

The Delaware River American shad stock: a positive assessment

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A Delaware River American shad



Background on American shad

- The American shad is the largest member of the herring family in the world (Gee Whiz!), and like other herring, filter-feeds on planktonic organisms
- *Alosa sapidissima* is named for the delicious taste of its flesh
- Anadromous life history, including several years spent at sea, migrating up into the Gulf of Maine
- Iteroparous life history, meaning they can spawn several times.
- The Delaware is the only major undammed river on the coast, and consequently, Delaware River shad make the longest spawning run, over 530 kilometers up into the East Branch in New York.

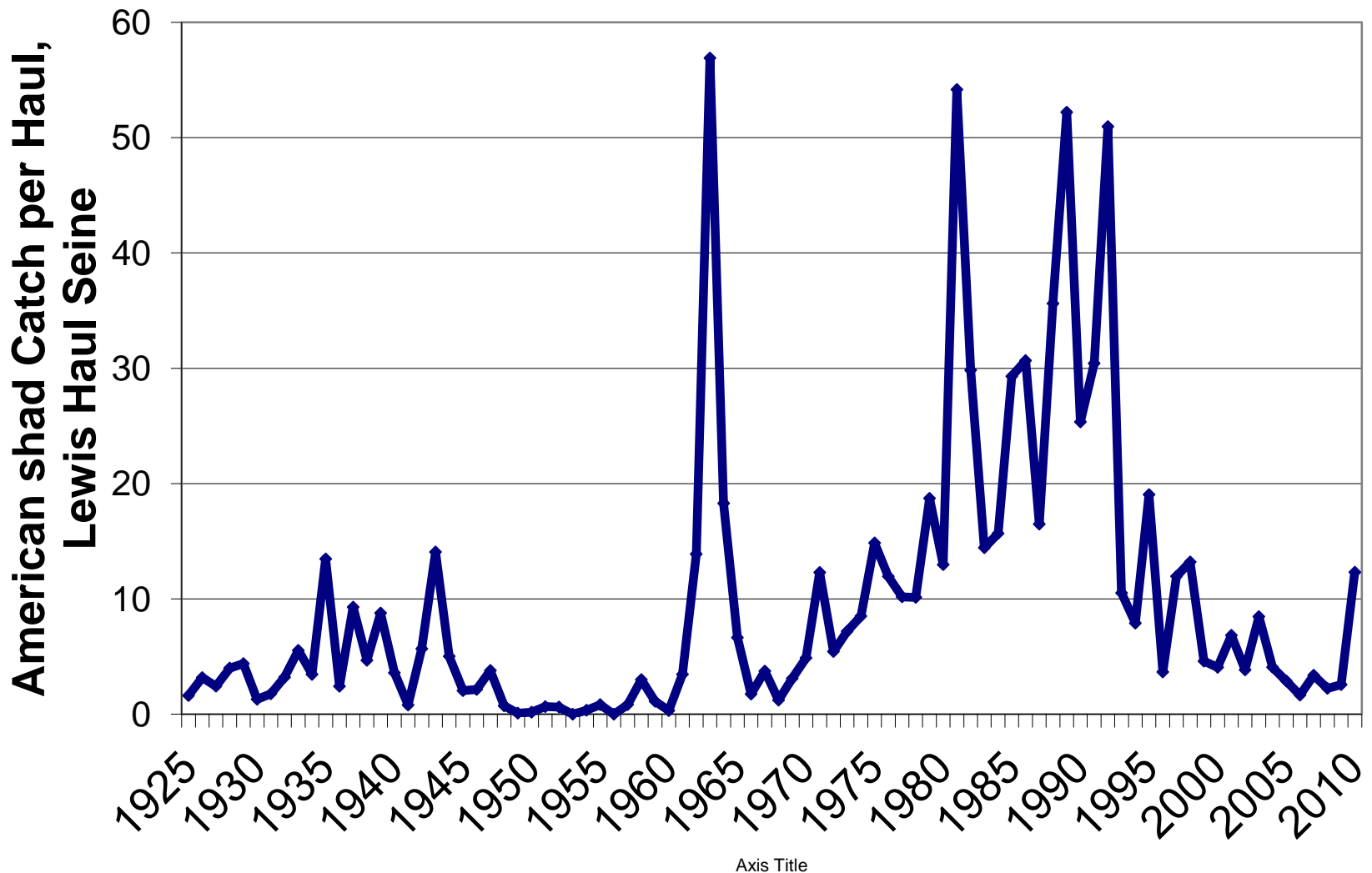
The Delaware shad migration: Cape Henlopen to the East Branch – more than 530 kilometers



