



Factors affecting smallmouth bass populations in the Susquehanna River

May 15, 2012

Mission: To protect, conserve, and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities

Smallmouth bass *Micropterus dolomieu*

- Member of the sunfish family
- One of the most popular and wide-spread game fishes
- Introduced to the Susquehanna drainage in late 19th century
- Prefers rivers and streams over lakes



Photo by RBest



Photo: Rich Best –Sunken Treasure SCUBA

"Blotchy Bass" syndrome

- Frequently observed by anglers this spring
- Picked up by local media outlets
- Questions and concerns to PFBC and legislators



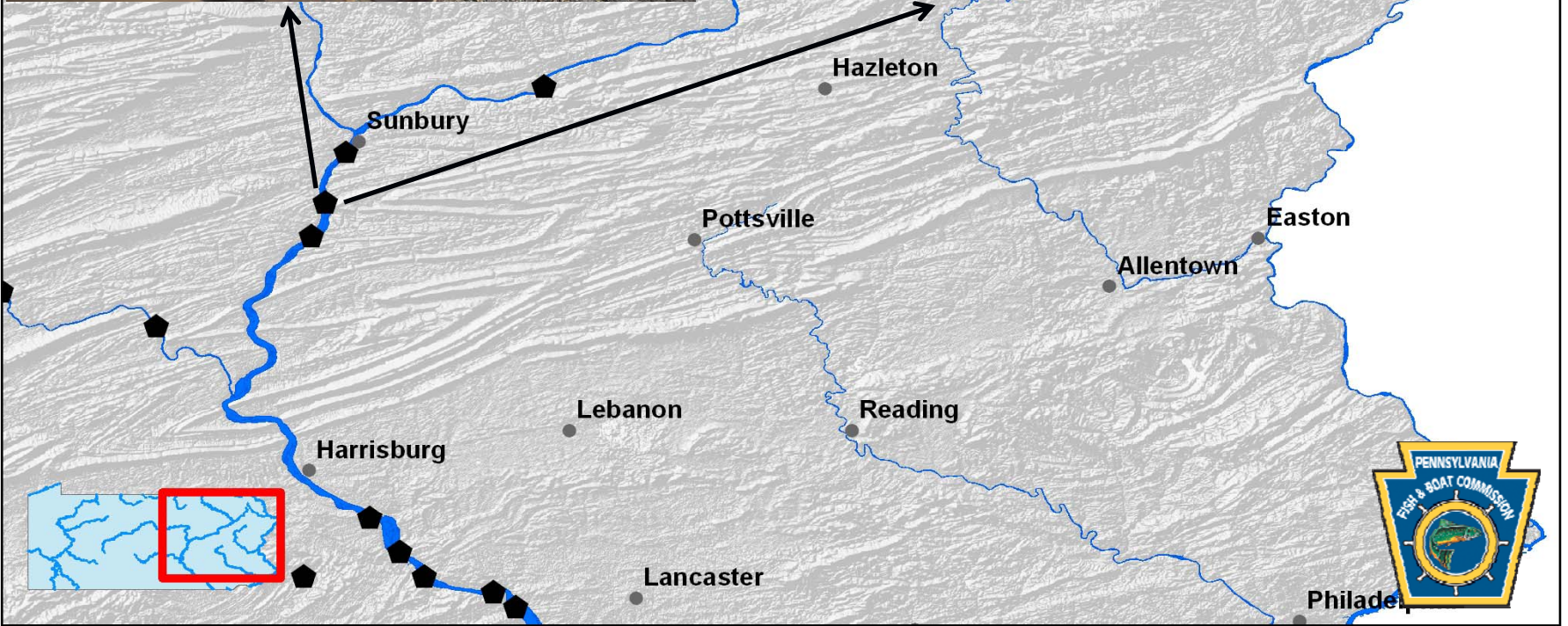
Angler submitted photo



"Blotchy Bass" syndrome

- What we know
 - Melanocytes and melanosomes in the dermis and epidermis of the fish.
 - Typically observed during cold water months
 - Observed throughout the range of bass
 - Melanin is under control of the endocrine (hormone) system
 - All fish observed are apparently healthy (actively feeding)
 - Observed at numerous locations in PA in the past and during 2012
 - Not definitively water-quality related in previous studies





