MARYLAND DEPARTMENT OF NATURAL RESOURCES

Managing Development and Chesapeake Bay's Estuarine Fish Habitat and Fisheries

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Maryland Fisheries Service

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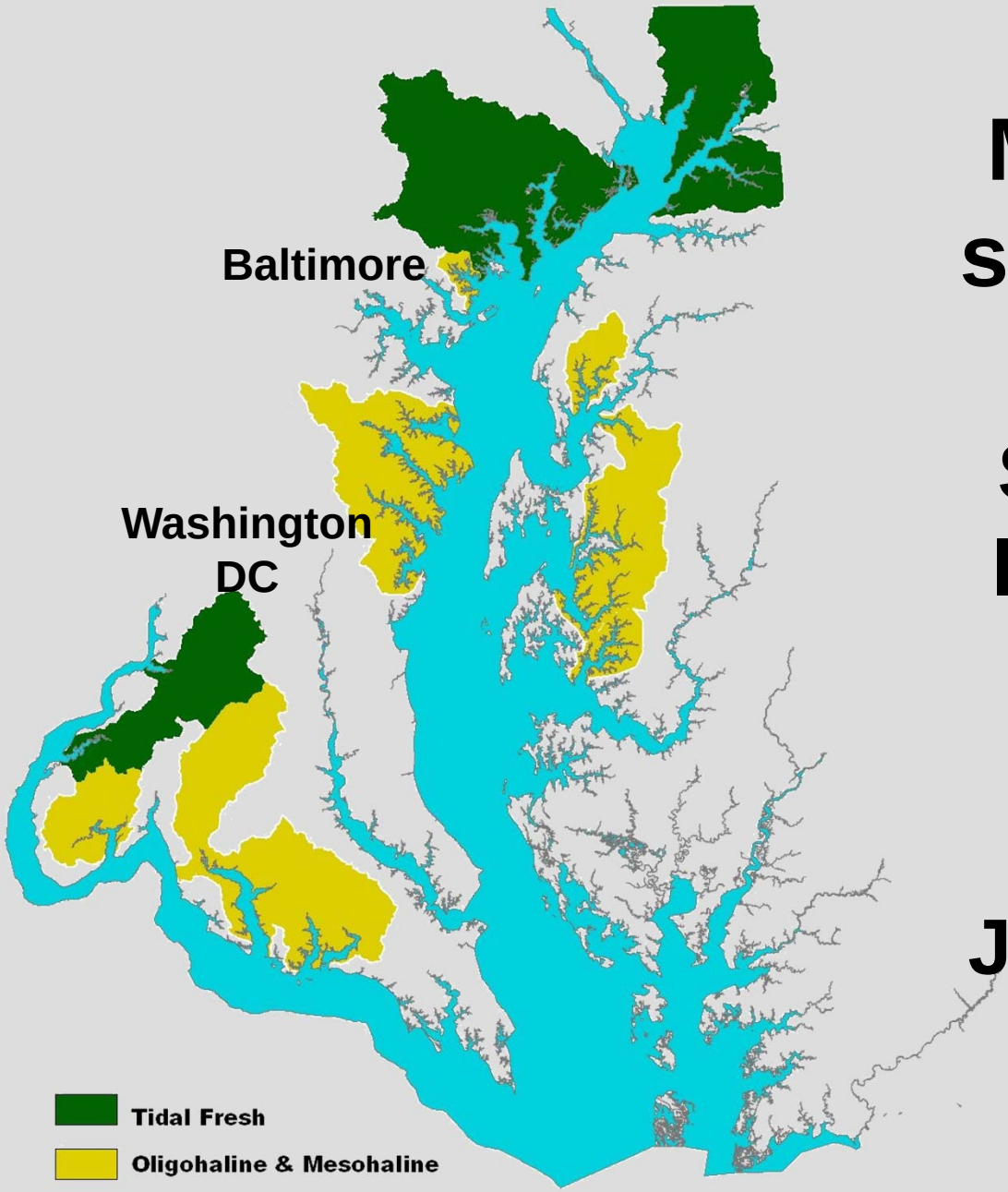
Maryland Fisheries Service has been looking at development and fish habitat dynamics in Chesapeake Bay

- **Goals:**
  - **Fish management strategies that reflect development's impact**
  - **Guidance for planning agencies**
  - **Public support for watershed conservation**