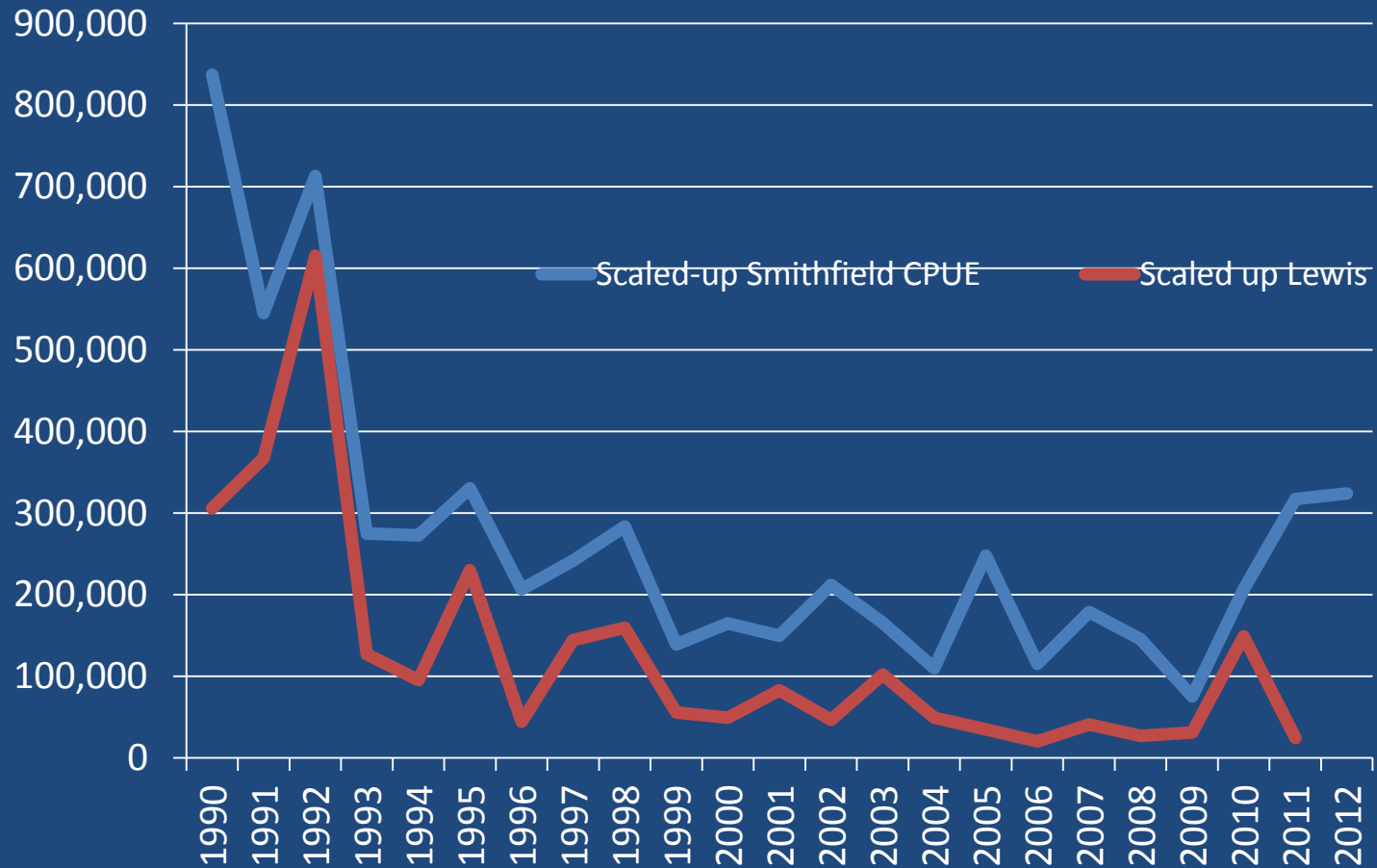
Water quality has been a major factor affecting trends in abundance

- Even during the decades of anoxia, adults could usually make it upriver in spring before DO dropped
- During the mid-twentieth century, by June, virtually zero dissolved oxygen in the Philadelphia – Wilmington corridor.
- Anoxia persisted through November most years
- Adult postspawn downriver during summer – blocked, probably killed by anoxia
- Young of year shad migrate down in the fall – blocked or killed.