"Blotchy Bass" syndrome

- What we are doing
 - Tissues from fish sent away for analysis
 - Bacterial, viral, and pathology
 - Anticipating results in coming weeks



Onset of disease outbreak

- First appeared in 2005
- West Branch Susquehanna, Susquehanna, and Juniata rivers
- Affected young-of-year (YOY) smallmouth bass
- Disease prevalence as high as 70%



Photo: J. Cukjati - USGS PA Water Sci. Center



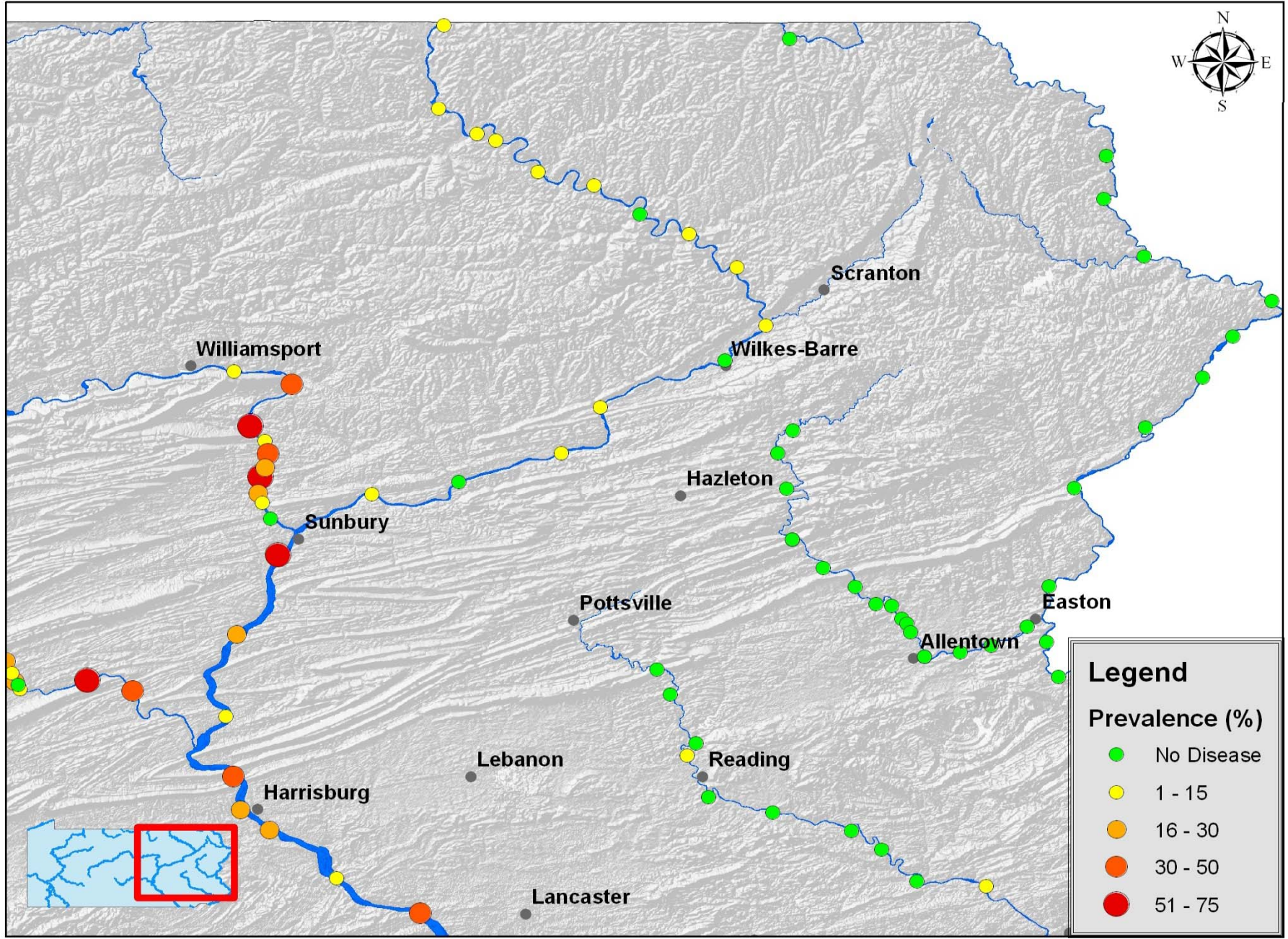
Onset of disease outbreak

- Varies temporally and spatially
- Most prevalent during years with high water temperature
- First documented in tributaries in 2010
- First documented outside of Susquehanna Basin in 2011
 - Still awaiting histopathological confirmation



