Controls on Methyl Mercury in the Upper Hudson

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Lia Chasar (USGS, FL)

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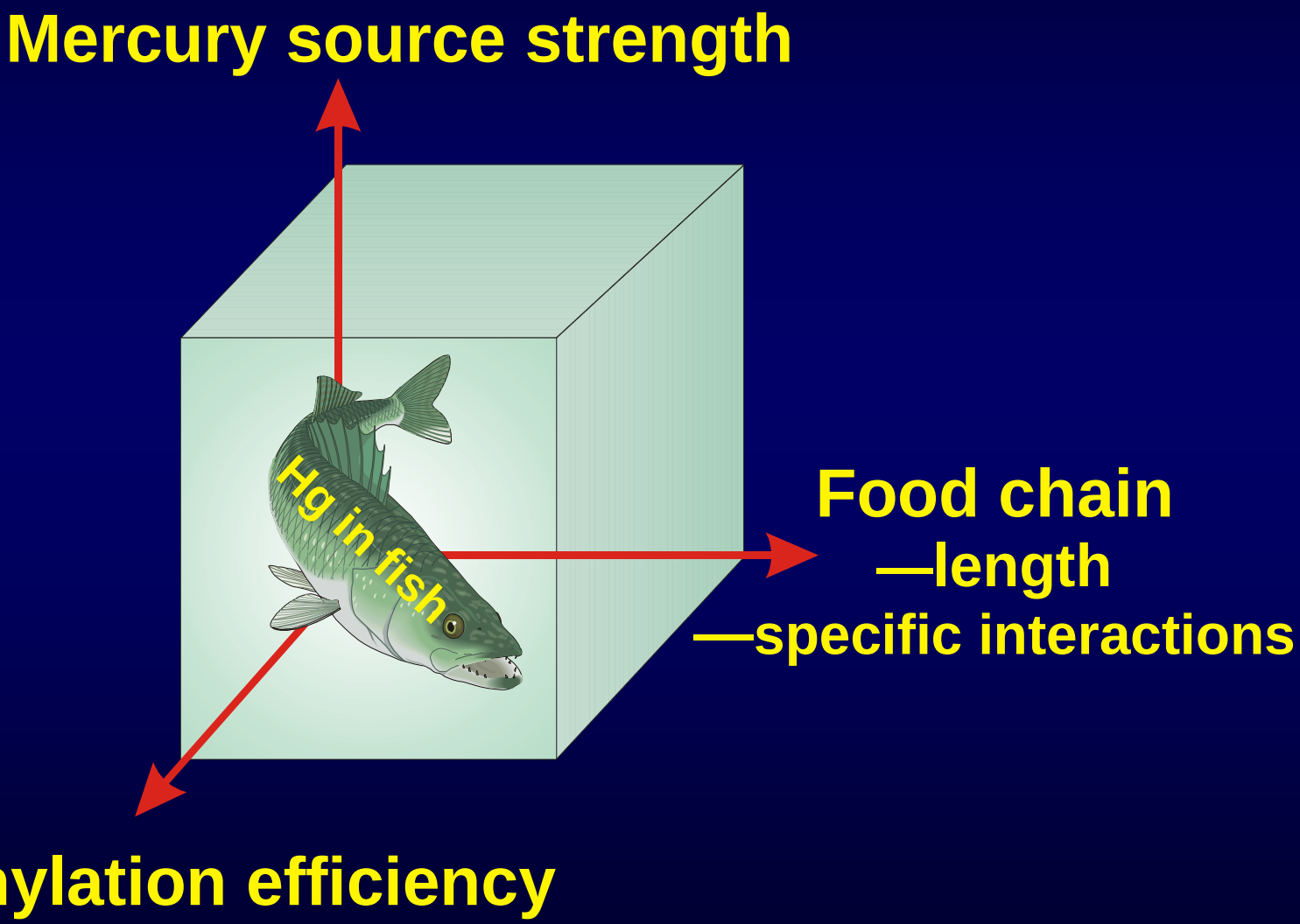
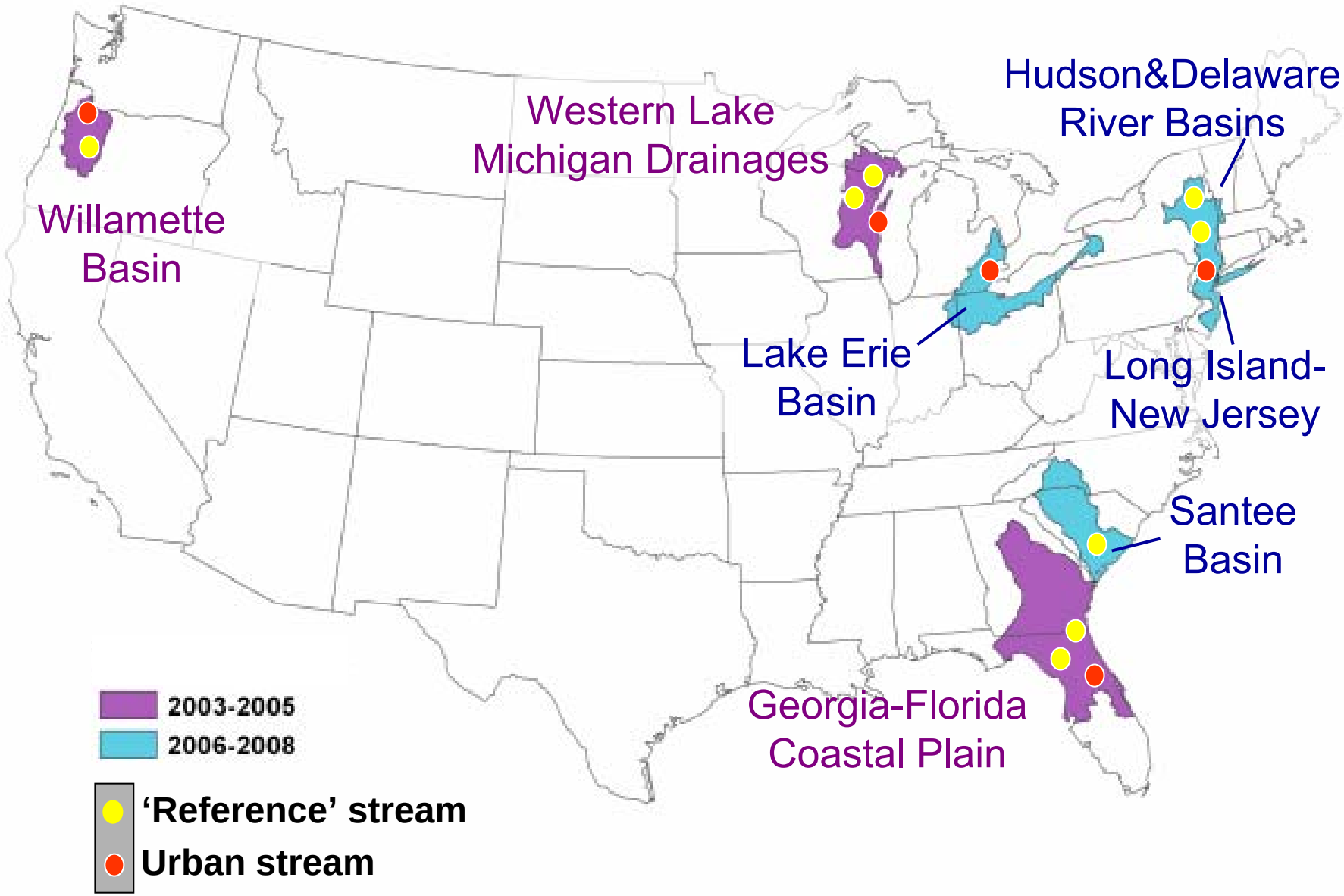
What drives mercury bioaccumulation in stream ecosystems?



USGS

After T.E. Mumley and K.E. Abu-Saba, in press.

