

Environmental Sciences Branch Fisheries Programs

Fish community assessment
Fish tissue monitoring
Fish kill data assessment and support
Special projects

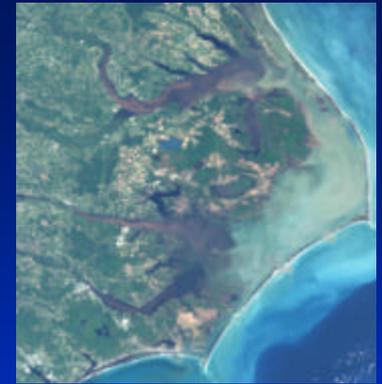


Waccamaw Drainage 1992 Routine Basinwide Sampling

- 60% Largemouth Bass > FDA criteria of 1.0 ppm
- DWQ initiates follow up studies



1992 - 1994 Mercury Monitoring



- 55 sites located in SE NC and Coastal Plain
- over 1200 samples
- 29 of 55 station means exceeded FDA/NC limit of 1.0 ppm
- Bass, bowfin, chain pickerel

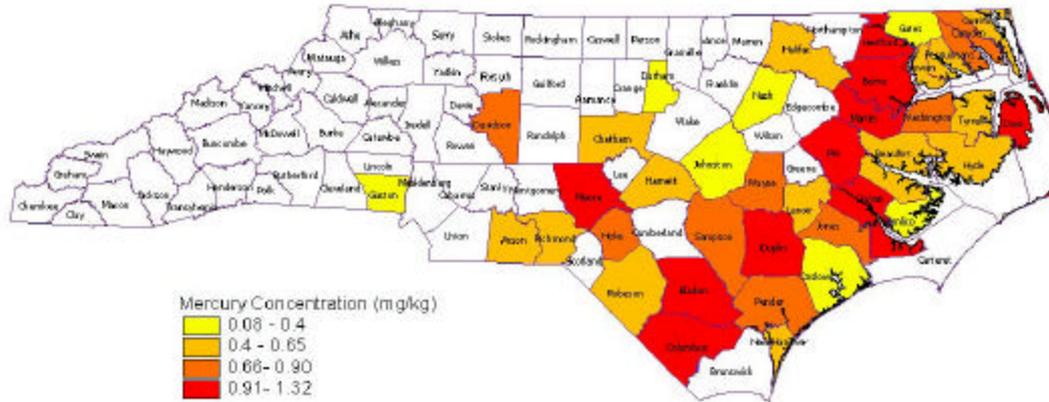


DWQ Efforts 1995 -1999

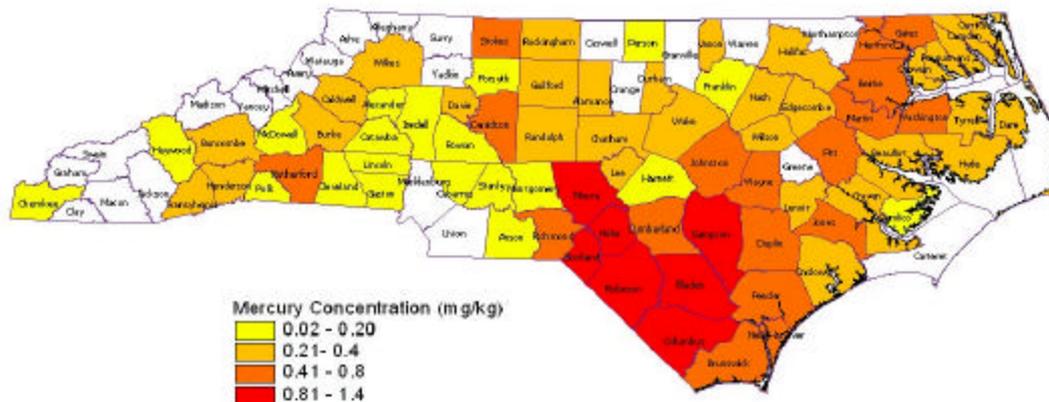
- Monitoring for mercury and other contaminants continues under Basinwide Assessments
- Sampling Statewide
- Further confirmation of high levels in eastern piscivores
- King mackerel survey with DMF