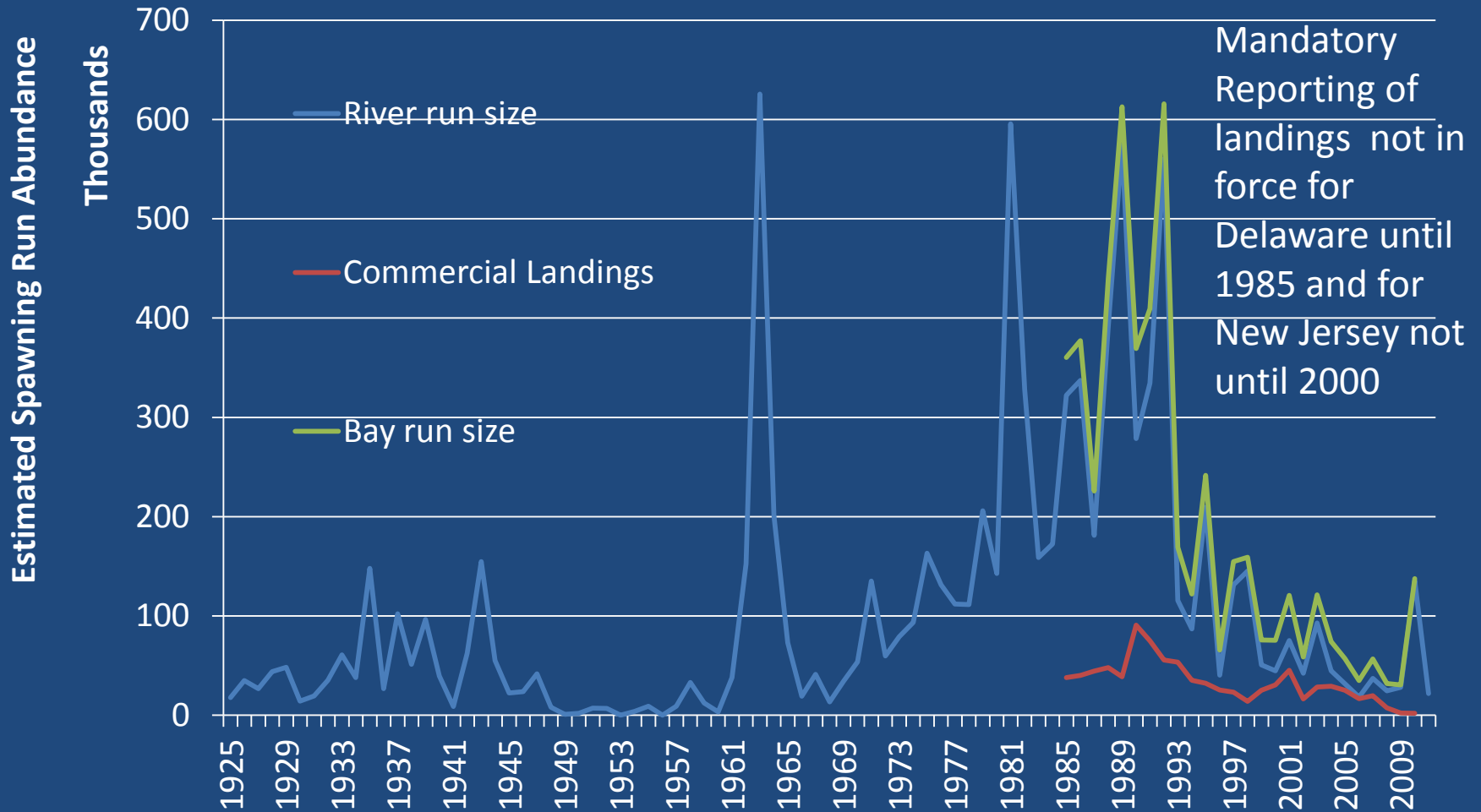
The American shad spawning run, Delaware River, relative abundance 1925 – 2010