NAWQA mercury study areas



USGS

Focus for 1st round studies

- Source, mass flux, seasonality of mercury and methylmercury
- Biogeochemical species and transformation rates
- Bioaccumulation / trophic transfer, food web interactions

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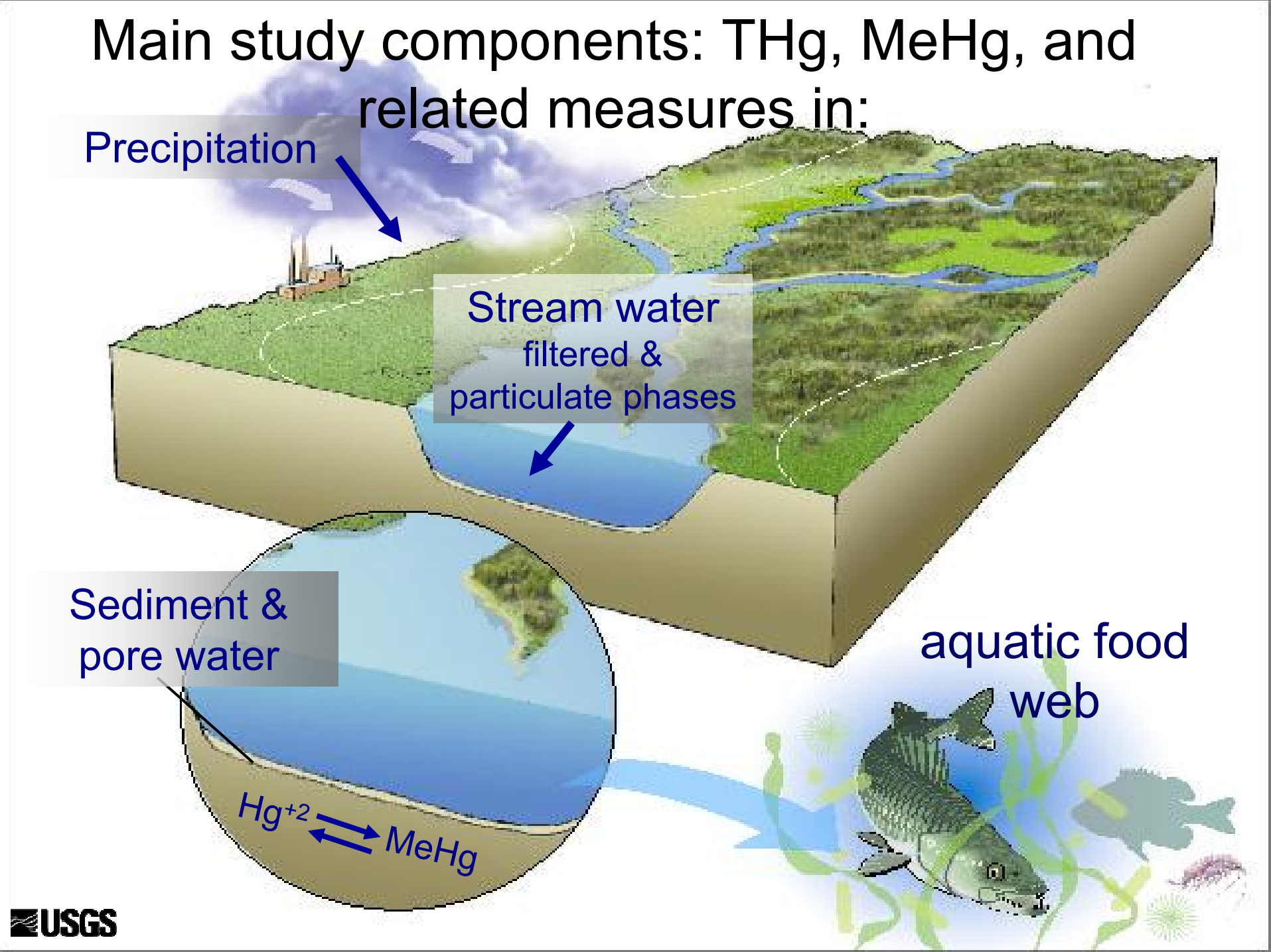
Main study components: THg, MeHg, and related measures in:



USGS

Main study components

- MDN site in or near stream basin
- Flow monitoring at gage
- Stream water monitoring
- Food web sampling
- Hg Flux at basin outlet – 18x/year
- Hg Flux throughout watershed – 2-4x/year
- Hg in ‘sentinel’ macroinvertebrate throughout watershed 2-4x/year

USGS

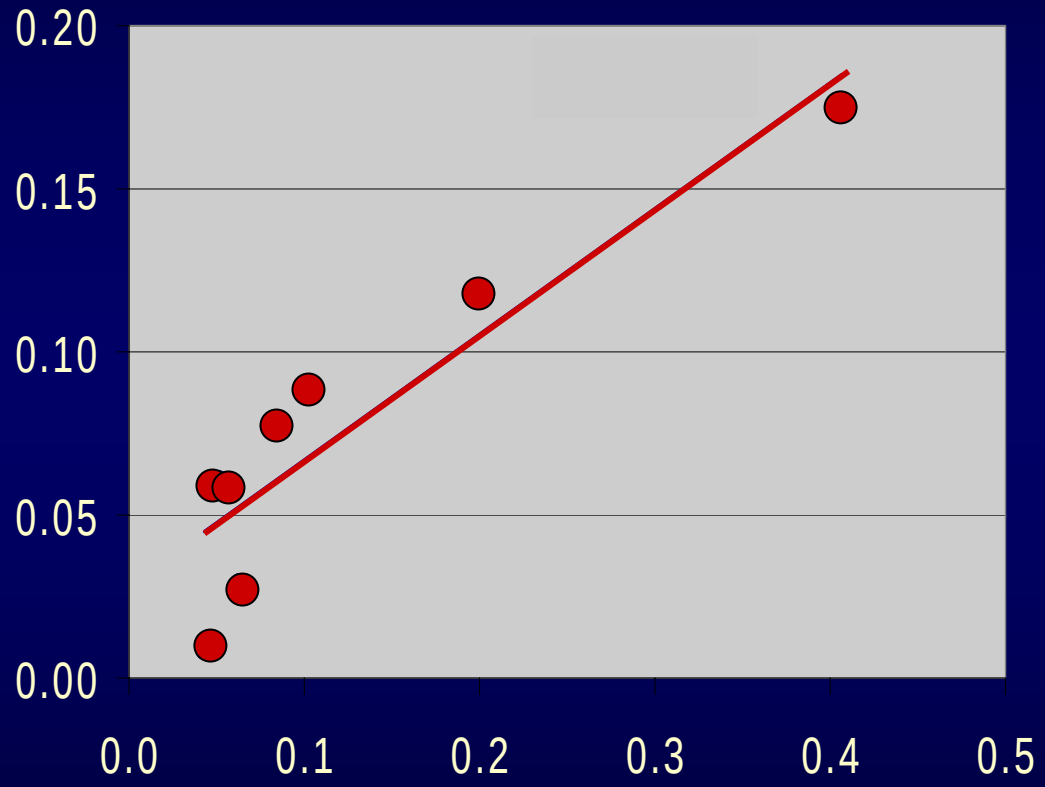
Bioaccumulation of Mercury in Stream Ecosystems:
Food web processes
Selected 1st round results

Lia Chasar (FL)
Barb Scudder (WI)
Robin Stewart (CA)
Amanda Bell (WI)
Denny Wentz (OR)

From 1st round of studies: Aqueous methylmercury (MeHg) is a major control on mercury bioaccumulation

Hg in forage fish (µg/g wet wt.)

[mean of N ≈ 24 at each site]



[mean of N ≈ 35 at each site]

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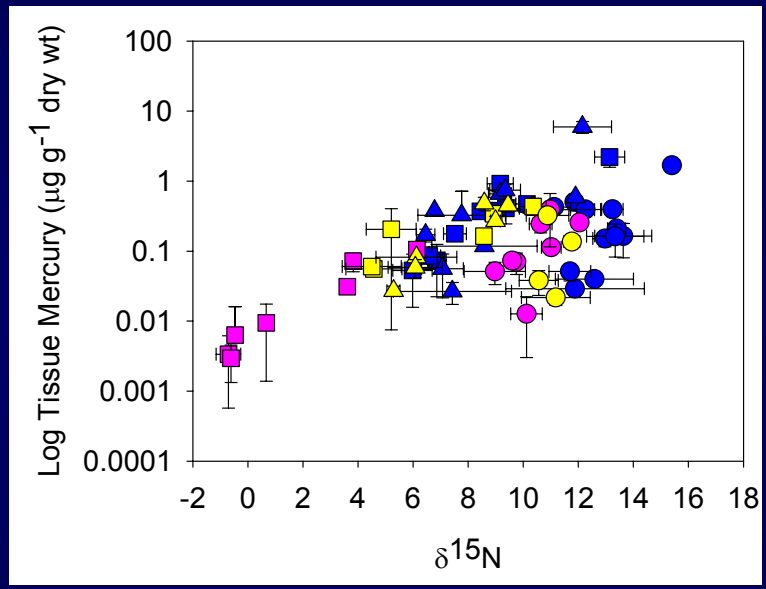
1st round bioacumulation results