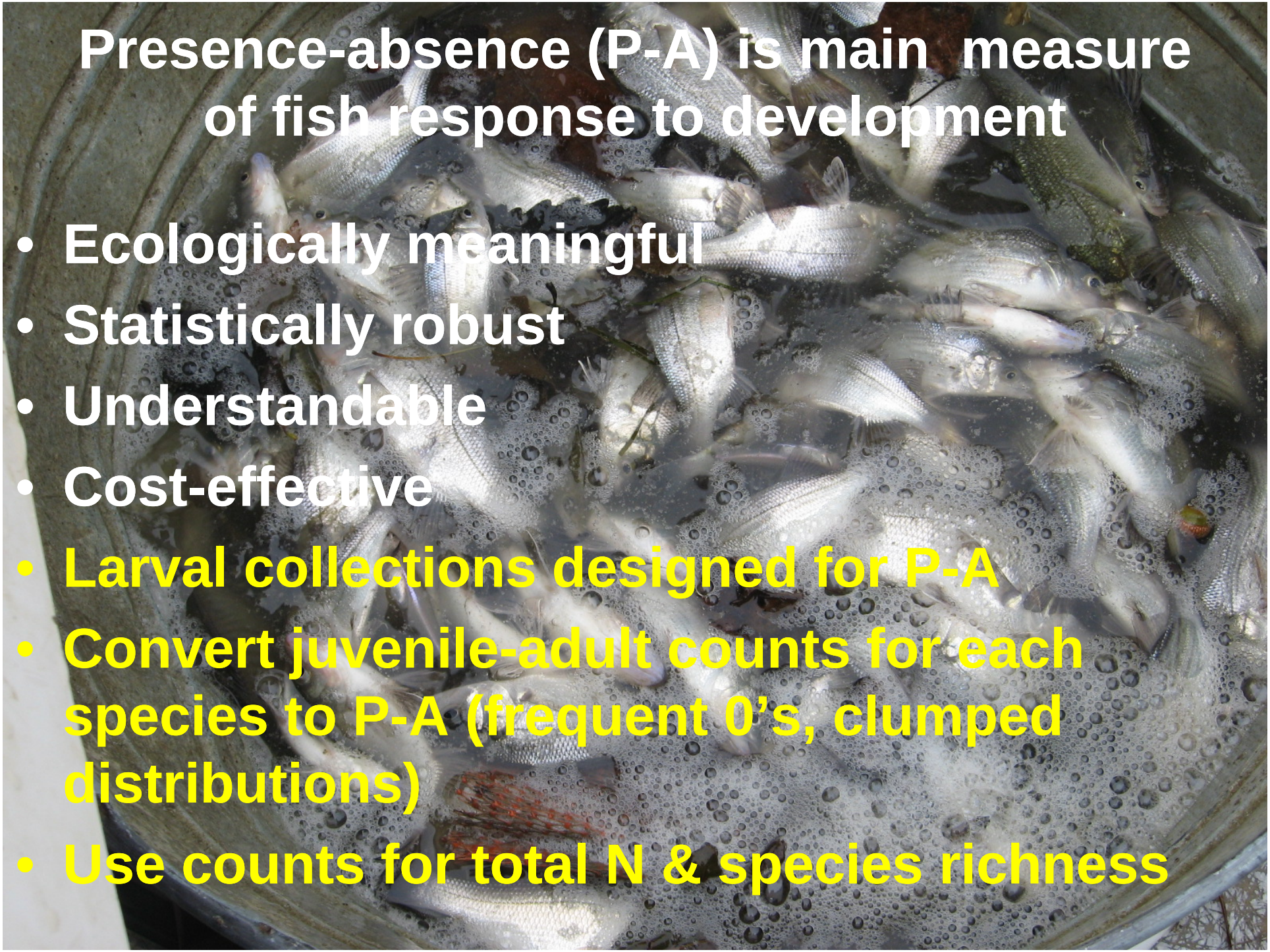


MD subestuaries studied 2001-2011

Spring spawning & larval habitat: egg-larval collections.

