish-Hg Model **Hg Data Mapper** Links to Other Hg Sites

Raw Data

Temporal Trends

Consumption Advisories

USGS Base map Layers

- Structures
- Geographic Names
- Transportation
- Boundaries
- Hydrography
- Orthoimagery
- Land Cover
- Elevation
- USGS Topo Maps
- Population

Help:

- A closed group, click to open.
- An open group, click to close.
- A hidden group/layer, click to make visible.
- A visible group/layer, click to hide.
- A visible layer, but not at this scale.
- A partially visible group, click to make visible.
- An inactive layer, click to make active.
- The active layer.

“Continuously updated” data & analysis

How Can I Evaluate this Model?

- You voluntarily provide data
- ~~You apply model~~ We apply model and provide results on website
- You evaluate prediction quality (Do predictions make sense?)
- You decide if, and how much, results are used

Questions/Comments

Additional information:

- Website demonstration in poster area (sign-up to receive website address)
- Presentation: Tuesday @8:55 AM, "Model Application for Monitoring Hg in Fish"
- Peer-reviewed publication in preparation
- Request presentation (via telephone) to your group (spwente@usgs.gov)