- MeHg in invertebrates, forage fish & top predators is related to aqueous meHg
- Bioaccumulation of Hg appears to depend on DOC Quantity and Quality
- Tissue Hg increases with trophic position
- Patterns of bioaccumulation are similar among sites



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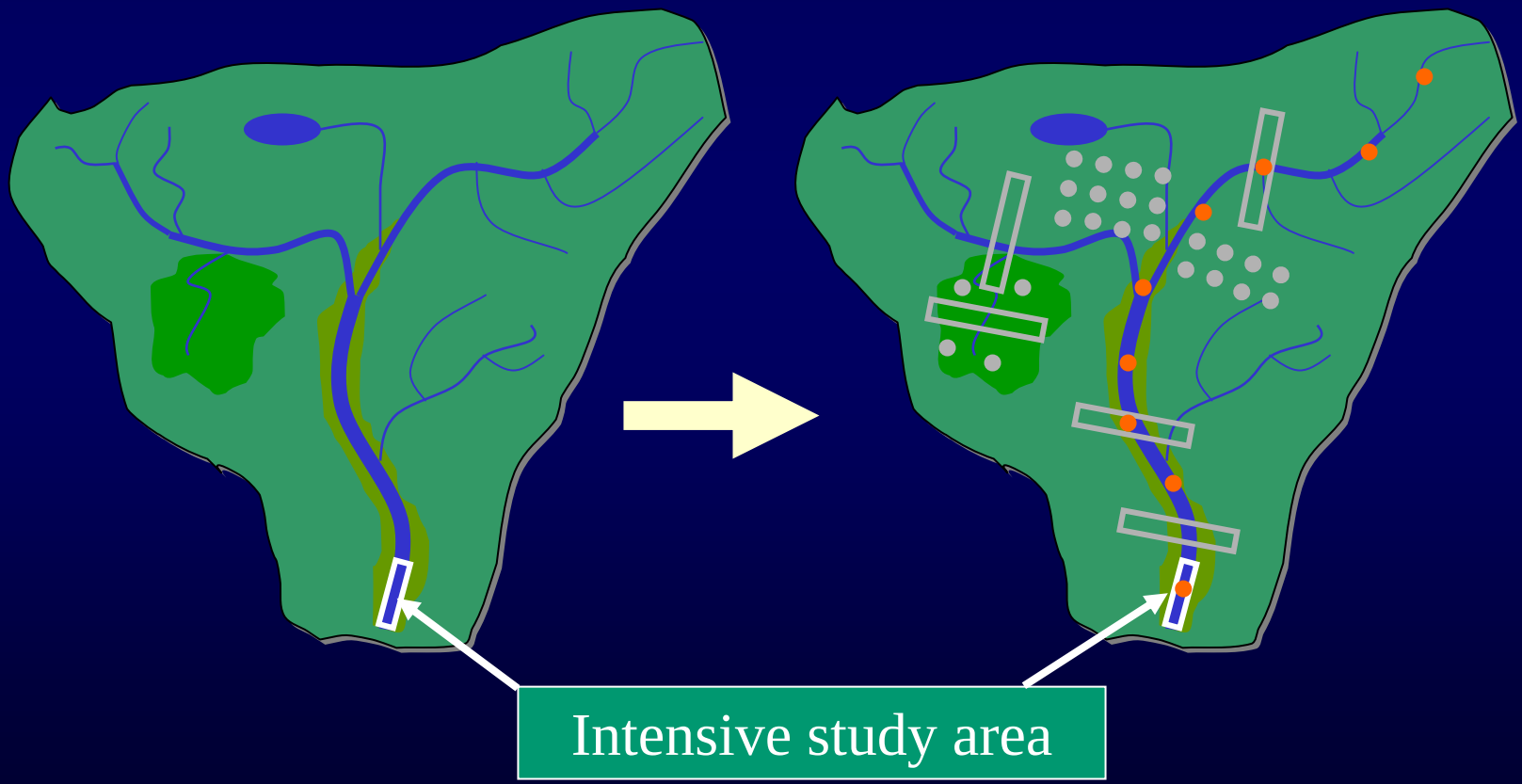
Focus of 2nd round studies

- Aqueous MeHg and THg sources & transport
- Longitudinal profiles of methylmercury
- Spatial surveys of consumer-level fish taxon

USGS

Focus for 2nd round studies: MeHg Mass Flux



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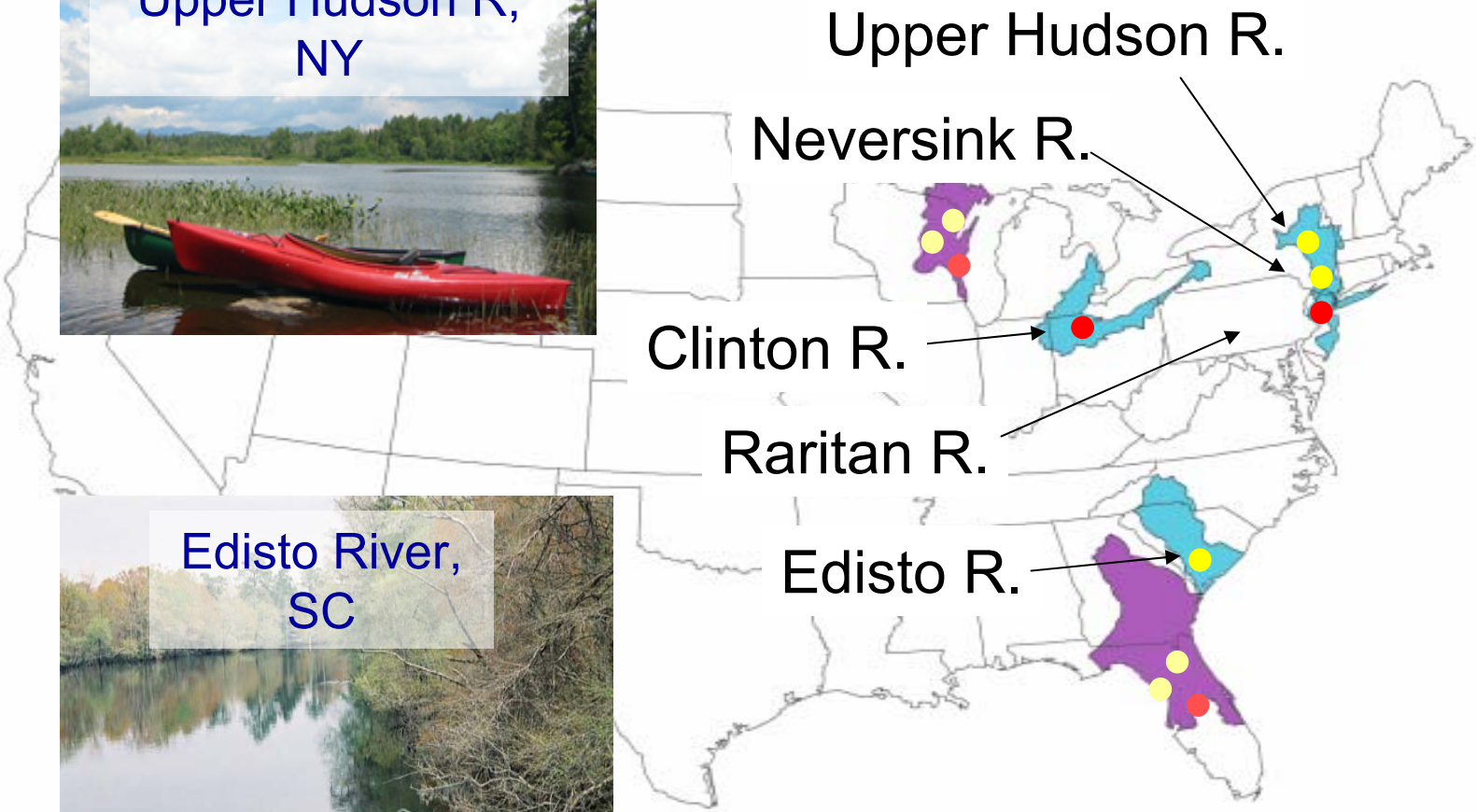
Rescoping - fall '06