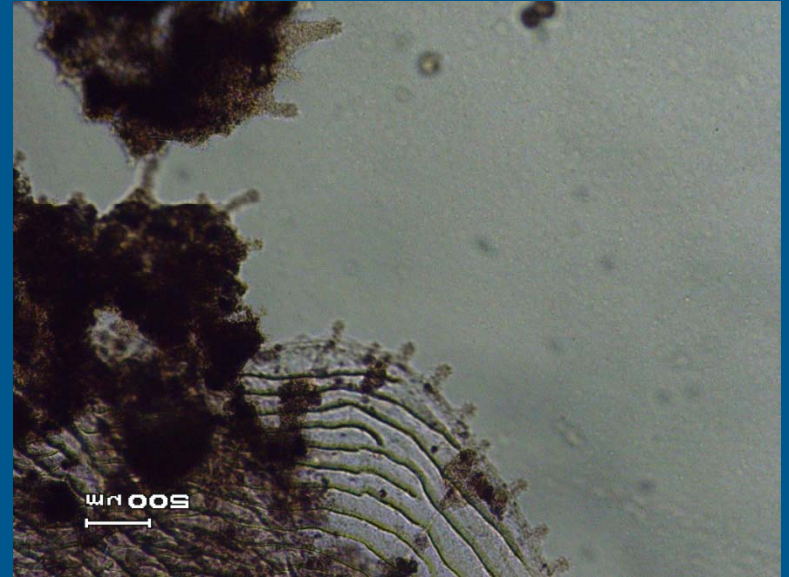
Photo: J. Chaplin - USGS PA Water Sci. Center





Initial diagnosis

- Bacterial infections by *Flavobacterium columnare* or “columnaris”
 - A ubiquitous bacteria found in soil and water
- So why now?



Photos: K. Stark – PFBC retired



Initial hypothesis

- Stressful water quality conditions are compromising immune systems and allowing bacterial colonization
- Why only one life stage of one species?
 - Conditions were most severe in the habitats they reside in at that life stage



Water quality

- Paired main channel and microhabitat study conducted by USGS (2008 – 2010)
 - dissolved oxygen
 - pH
 - specific conductance
 - temperature



Photo: J. Chaplin - USGS PA Water Sci. Center



Susquehanna River at Clemson Island (near New Buffalo, PA)