Two estimates of shad spawning run absolute abundance, 1990- 2012



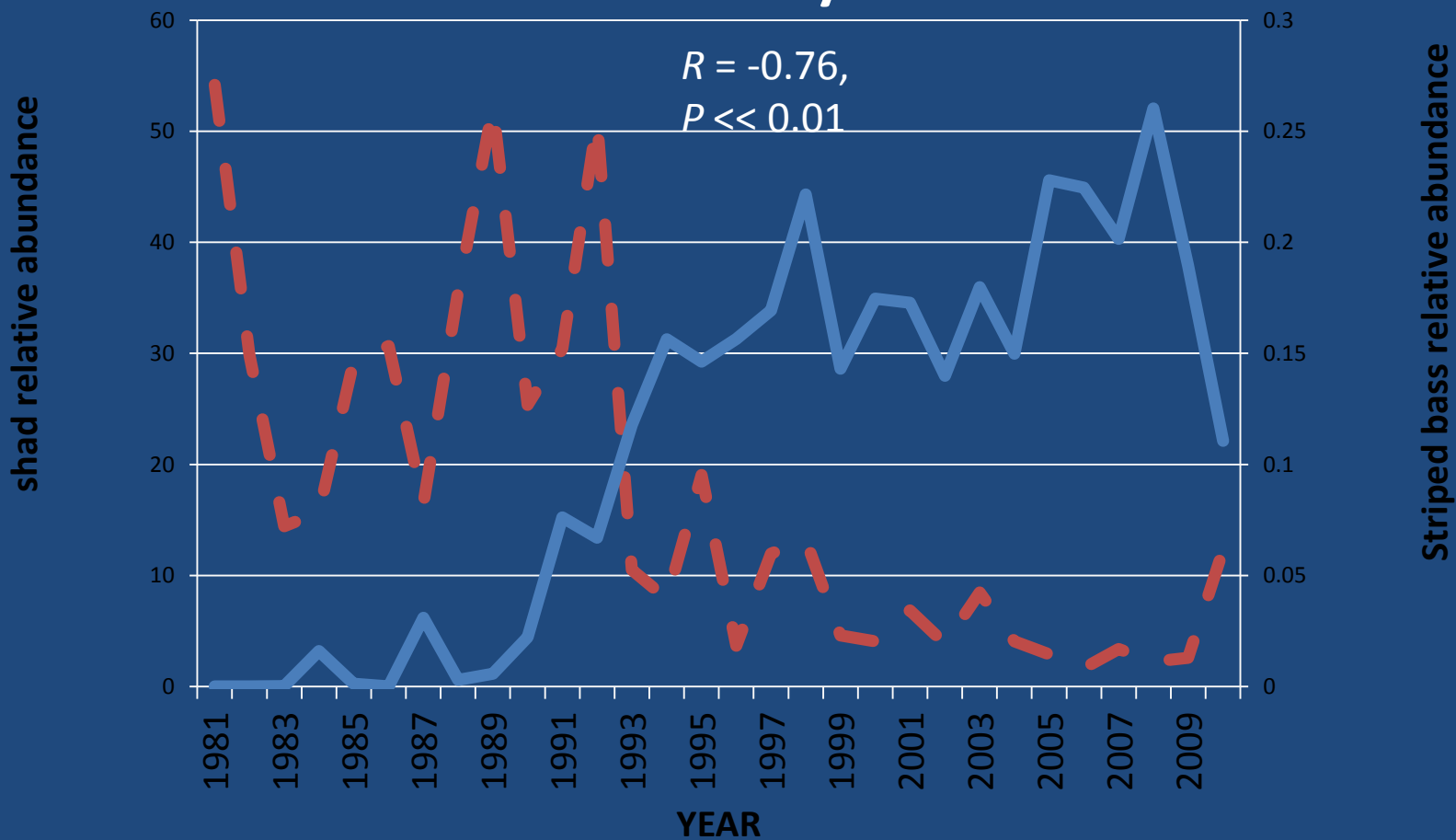
Estimated Spawning Run Abundance, 1925 – 2011, with commercial fishery landings 1985-2011



More than one hypothesis for the cause of the coast-wide shad decline of the 1990- 2009 period