Summer habitat: Juvenile-adult & DO

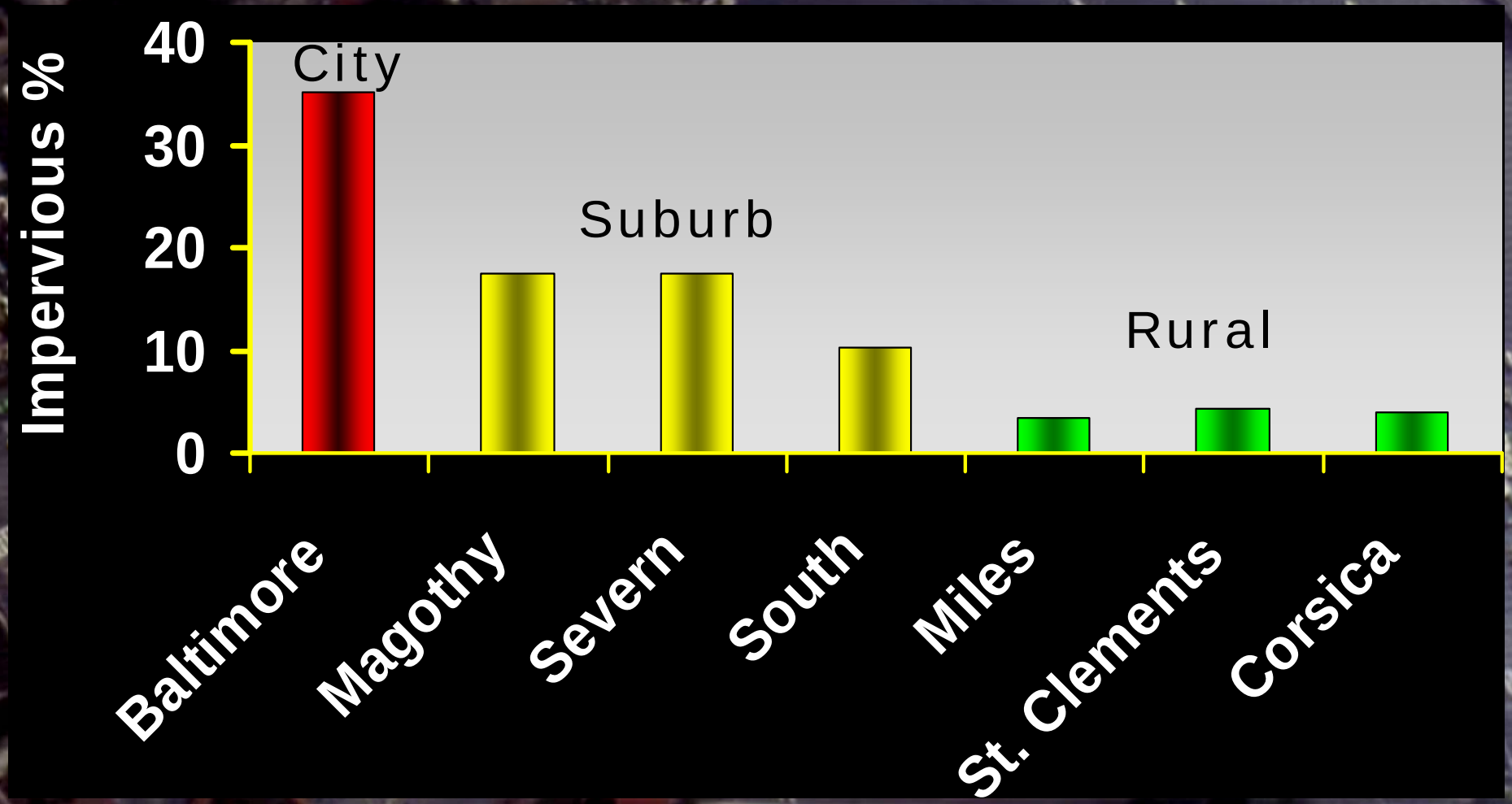
Focus is on “iconic”managed species



Presence-absence (P-A) is main measure of fish response to development

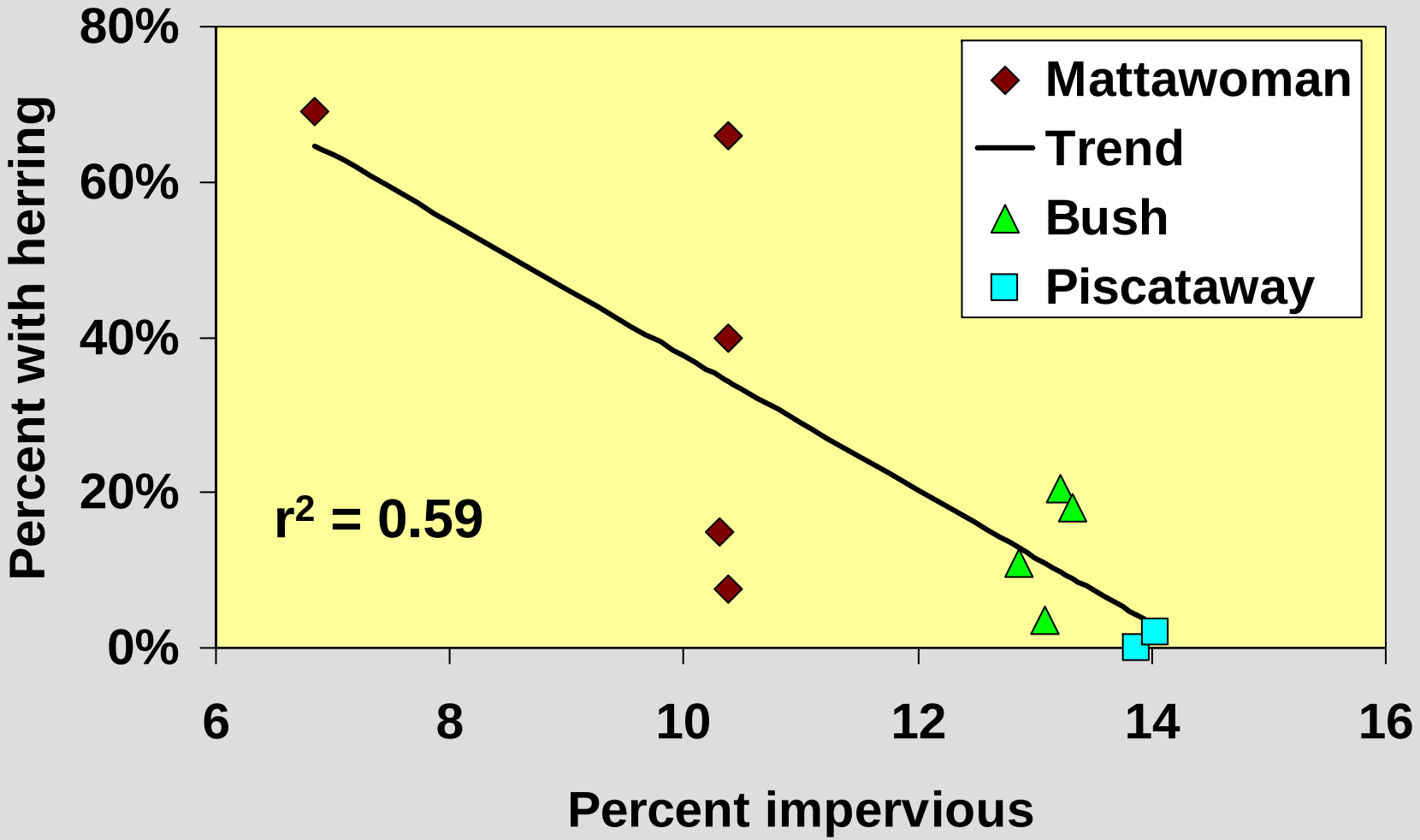
- Ecologically meaningful
- Statistically robust
- Understandable
- Cost-effective
- Larval collections designed for P-A
- Convert juvenile-adult counts for each species to P-A (frequent 0's, clumped distributions)
- Use counts for total N & species richness

Impervious surface measures intensity of development

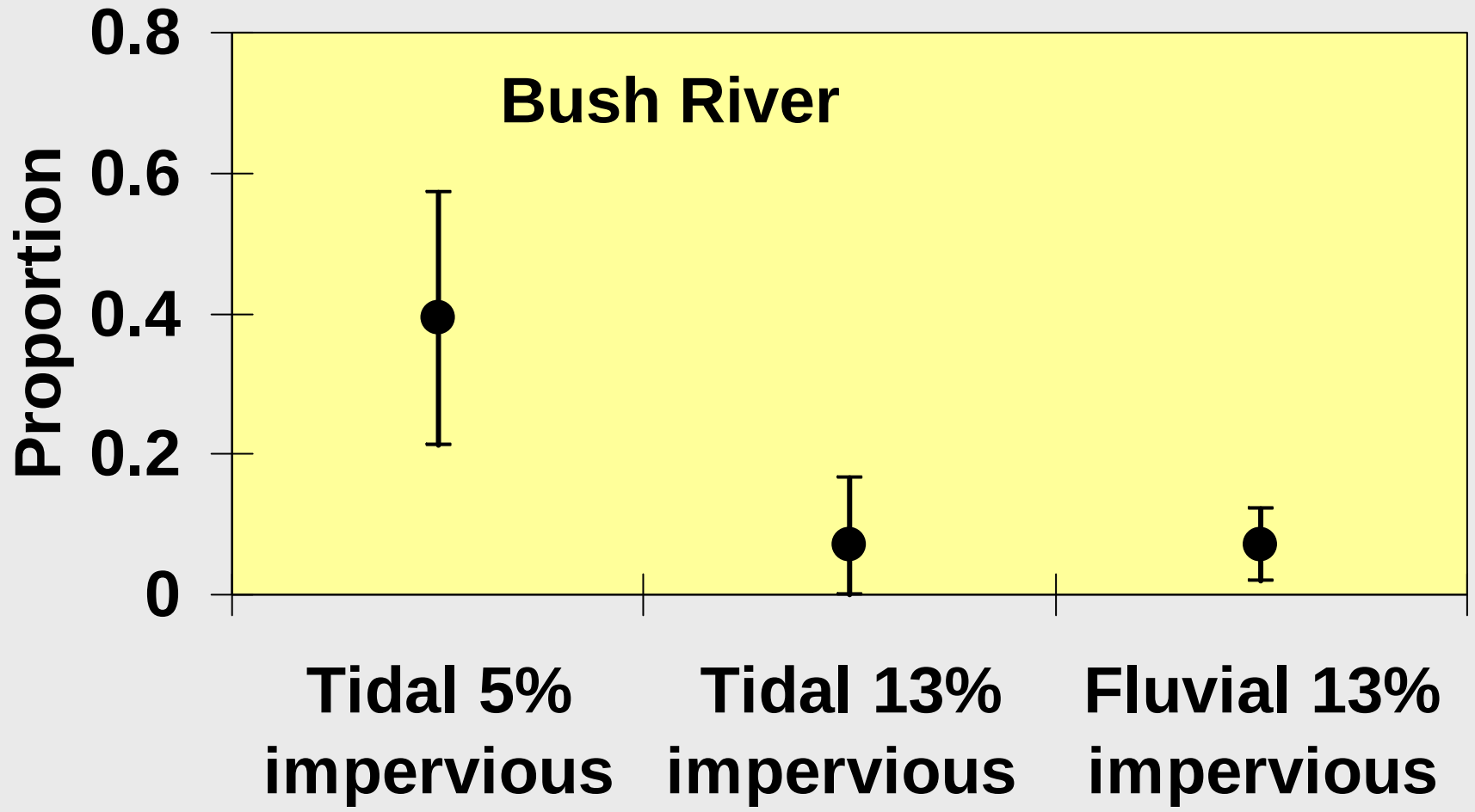



Volunteers conducted anadromous fish stream surveys during 2005-2010 to explore development's effect.
Three watersheds were sampled.