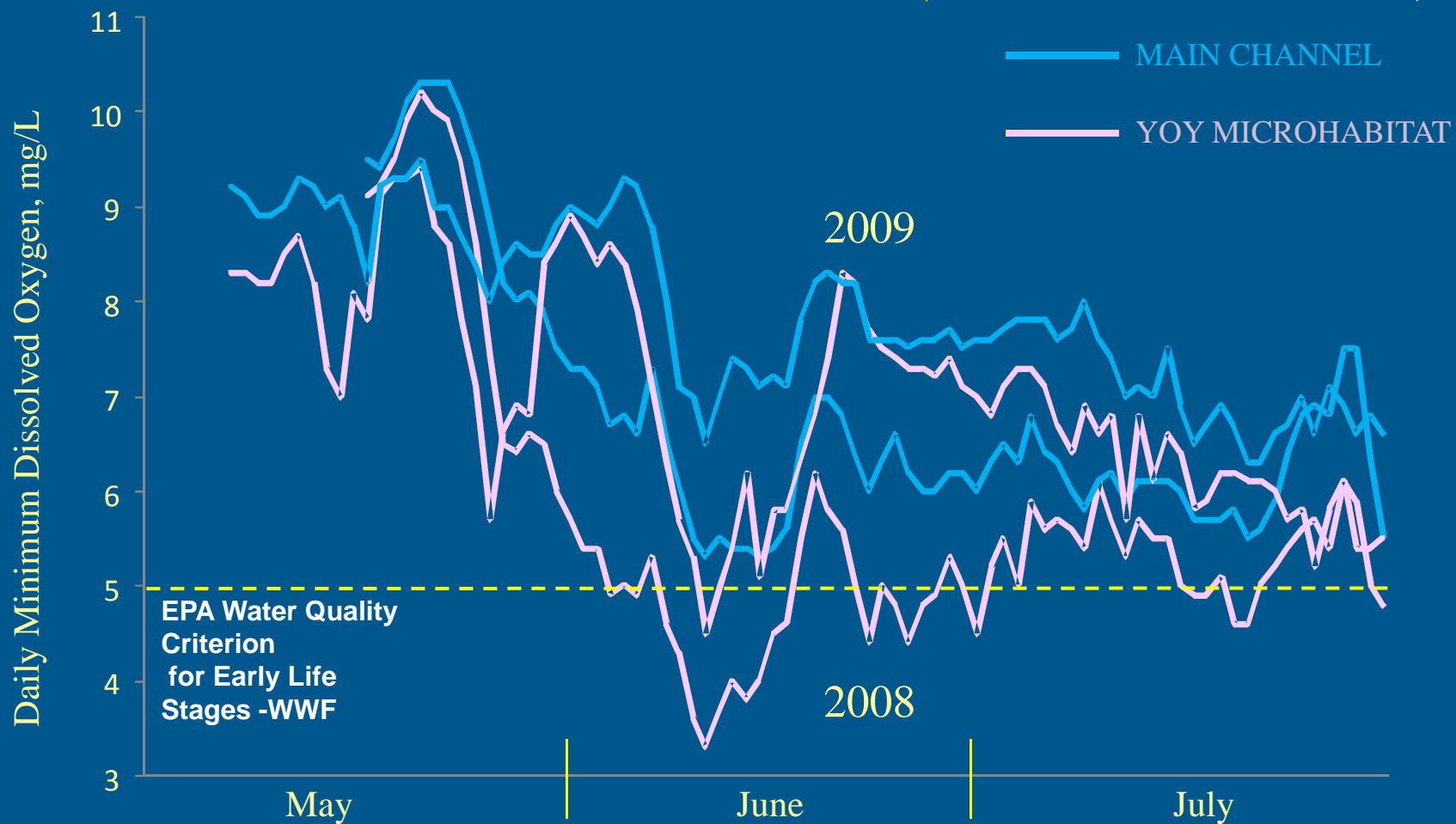


Figure: J Chaplin – USGS PA Water Sci. Center

Why low DO?

- Respiratory demand by aquatic plants
 - Coincident with longest photoperiod of the year and warmest water temperatures
 - Saturation values also the lowest