Mercury Levels in Bass and Bowfin by County

Bowfin Mercury Concentrations by County



Largemouth Bass Mercury Concentrations by County



Mercury sensitive waters in NC

- Roughly I-95 East
- Low pH
- Low productivity
- High DOC
- Anoxic water
- Coastal “black waters”



Mackerel Survey 1998-1999



- Analysis of king mackerel and spanish mackerel samples collected by DMF
- Recreational and commercial sources
- Range of sizes and seasonal populations

Mackerel Results



- Spanish mackerel contained lower Hg levels
- King mackerel

strong relationship between mackerel size and
Hg

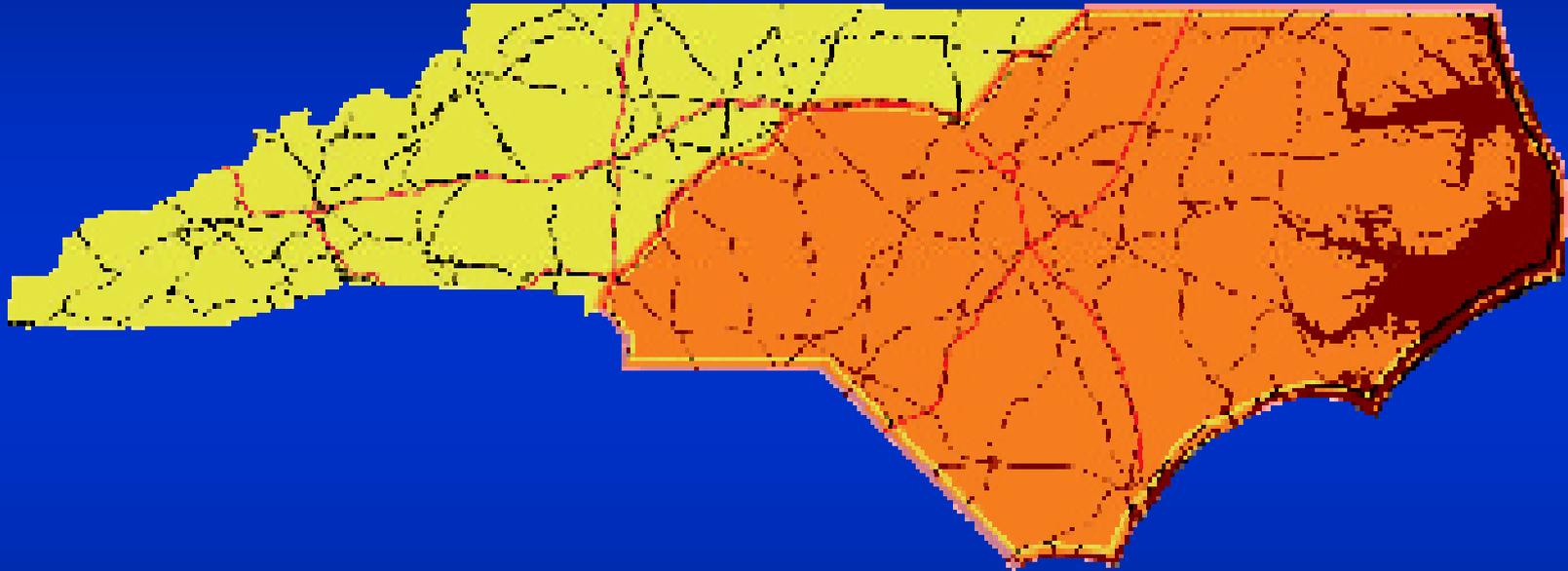
Hg over 1ppm predicted for fish > 13 lbs. and 37
inches