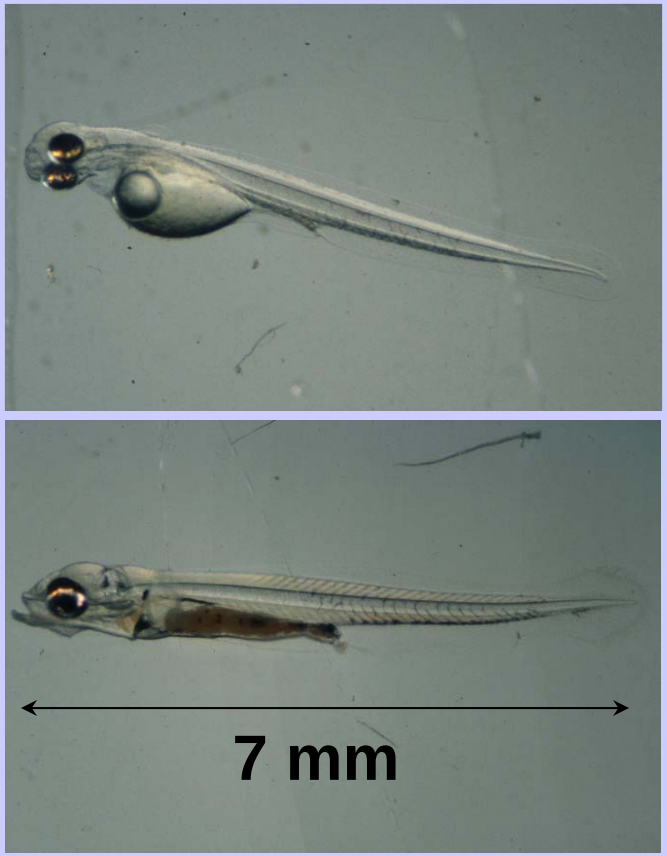
Percent of stream samples with herring eggs and larvae falls with impervious surface



Proportion of samples (95% CI) with anadromous fish eggs or larvae in developed and undeveloped portions of watershed