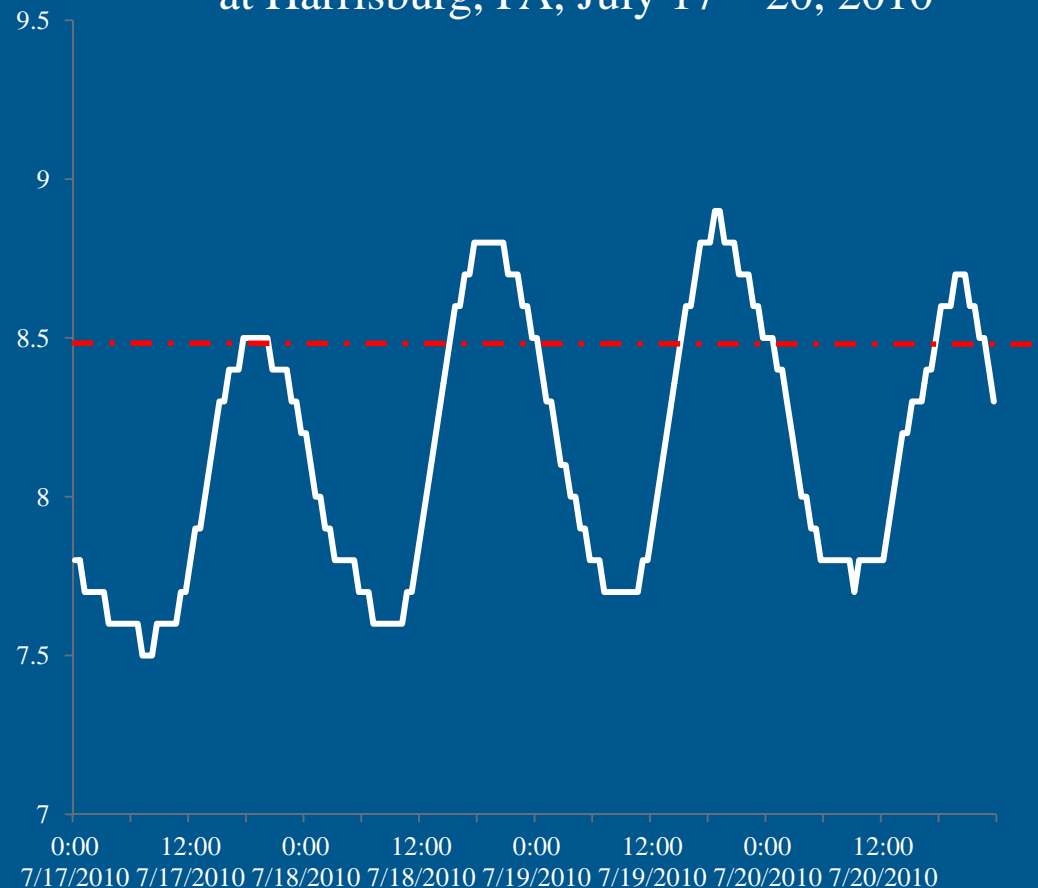
Photo: J. Hepp - PADEP



High pH

- OH^- a product of photosynthesis
 - Wide daily variation
 - Stressful max values
 - Affects osmoregulatory function of fish
 - Many metals and other contaminants become soluble again

pH (standard units) of the Susquehanna River at Harrisburg, PA, July 17 – 20, 2010



The "Perfect Storm" is occurring

- Stressful water quality
 - Temperature
 - Nutrients
 - Dissolved oxygen
 - pH
 - Contaminants
- Bacteria
- Viruses
- Parasites