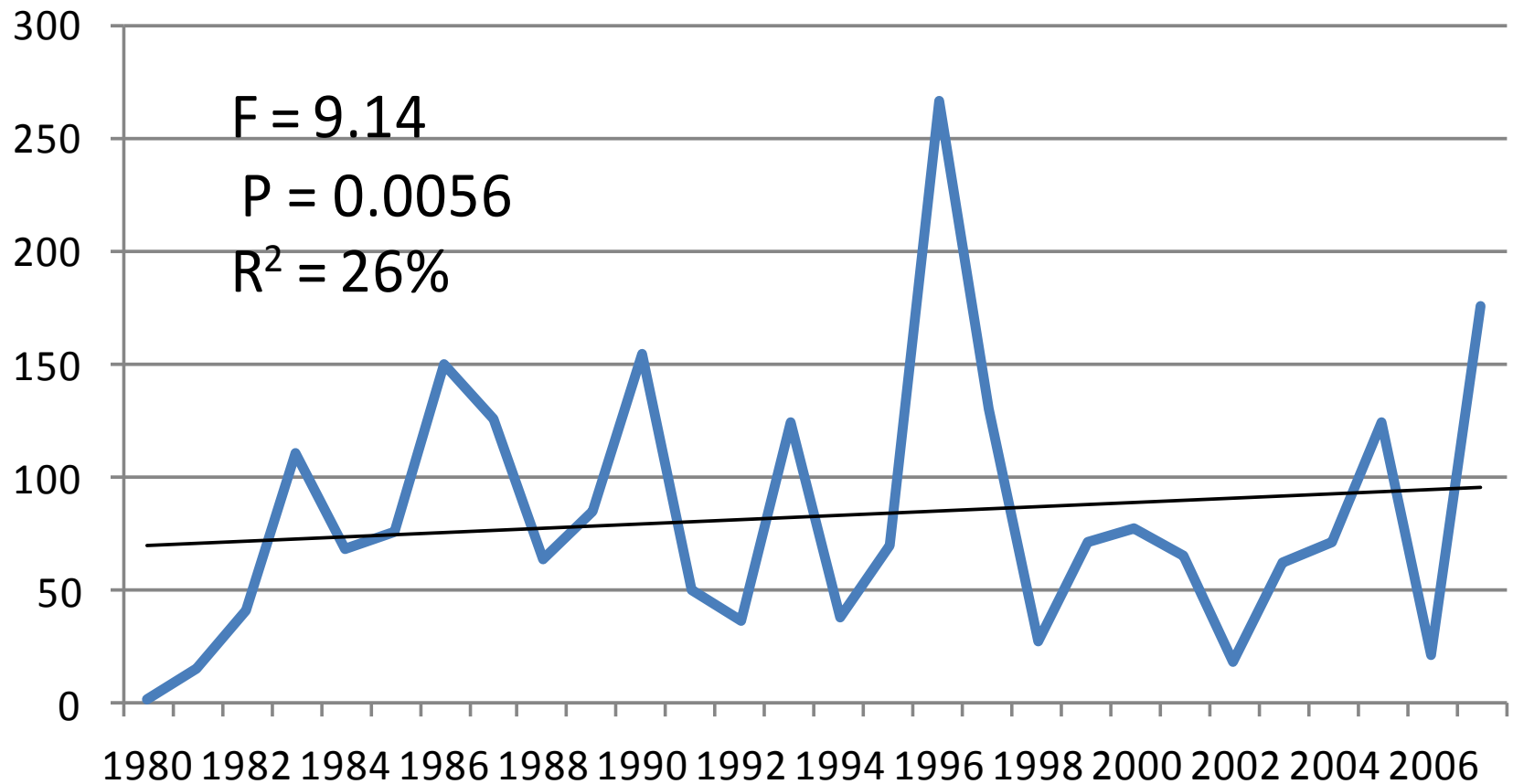
- Overfishing? Managers acted on this by closing the ocean fishery by 2005, but the stock did not respond
- Increased predation by striped bass suggested by research on the Connecticut River. We tested this hypothesis for the Delaware, and could not reject it.