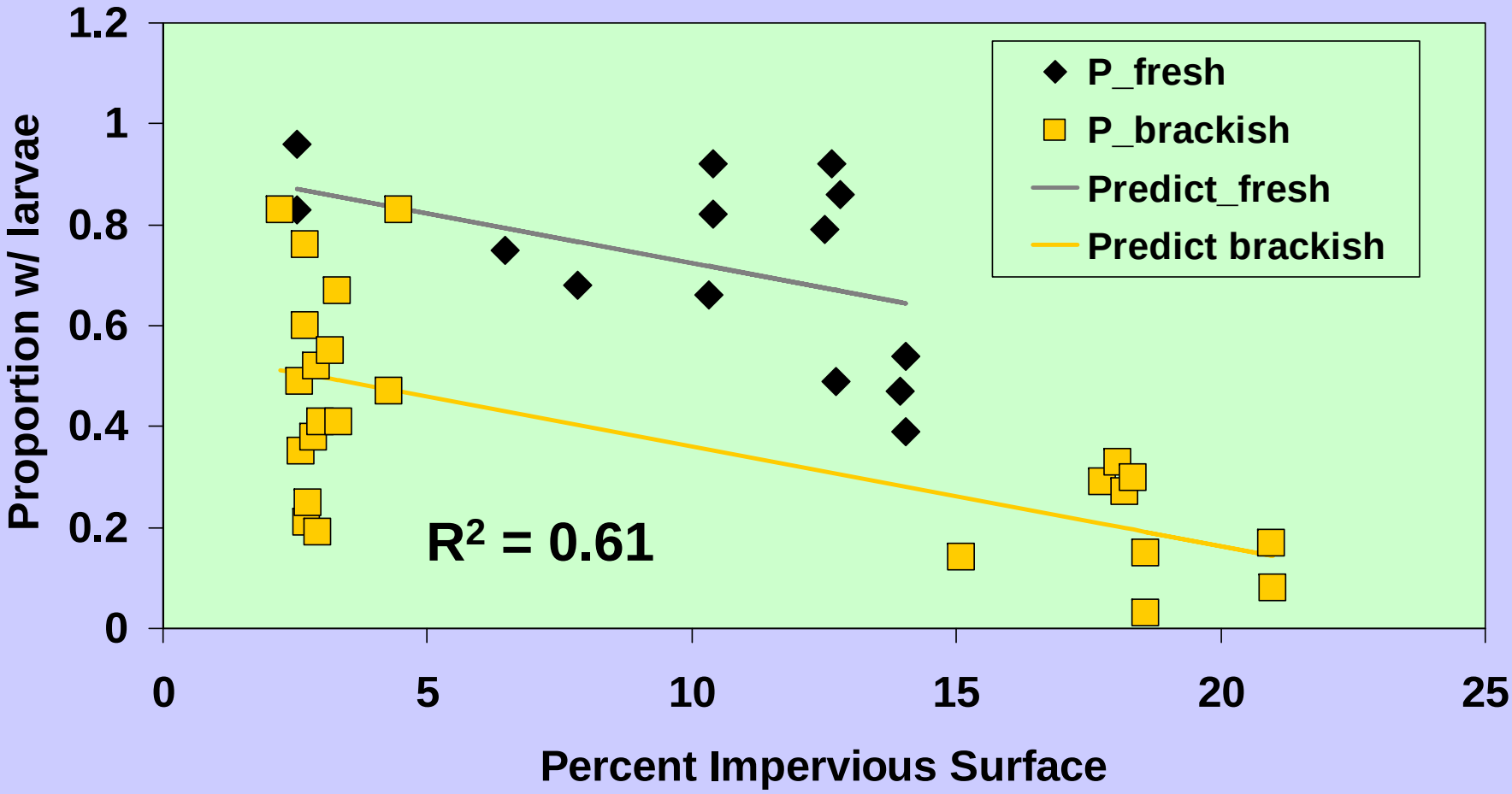


Estuarine yellow perch larvae were sampled with plankton nets towed from boats

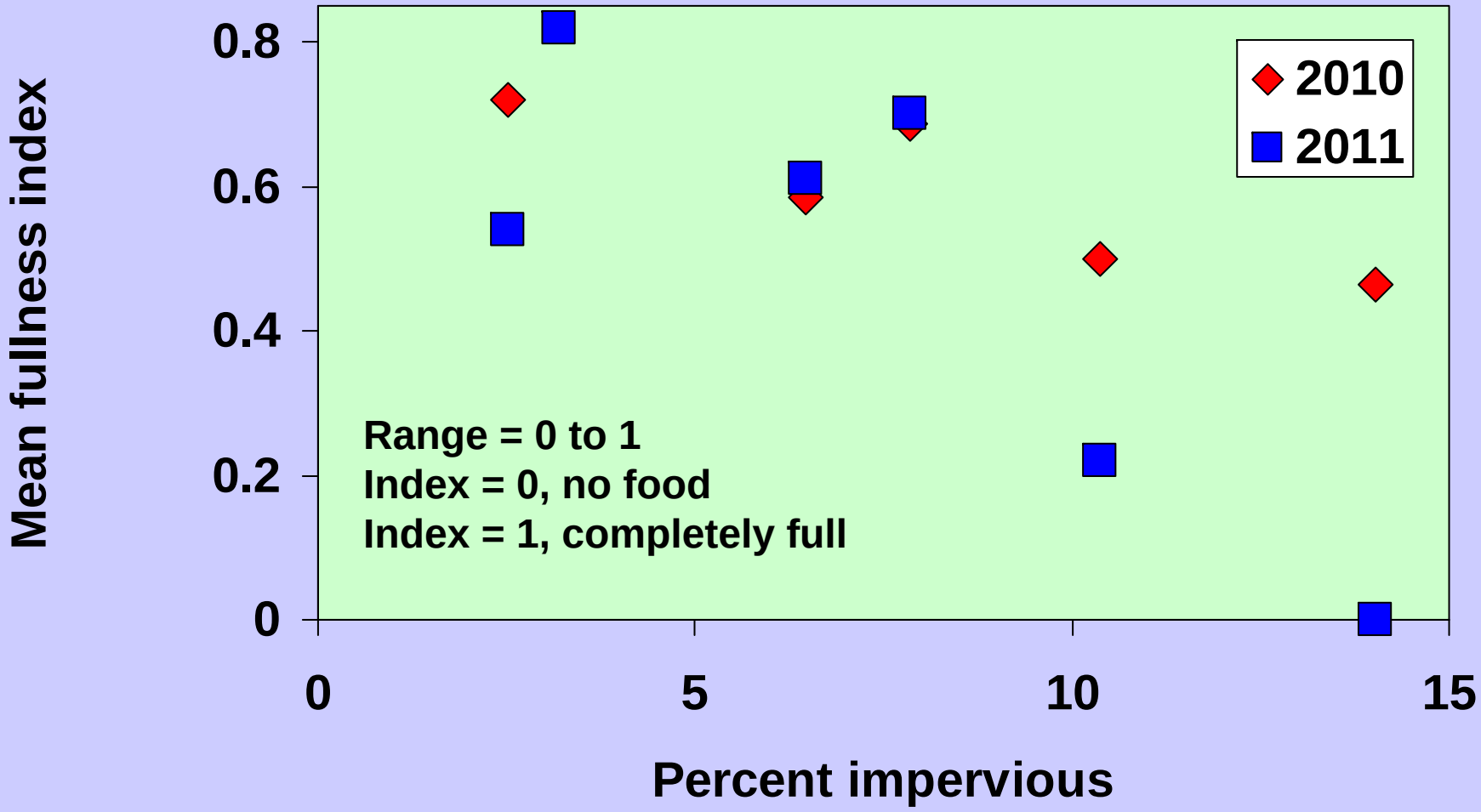


Proportion of tows with yellow perch larvae declines with development in tidal-fresh and brackish subestuaries

(fresh and brackish as categories in regression)

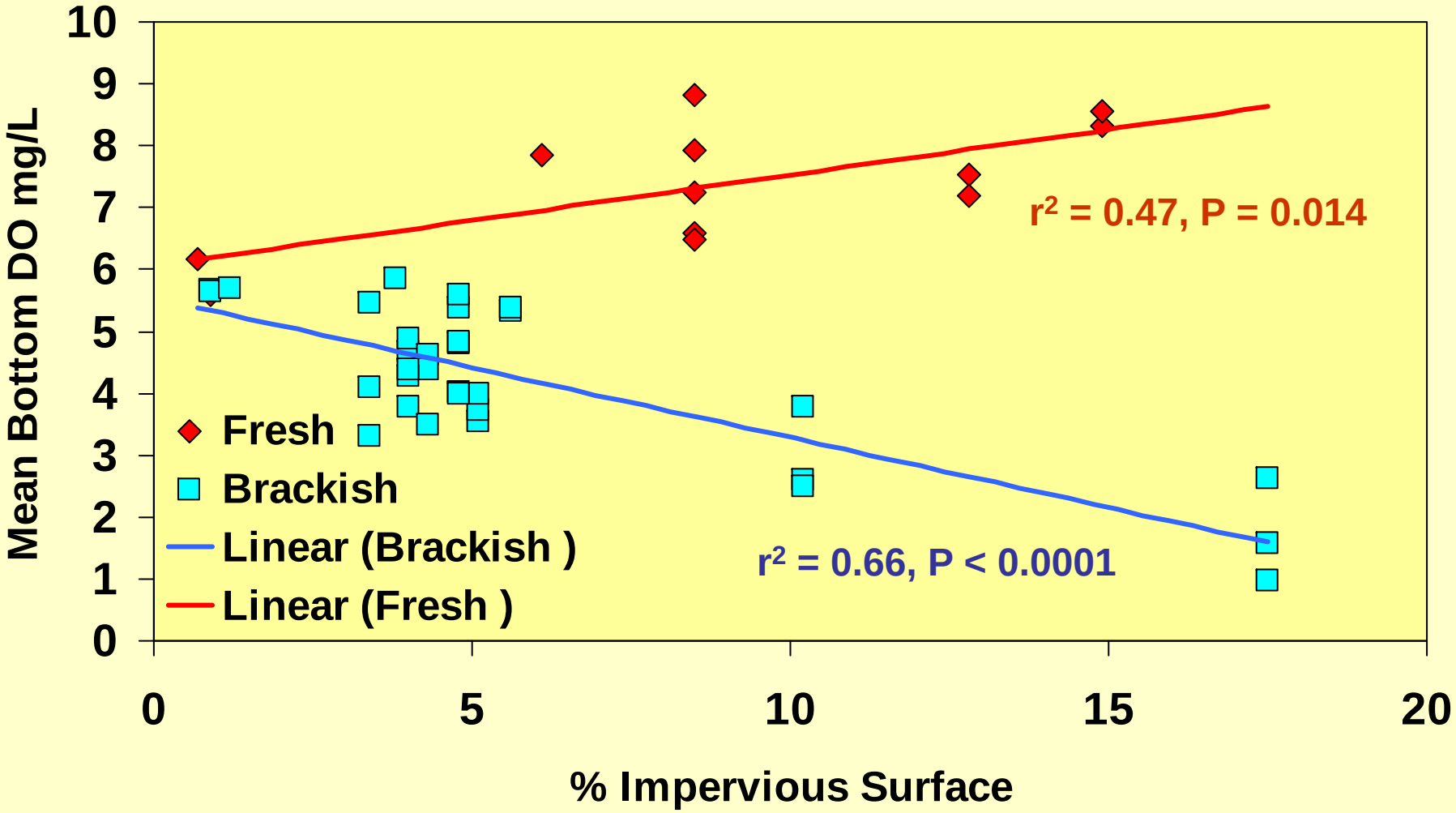


Early larvae feeding success on zooplankton in 2010 & 2011 declines with development