Photo: J. Tryniewski - PFBC



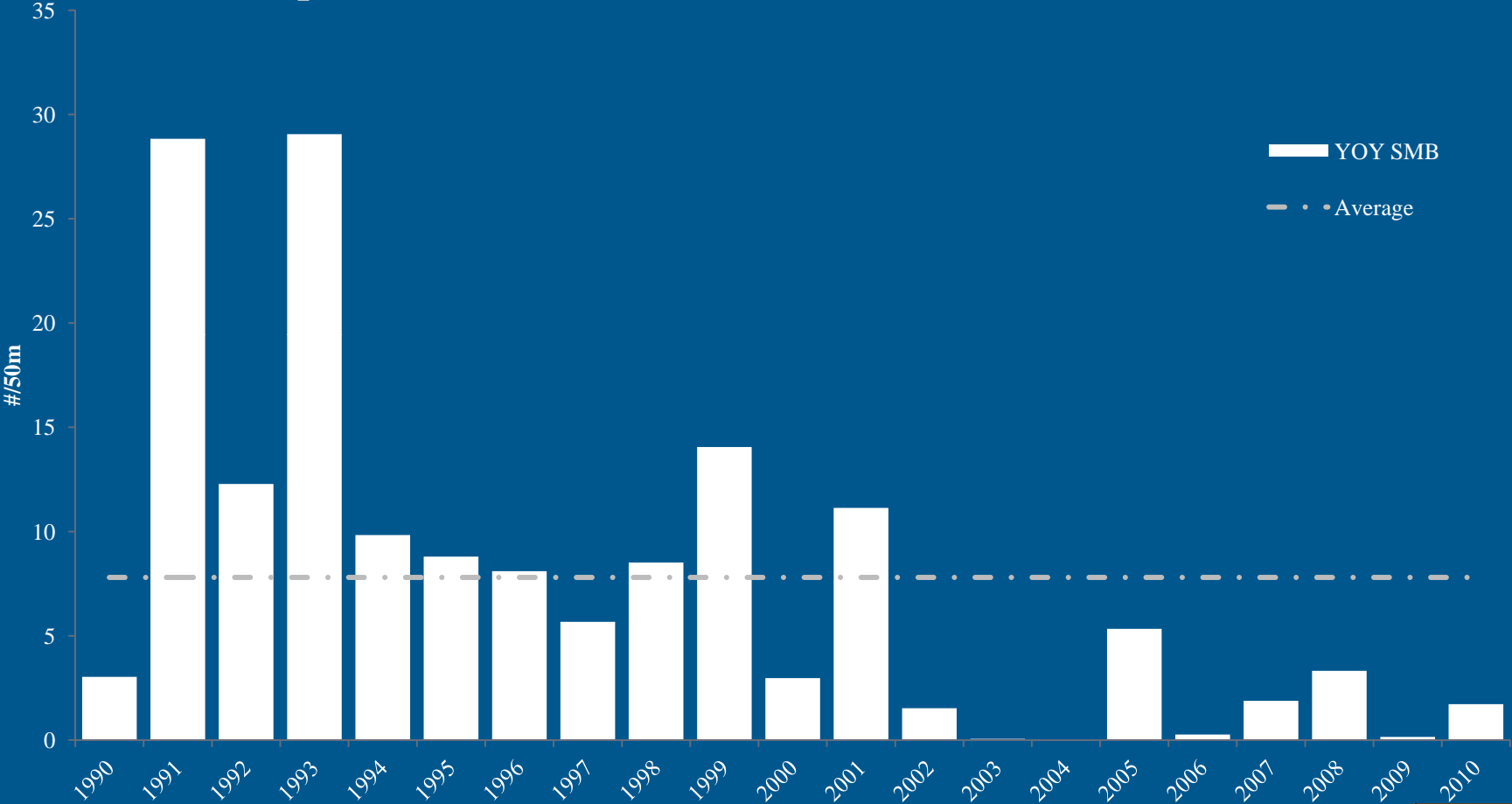
What do we know?

- Several factors seem to driving the condition
- No single factor seems to be responsible
 - Changing the paradigm of fish mortality events
- Recent “behavior” indicates more disease-like
 - Expanding range