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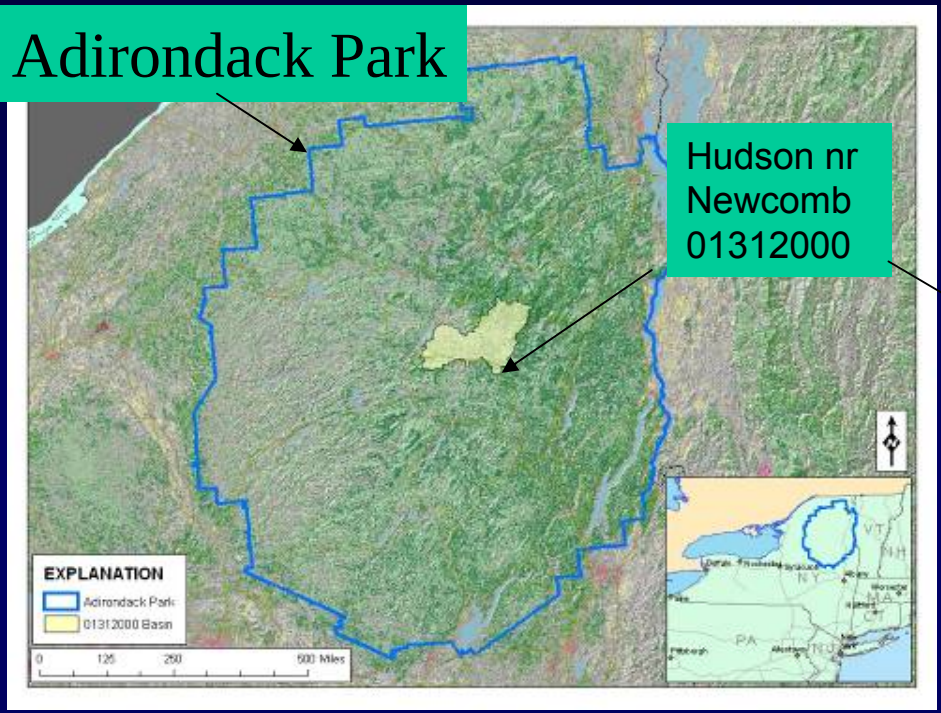
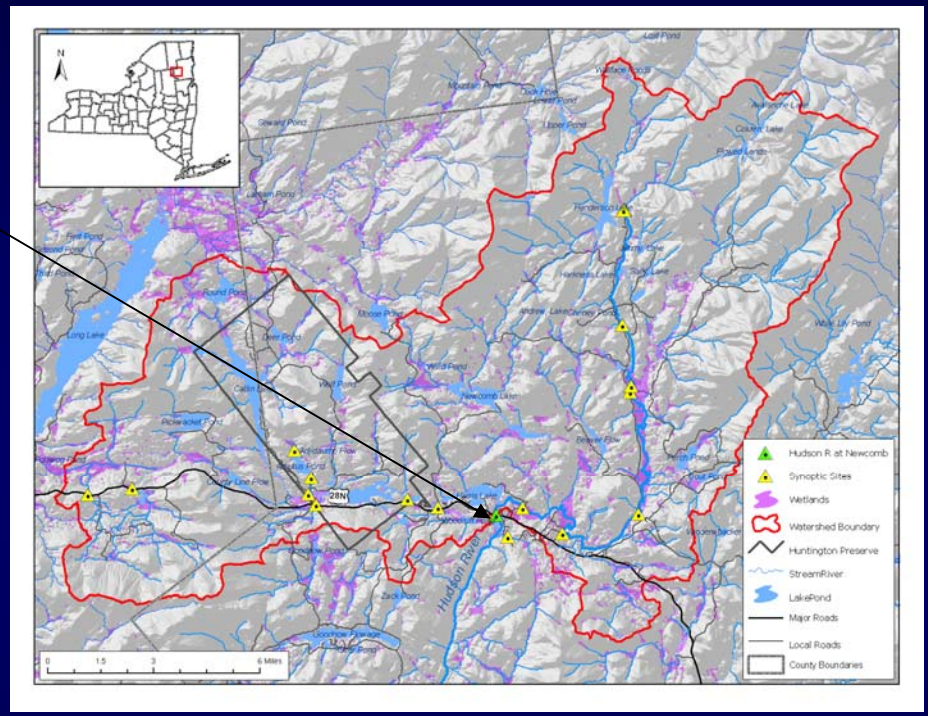
Upper Hudson Study Area





Drainage area = 192 mi^2
~88% forest, 8% wetland,
5% open water

GIS data from Adirondack Park Agency

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Sampling approach 2005-06

Element	Core site	Synoptic site
Timing	18/yr Monthly & storms	2/yr May & Aug
Me Hg & T Hg Mercury	Filtered & Particulate	Whole-water
DOC	conc, UVA254nm, fractionation	conc, UVA254nm
Discharge	continuous	instantaneous
Other chemicals	Lab analyses - majors, minors, nutrients, suspended sediment	Field analyses - SO4, Fe++, FeTot, NO2