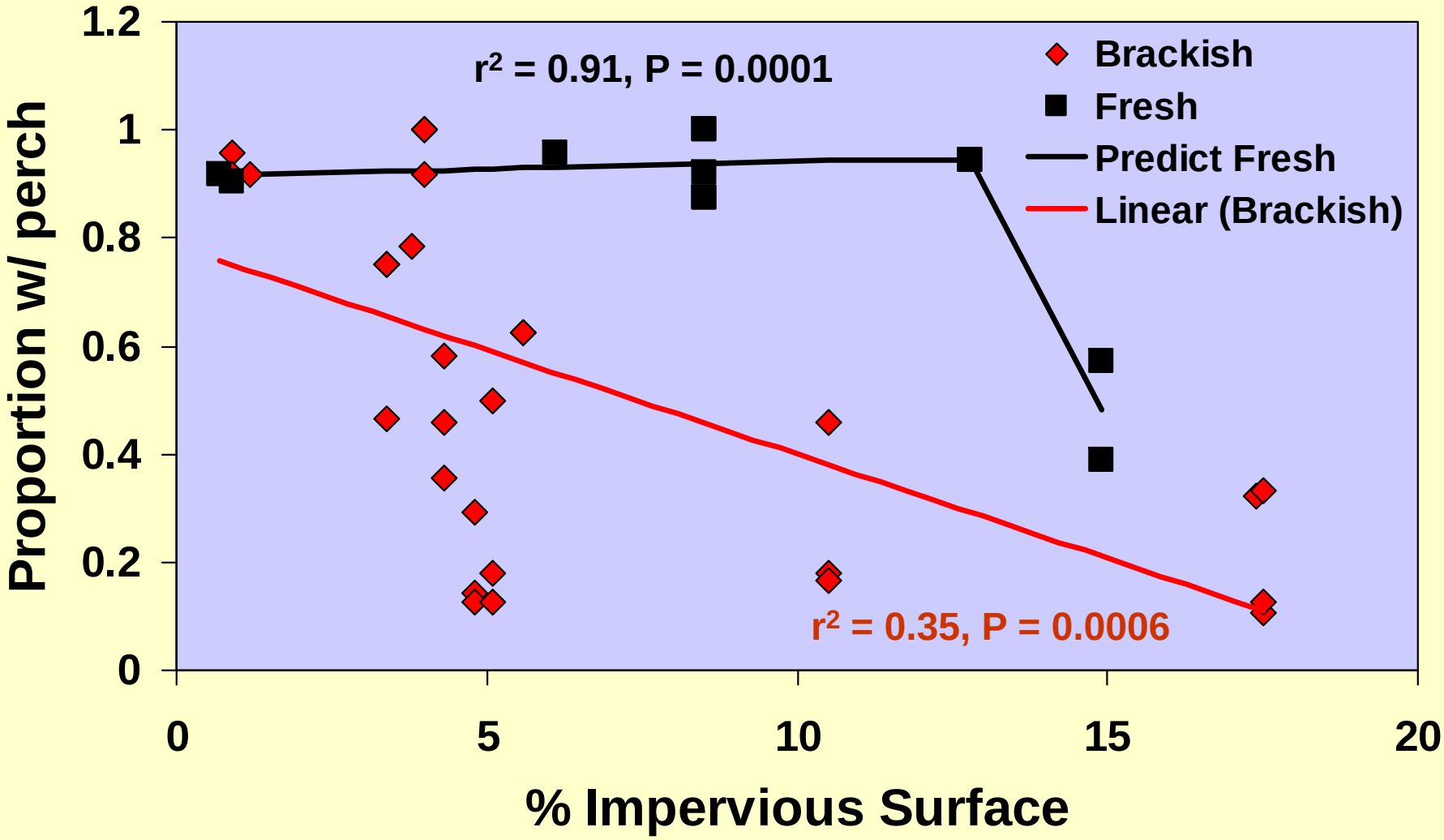


Summer habitat: habitat occupation and dissolved oxygen

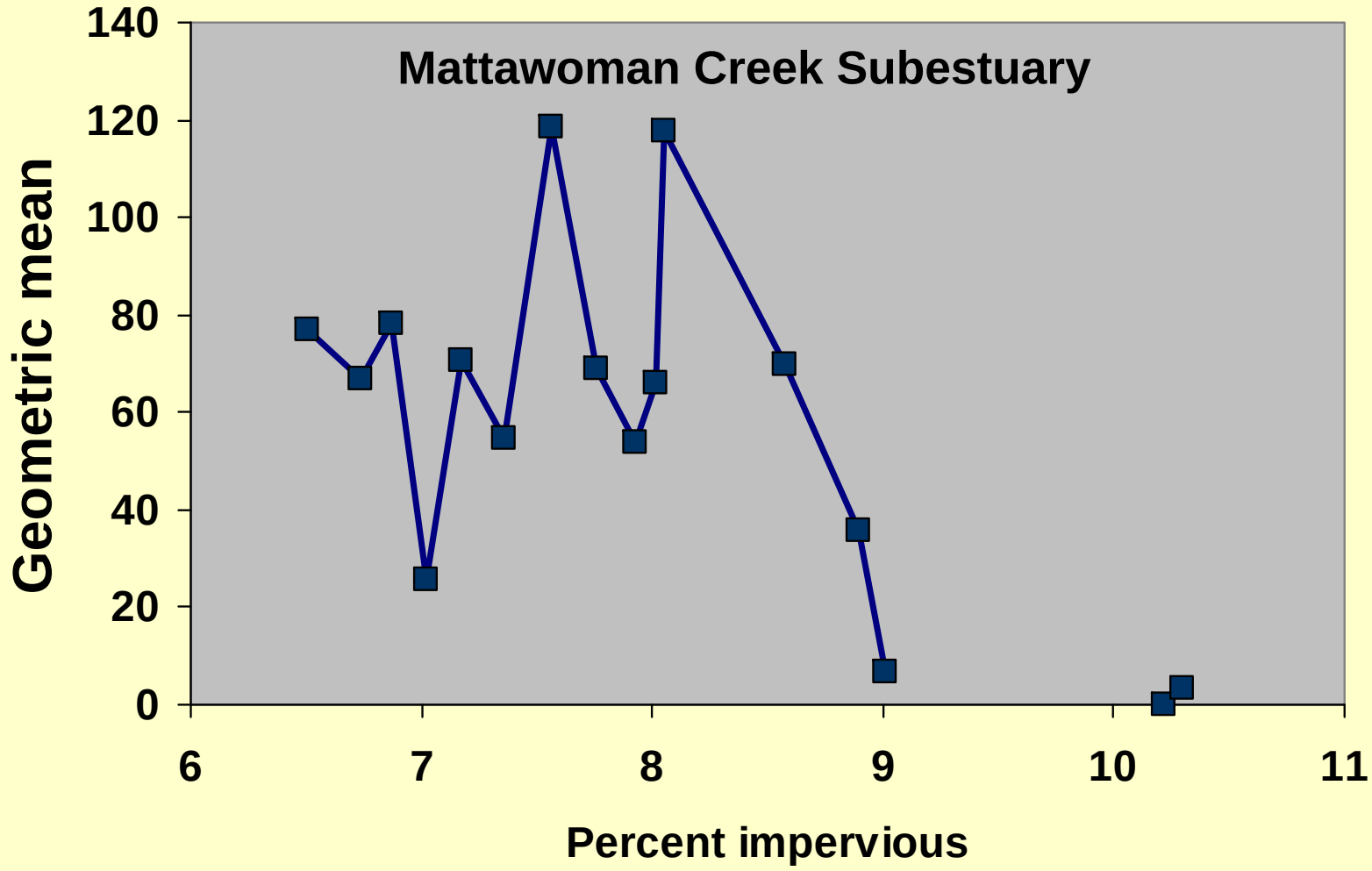
Mean summer bottom DO and percent impervious for fresh and brackish tributaries.