DHHS Fish Advisories



- Hg results forwarded to DHHS
- Prior to 2002: Site or basin specific advisories based on 1.0 ppm
- 2002 – Statewide Fish Eating Guidelines
 - Based on 0.4 ppm level of concern
 - New level of concern adjusted per recommendations of NCDENR Secretary SAB

NC Safe Fish Eating Guidelines



Freshwater: Bass, Bowfin, Chain pickerel

Marine: Swordfish, Tilefish, King mackerel, Shark

South and East of I-85 in North Carolina



Women of Childbearing Age (15-44 years), Pregnant Women, Nursing Women, and Children under 15:

- **Do not eat** shark, swordfish, tilefish, king mackerel, bowfin, largemouth bass, chain pickerel
- **Eat up to two meals* per week of other fish.**

Other Women, Men, and Children 15 years and older:

- **Eat no more than one meal* per week** of shark, swordfish, tilefish, king mackerel, bowfin, largemouth bass, chain pickerel
- **Eat up to four meals* per week of other fish.**

*A meal is 6 ounces of cooked fish for adults, or 2 ounces of cooked fish for children under 15.

Fish Tissue Mercury Surveys



- Removed from Basinwide in 1999
- Limited resources in “clean” watersheds
- Present surveys target
 - Hg trouble spots (coastal plain)
 - request by regions, agencies
 - sites where data absent or suspect



Present ESB Mercury Efforts

- Riegelwood(Cape Fear Basin) area Hg monitoring
- Marine species analysis
- Eastern NC Regional Hg study

Riegelwood Area Monitoring



- Monitor tissue after removal of known regional atmospheric source
- 6 stations around Riegelwood chlor-alkali plant (lower Cape Fear near Wilmington)
- Began in 2001 and will continue as resources allow for years to follow

Marine Species Analysis



- Hg levels in commercial and recreational caught species
- Joint effort with DWQ, DHHS, and DMF
- Spot, croaker, speckled trout, and bluefish during winter 2002
- Large bluefish during 2003
- More species as resources allow

Eastern Regional Low Level Hg Study (ERMS)



- Funded by USEPA grant (104(b)(3))
- Goals
 - Evaluate levels of ambient mercury in surface water systems using low level techniques (Method 1631)
 - Estimate site-specific total mercury:methyl mercury translators to evaluate water quality criteria
 - Estimate site-specific water to fish bioaccumulation factors (BAF's)
 - Evaluate potential mercury loads from WWTPs

What is the significance of BAFs?