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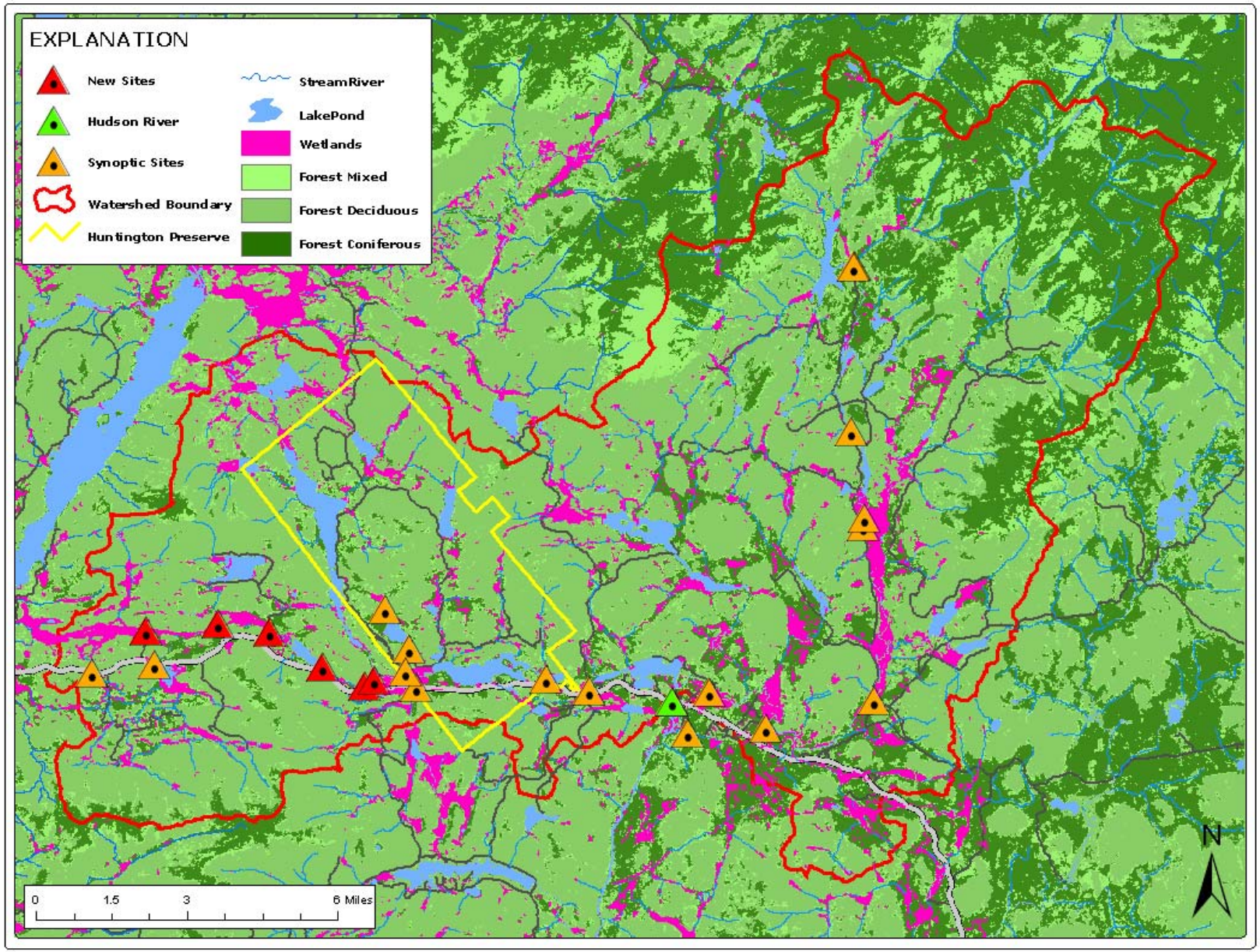
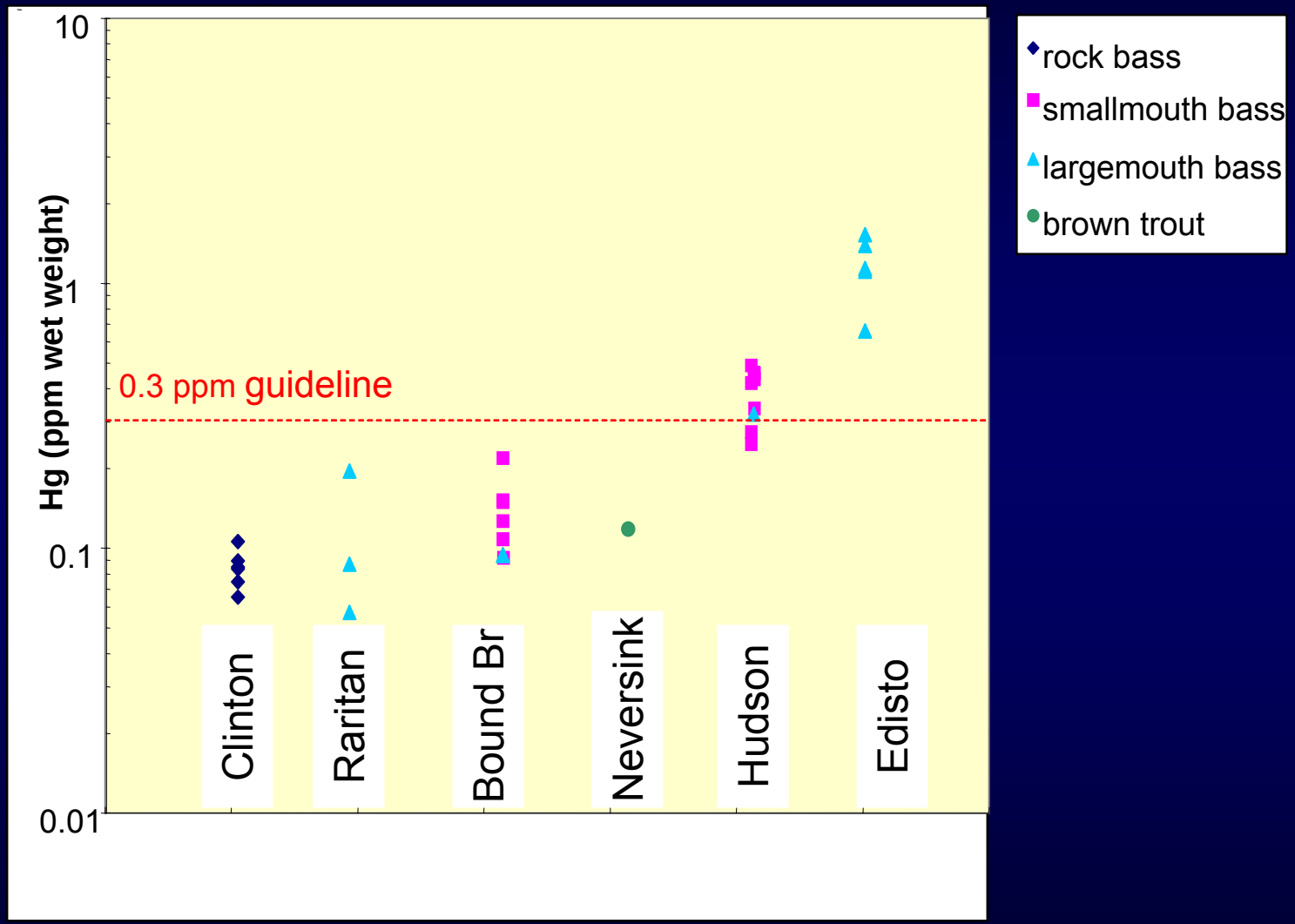
Study sites 2005-06



Fish tissue Hg concentrations at core sites



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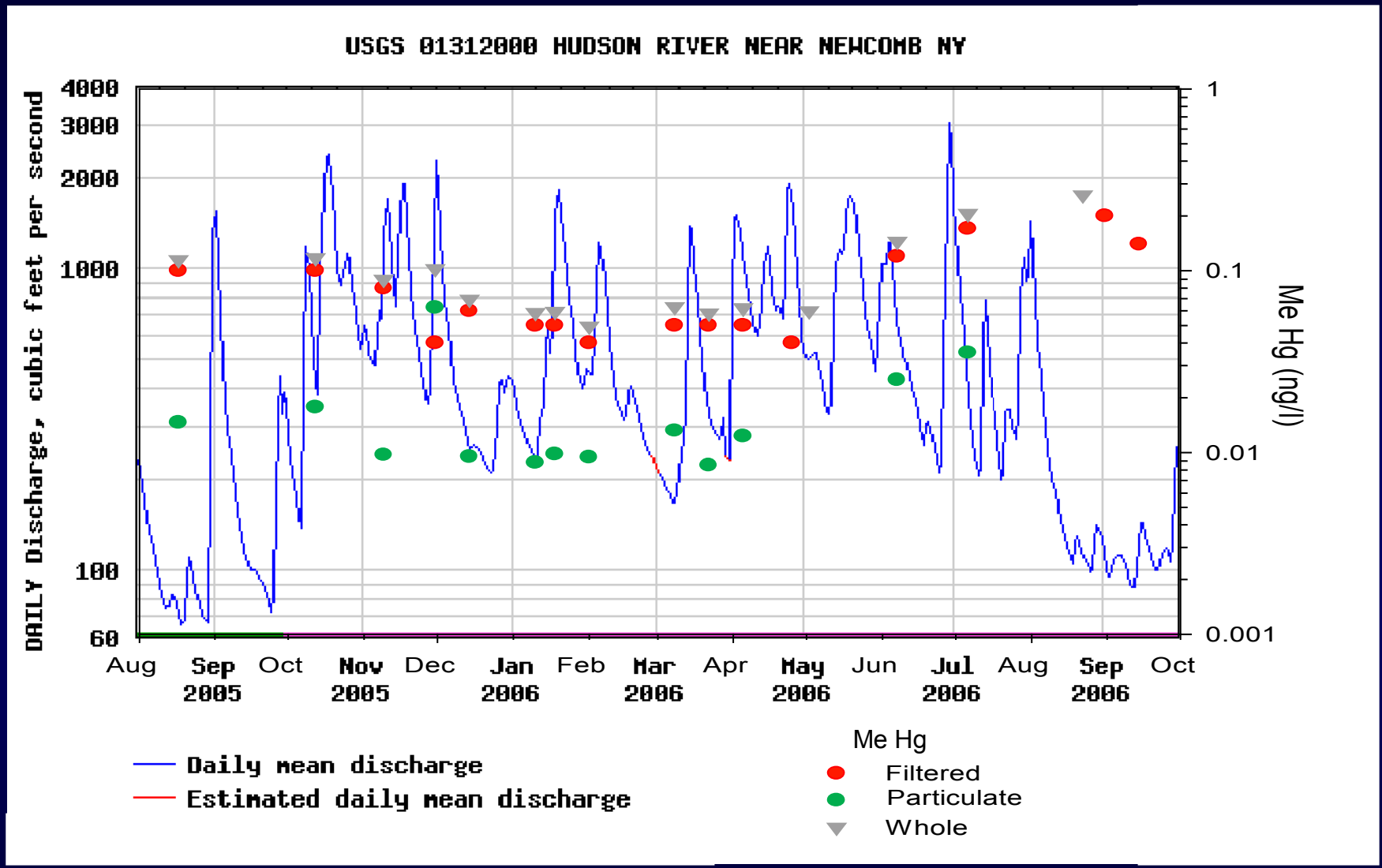
Results ’05-06– core site – Methyl Hg