Shad and bass are negatively correlated in the Delaware River and Bay



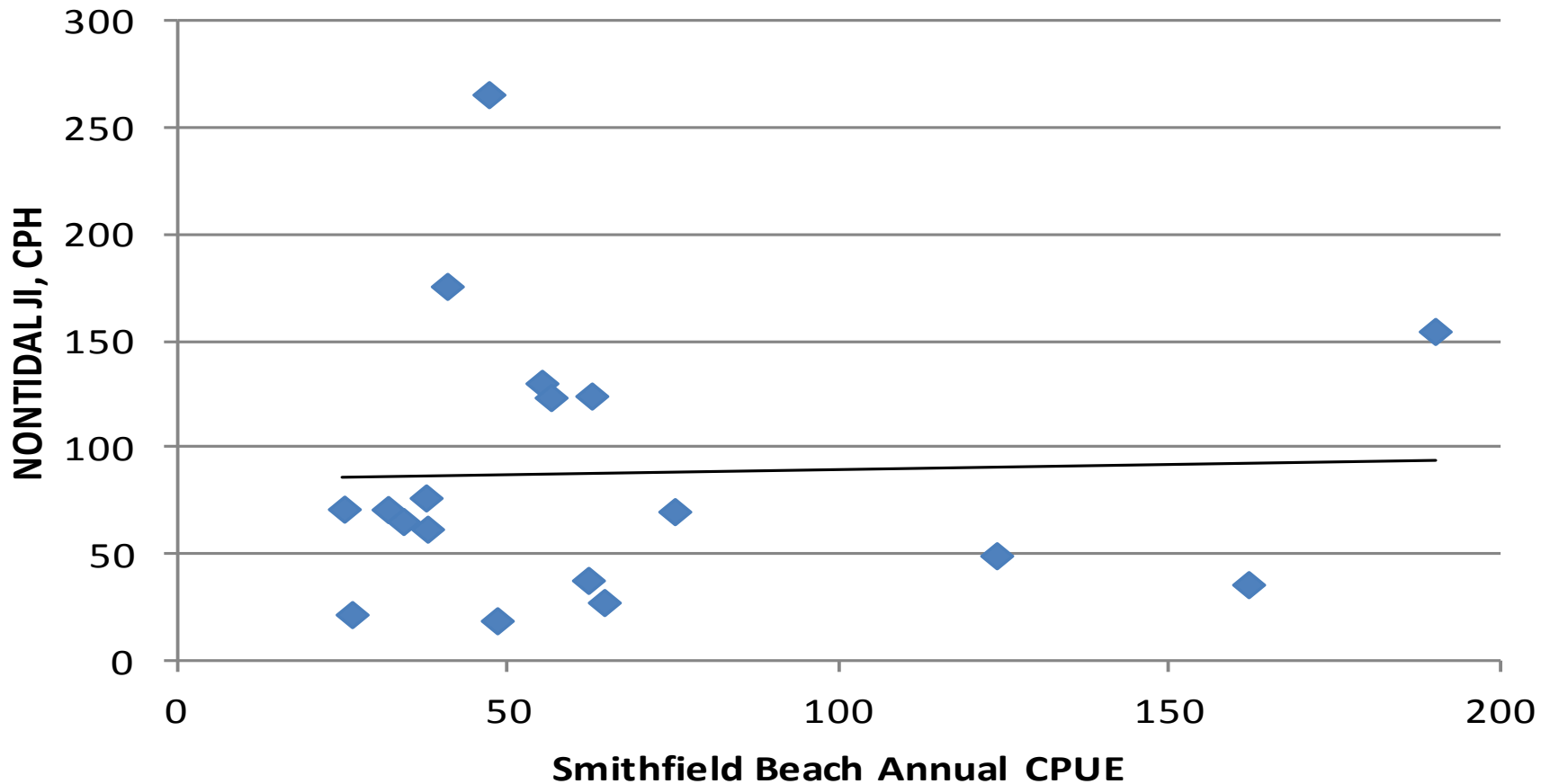
Stock reproduction: Both young-of-year indices show a positive trend over time in young of year abundance

Upper Non-tidal Young-of-Year Index



Did the recent reduction in the spawning run produce a reduction in young of year production?

No clear reduction in production of young shad at lower run sizes.



Conclusion

- The stock is healthy and reproducing at a relatively consistent level
- Negative impact of anoxia has been eliminated
- Recent abundance fluctuations are consistent with a dominant effect of predation by striped bass
- Fishing impacts have been at a sustainable level over
- the last decade (only period with mandatory landings reporting).