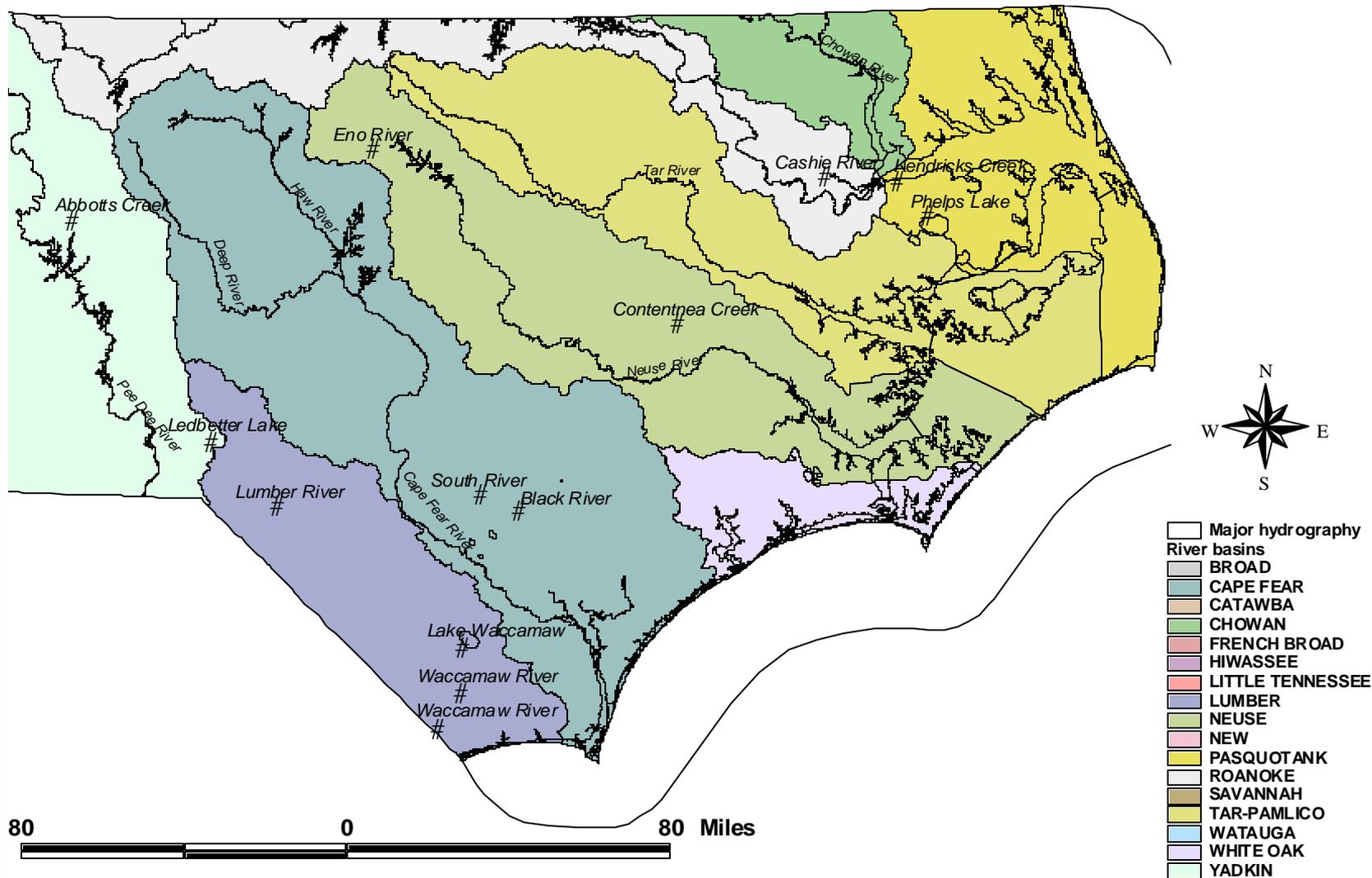
- We use the BAFs to calculate the allowable water concentrations of MeHg and ultimately Hg(t).

ERMS Site selection



- Thirteen sites in eastern North Carolina
- Selection criteria
 - 2000 303(d) Listed waters for fish consumption-mercury
 - Locations of USGS discharge monitoring stations
 - Locations of current or previous DWQ ambient monitoring stations
 - Locations of other studies by either US Fish and Wildlife or by USGS

NC Eastern Regional Mercury Study Sites



ERMS Results



- Ambient Hg generally $<$ NC WQS of 12 ng/L
- Existing NC WQS is not protective of fish tissue except for smaller fish, and even then not in all cases
- In most cases MeHg is dominant form in Coastal Plain waters
- EPA BAF methodology is reasonable way to estimate allowable MeHg levels in surface water
- BAF methodology is complicated with a host of site specific factors

ERMS Future Plans



- “Go West Young Man” - Piedmont Sites
- Calculate BAF’s for other parts of state
- Establish long term Hg database at selected sites (including air data)

ERMS Questions?



Michelle Woolfolk

Div. of Water Quality, Modeling Unit

(919) 733-5083 ext. 505

michelle.woolfolk@ncmail.net

Connie Brower

Div. Of Water Quality, Standards Unit

(919) 733-5083 ext. 572

connie.brower@ncmail.net