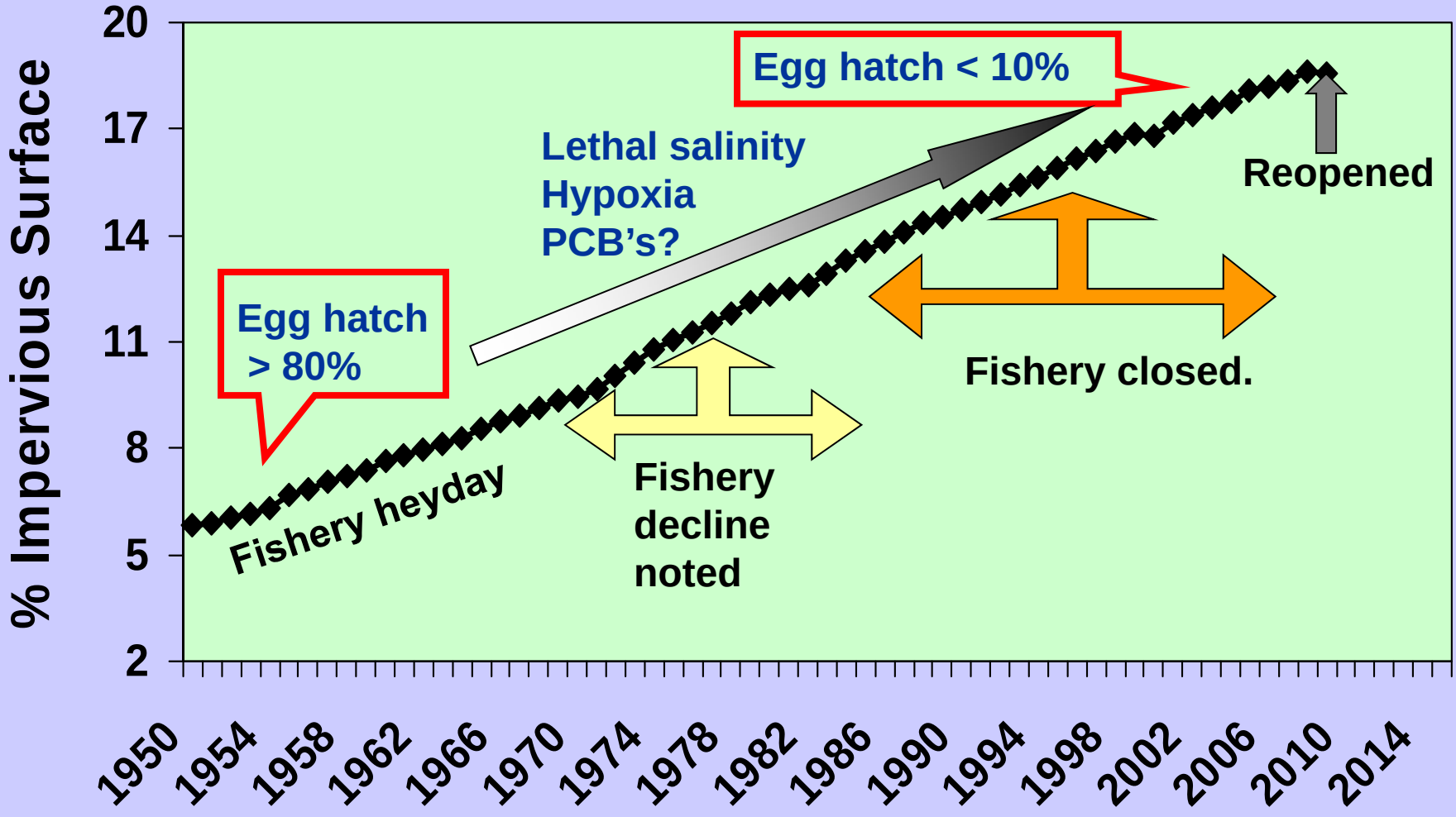
Proportion of bottom trawls with adult white perch degrades by 15% impervious in fresh-tidal or brackish, but how you get there differs.



Case study (1989-2002 & 2009-2010) suggests fresh-tidal fish community threshold. Abundance of all species in summer trawl samples collapses.