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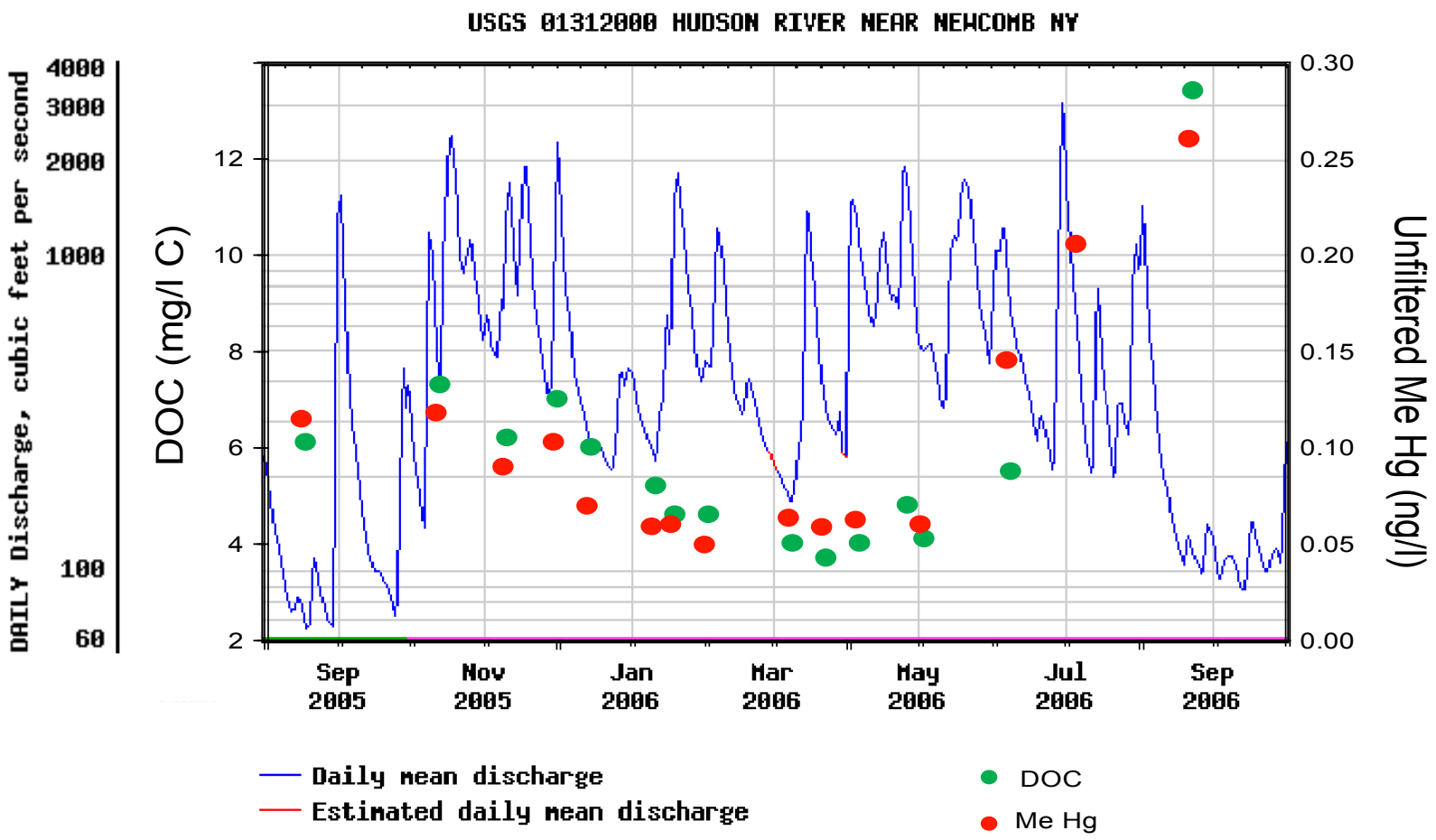
Results ’05-06 - DOC & Me Hg



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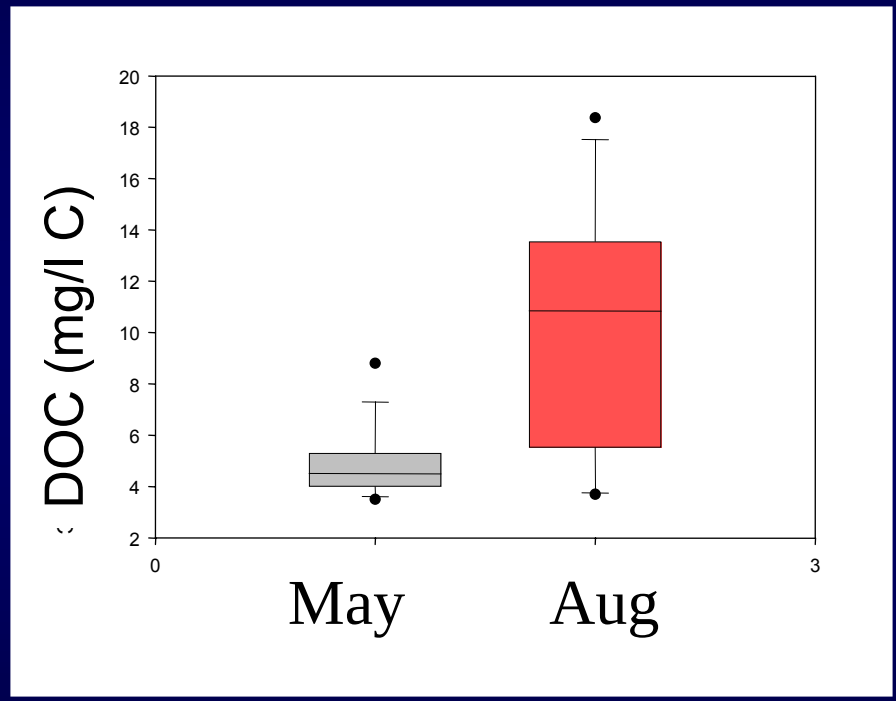
Synoptic results – May & Aug 2006 - DOC



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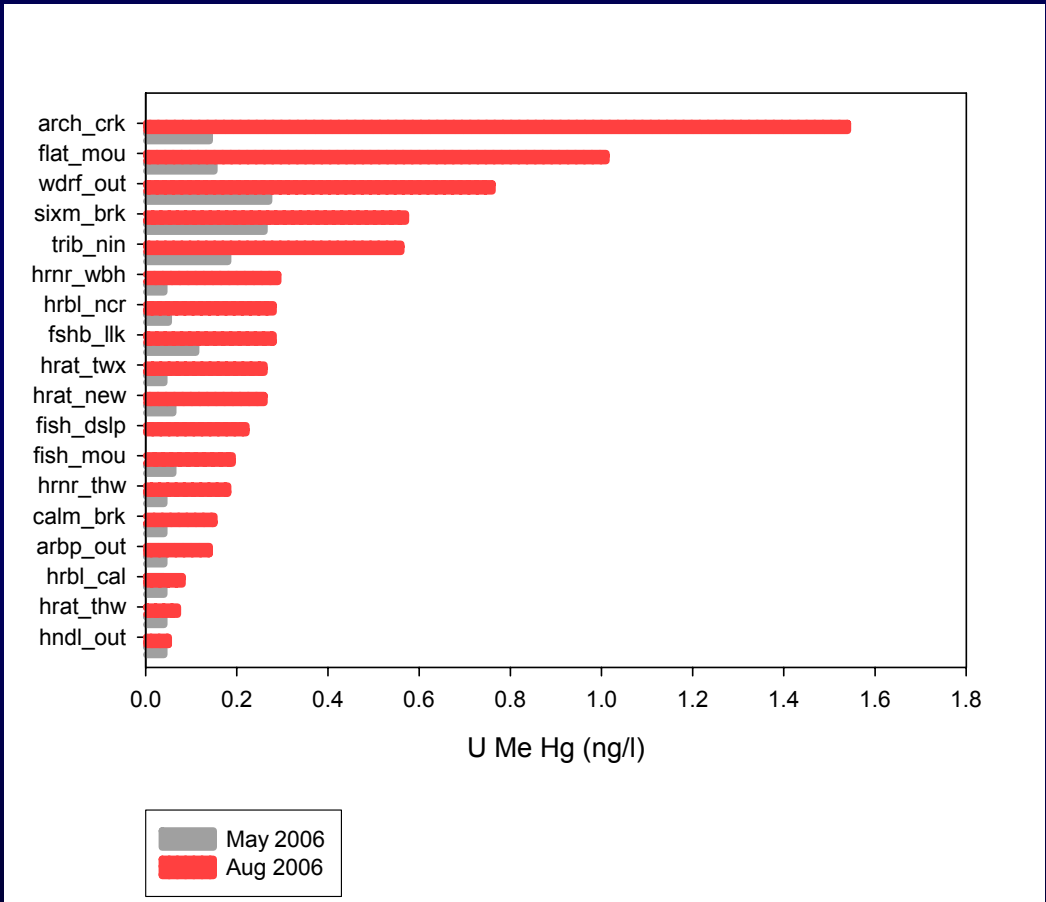
Synoptic results May & August 2006 MeHg