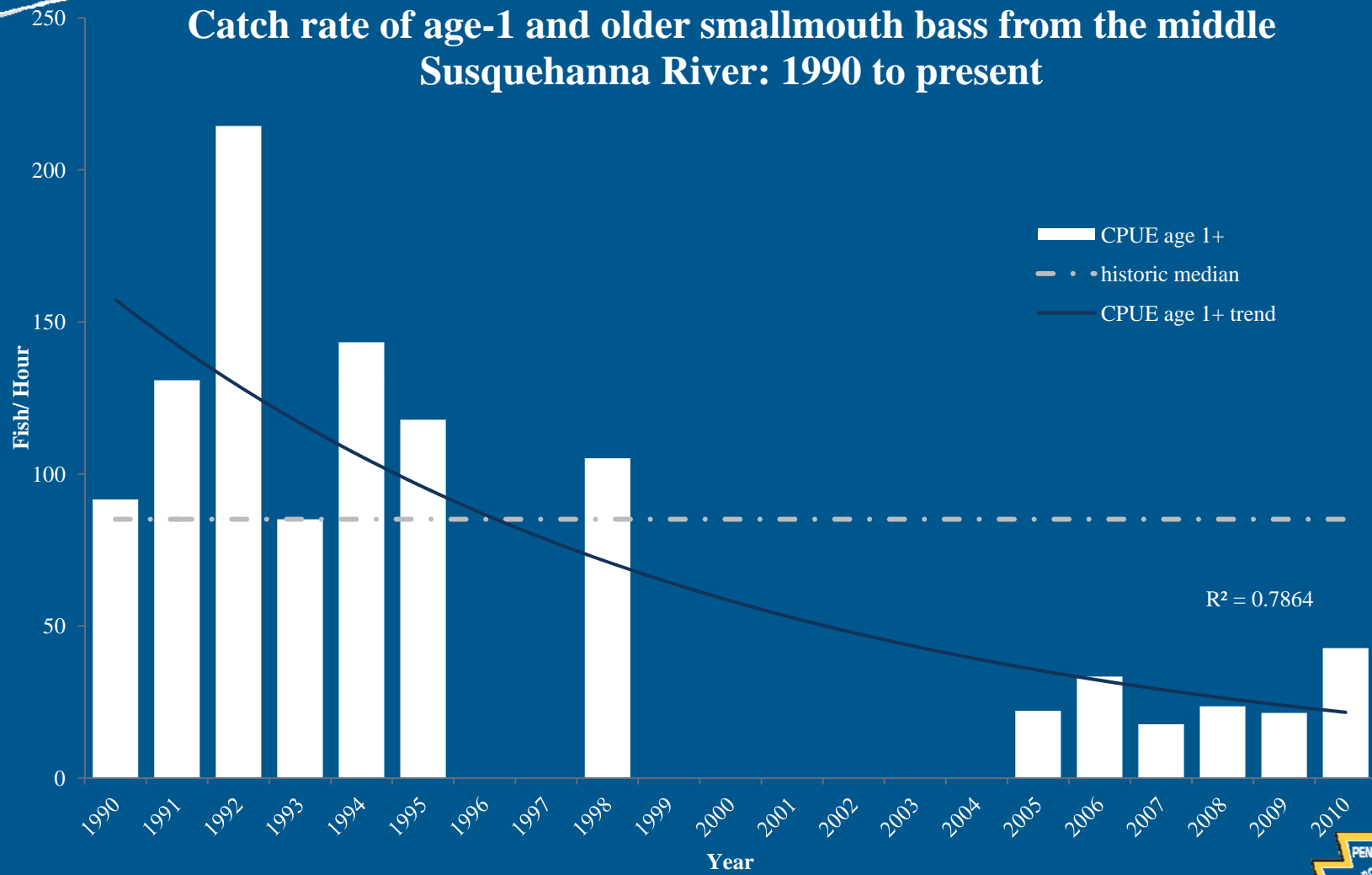


Photo: J. Chaplin – USGS PA Water Sci. Ctr.

Susquehanna River (middle) YOY smallmouth bass catch rates



Catch rate of age-1 and older smallmouth bass from the middle Susquehanna River: 1990 to present



Big business

- Fishing and Boating are big business in PA
 - \$3.4 billion to PA economy, annually
 - 18,000 jobs
 - \$120 million in state and local tax revenue, annually
- Major recreational resource
 - Susquehanna River smallmouth bass
 - Nearly 69,000 trips
 - 286,144 hours (Smucker *et al.* 2010)



Photo: M. Hendricks



Public outcry

- Several public meeting over the last several years
 - Approximately 1,000 attendees
 - Hundreds of comment letters
 - Contention between angler groups



Photo: PFBC Archives



Public outcry

- Press coverage
 - Newspaper articles, Editorials, Op-Eds
 - Numerous local articles (Harrisburg, Sunbury, Lancaster, Williamsport)
 - Baltimore Sun
 - Magazine articles
 - Mid Atlantic Fly Fishing Guide
 - Outdoor News
 - Flyfishing magazine
 - Outdoor America
 - Television programs and radio stories/ programs
 - Countless blogs and web forums



Policy-level activity

- Several contacts from legislators regarding constituents
- Presentations to House Fish and Game Committee
- Emergency Action to change regulations to immediate catch-and-release
- Formal regulation changes
- Request for PADEP impairment



Photo: S. Gearhart - PFBC



Request for PADEP Impairment

- Submitted data and letter to PADEP requesting listing in the *Integrated Monitoring and Assessment Report* as an impaired water
 - Violates minimum daily DO and pH for WWF
 - Signatories include PennFuture, Trout Unlimited (PA), Chesapeake Bay Foundation, and American Rivers



Request for PADEP Impairment

- Draft Report does not include Susquehanna River
 - Resubmitting data
 - Preparing comment letter
 - Requesting public support



Request for PADEP Impairment

- Public comment period ends May 22nd
 - Pennsylvania Department of Environmental Protection
Bureau of Water Standards and Facility Regulation
Division of Water Quality Standards
Molly Pulket
P.O. Box 8467
Harrisburg, PA 17105-8467



Questions