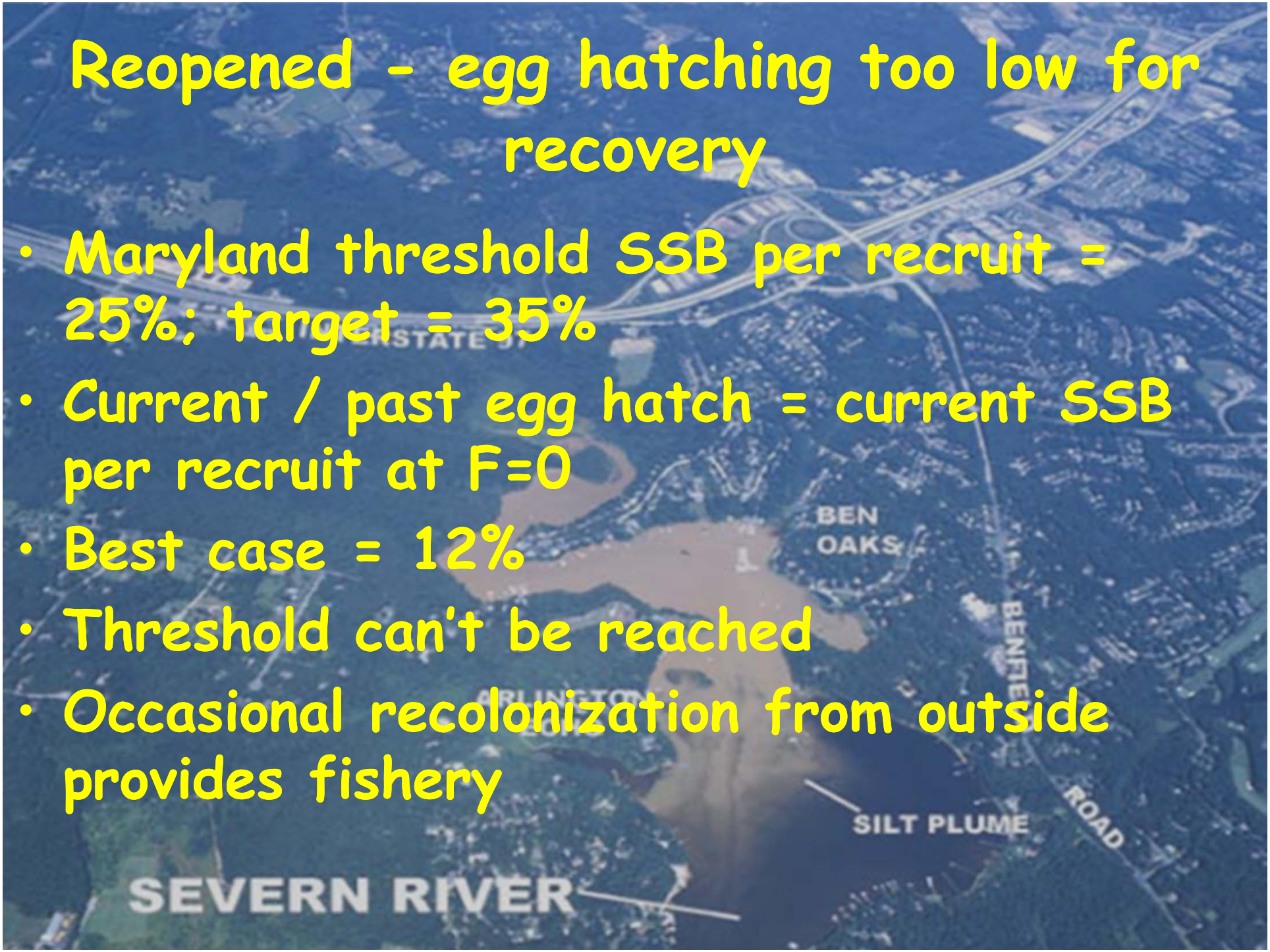


Severn River yellow perch fishery & development, 1950-2009

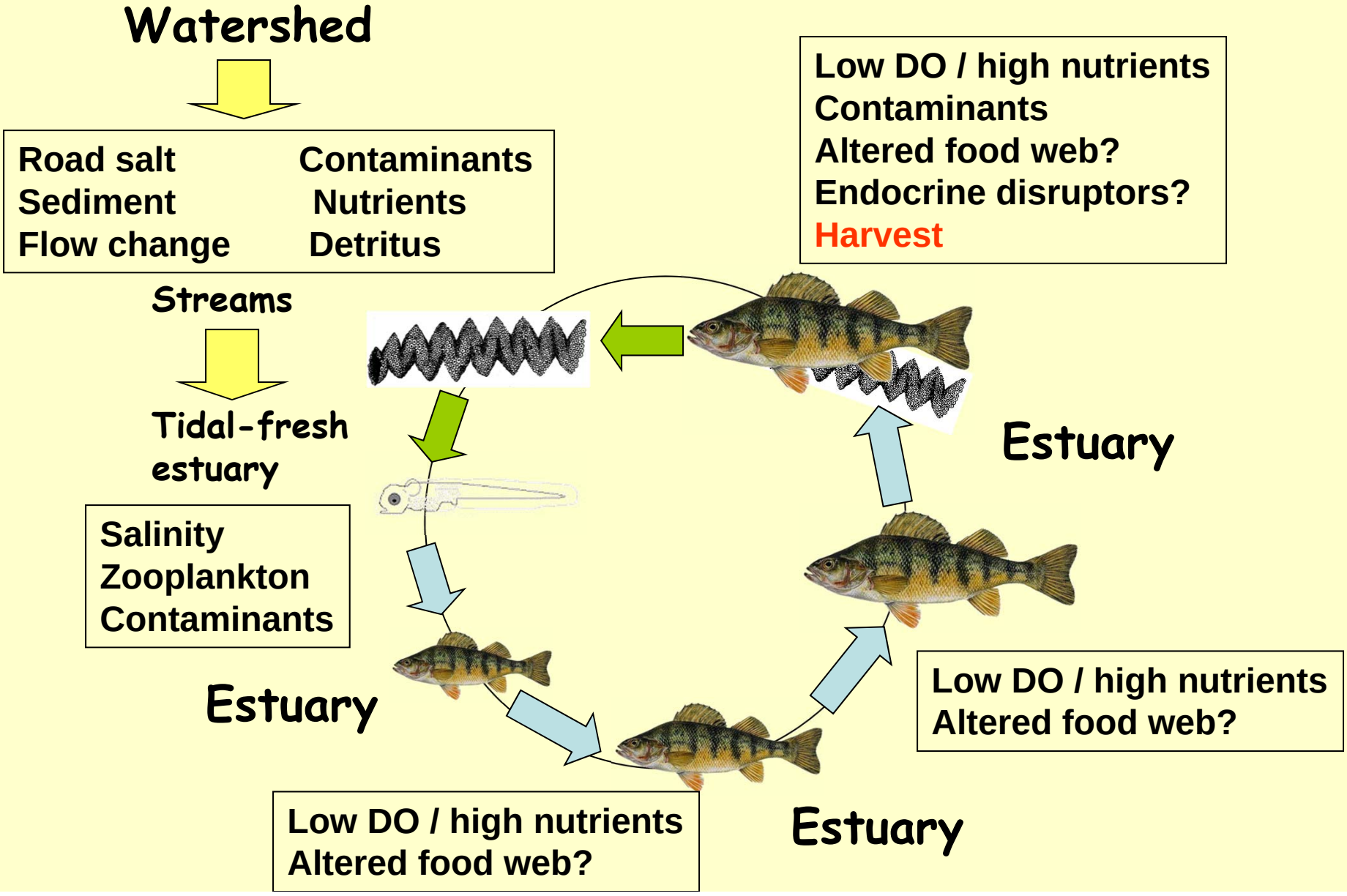


Reopened – egg hatching too low for recovery

- Maryland threshold SSB per recruit = 25%; target = 35%
- Current / past egg hatch = current SSB per recruit at F=0
- Best case = 12%
- Threshold can't be reached
- Occasional recolonization from outside provides fishery



Perch encounter multiple development-related stressors



It’s not just local or small scale: MD and VA supply most of the coast’s striped bass

- National resource
- US value estimate - $6.9 billion in & 68,000 jobs
- MD value estimate – $700 million & 8,200 jobs
- Harvest coordinated among states
- Development around spawning areas managed locally

USGS projections of development pressure in the Bay watershed and striped bass spawning areas (circled)

Development Pressure

- Low
- Moderate
- High
- Very high

Impervious surface reference points

- **< 5% impervious - harvest restrictions & stocking; preserve watershed**
- **5-10% - option to decrease harvest & stocking to compensate. Preserve & fix watershed**
- **>10% - preserve & fix watershed.**

  Managing harvest & stocking not sustainable strategies.
- **>15% - watershed & fishery solutions limited**

Planning and zoning is fisheries management!!!

- Development's stressors too extensive for fisheries managers to "go it alone"
- Local development plans are a proactive approach to managing land use and fish habitat
- New DNR effort – state resource managers work with local planners to protect fish habitat (Charles County Comprehensive Plan and Mattawoman Creek Watershed)

Planning and zoning is fish conservation!

Protect highly important resource areas (spawning areas, fisheries, high diversity)

Cap development in some rural watersheds

Reduce automobile dependency

Increase densities in existing urban areas

Stormwater utilities & tax incentives

Fixing is more expensive than prevention

We can't find examples of "fixes" that worked for fish