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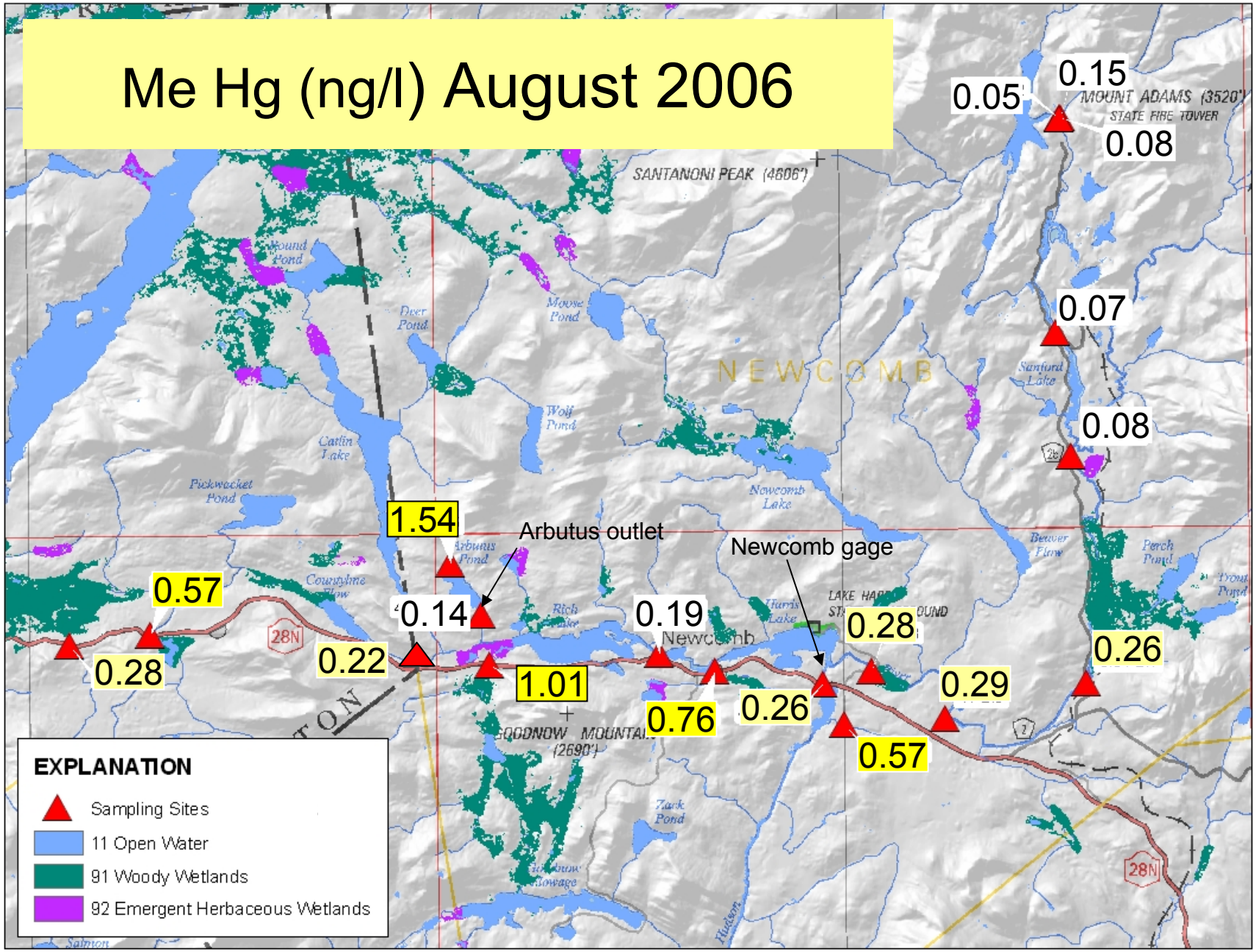
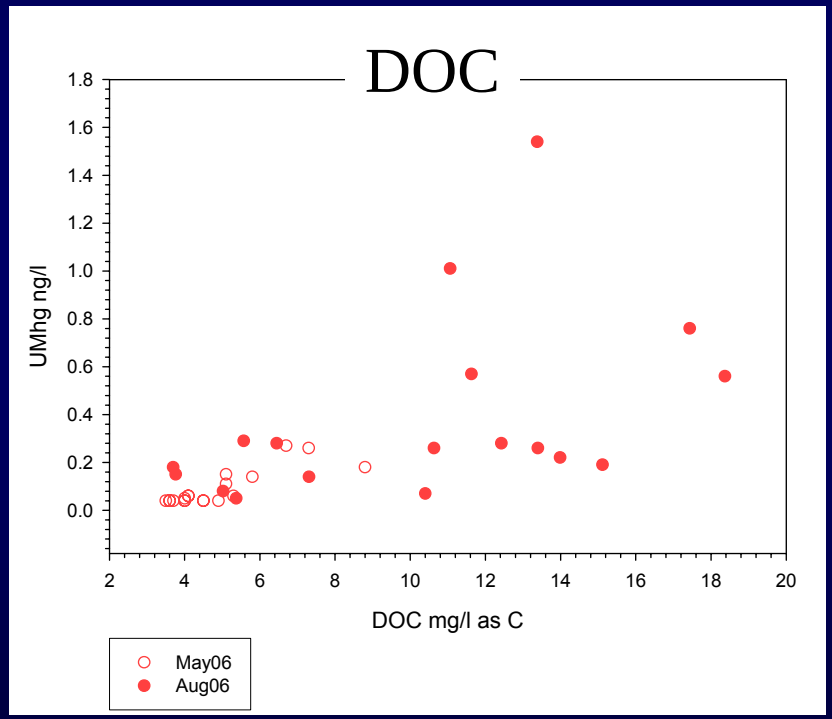
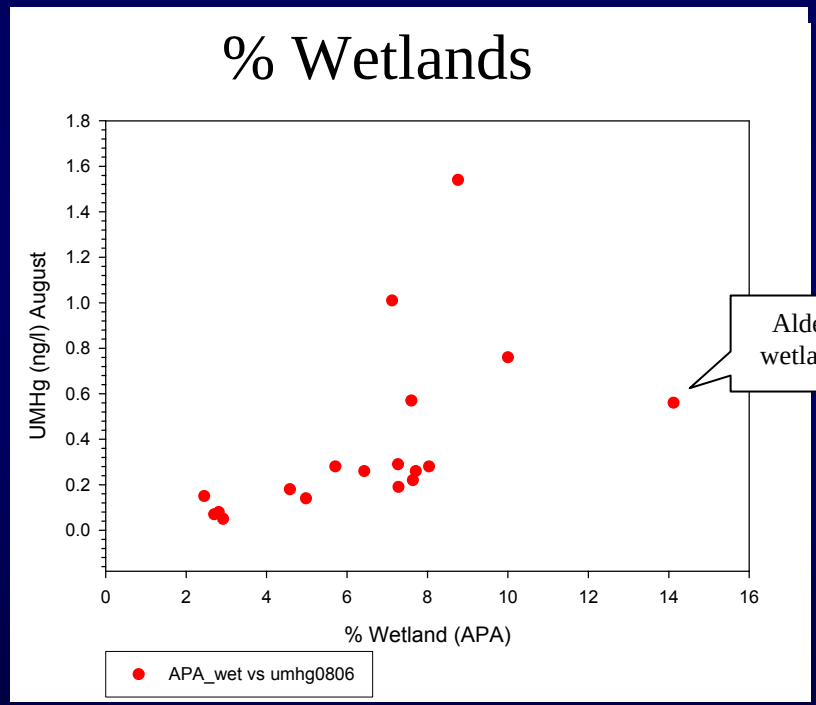
Me Hg (ng/l) August 2006



Me Hg – whole water, synoptic sites ‘06





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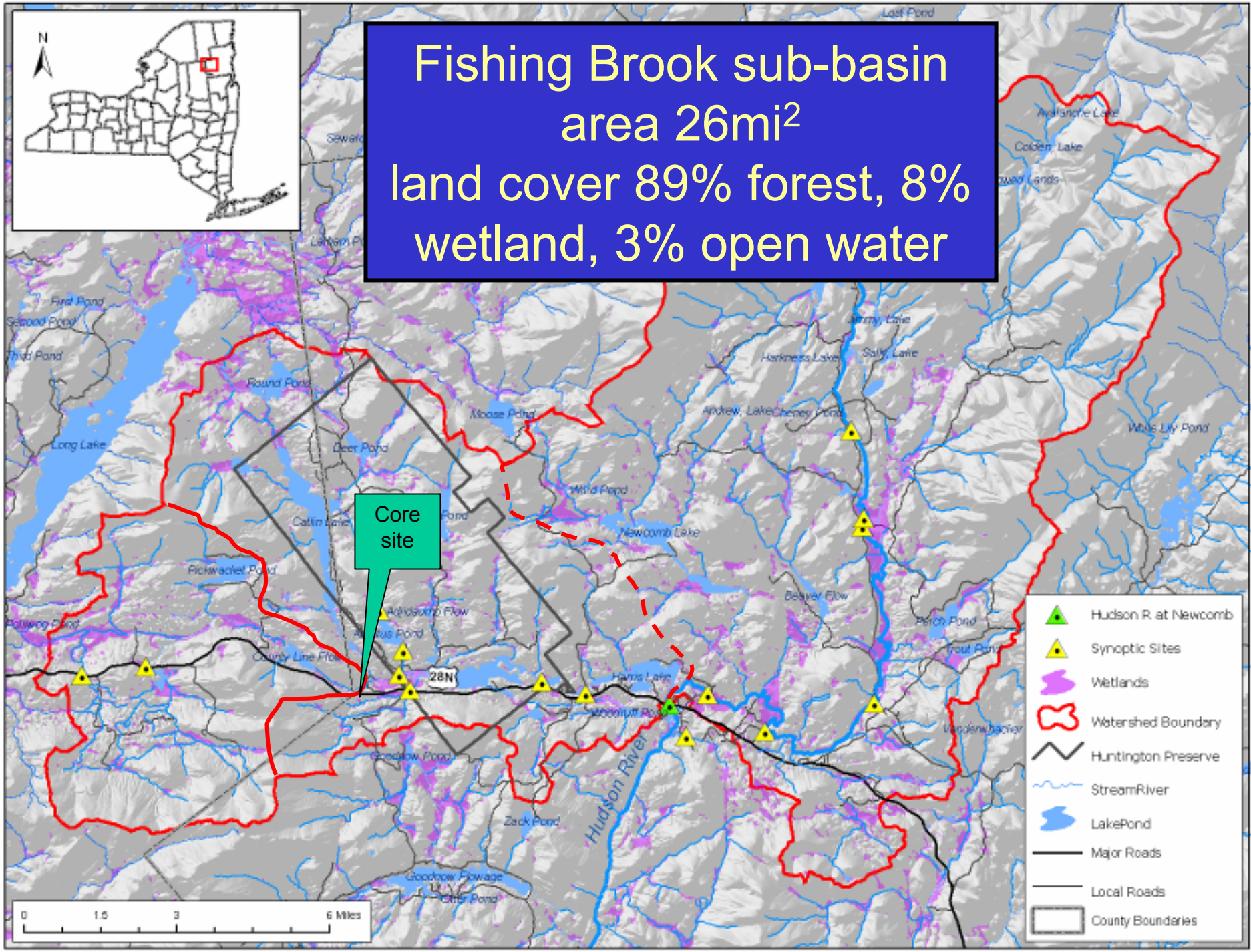
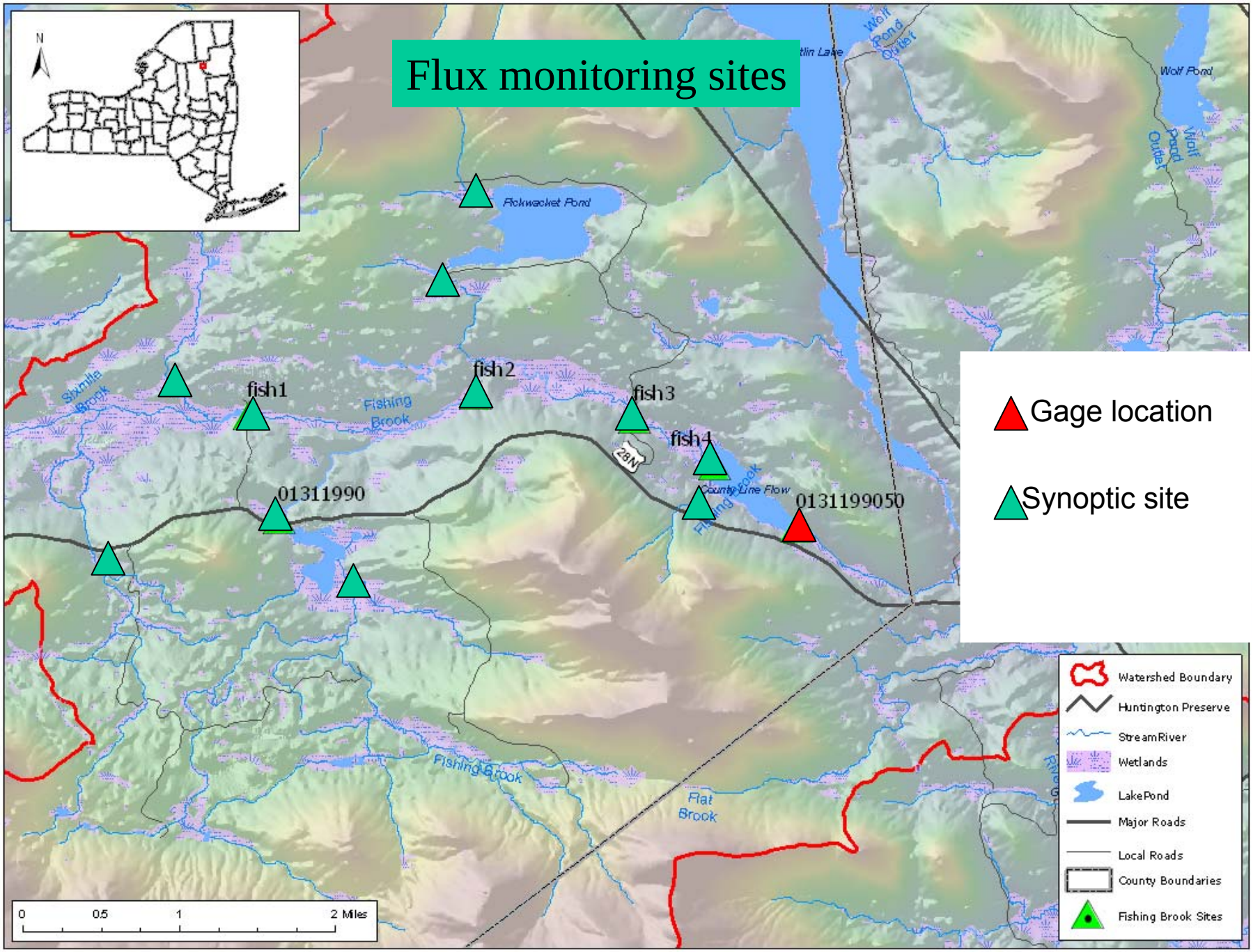

Fishing Brook sub-basin
area 26mi²
land cover 89% forest, 8%
wetland, 3% open water
Core site
N
Hudson R at Newcomb
Synoptic Sites
Wetlands
Watershed Boundary
Huntington Preserve
StreamRiver
LakePond
Major Roads
Local Roads
County Boundaries
Hudson River
28N
0
1.5
3
6 Miles


Flux monitoring sites
N
Rockwacket Pond
Wolf Pond
Wolf Pond Outlet
fish1
fish2
fish3
fish4
01311990
0131199050
Sixmile Brook
Fishing Brook
County Line Flow
28N
Flat Brook
Gage location
Synoptic site
Watershed Boundary
Huntington Preserve
StreamRiver
Wetlands
LakePond
Major Roads
Local Roads
County Boundaries
Fishing Brook Sites
0
0.5
1
2 Miles

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