Managing Chesapeake Bay's Land Use, Fish Habitat, and Fisheries

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Fisheries Service

Maryland Department of Natural Resources

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Habitat matters - Improvement of habitat has made striped bass more abundant in estuaries

- Restoration of DO in Delaware River
- Roanoke River flow management
- Savannah River restoration of flow and salinity regimes
- Contribution of agricultural best management practices to Chesapeake striped bass restoration

Crash and recovery of Chesapeake Bay striped bass has become a fisheries management parable: Recovery follows reductions in fishing mortality.

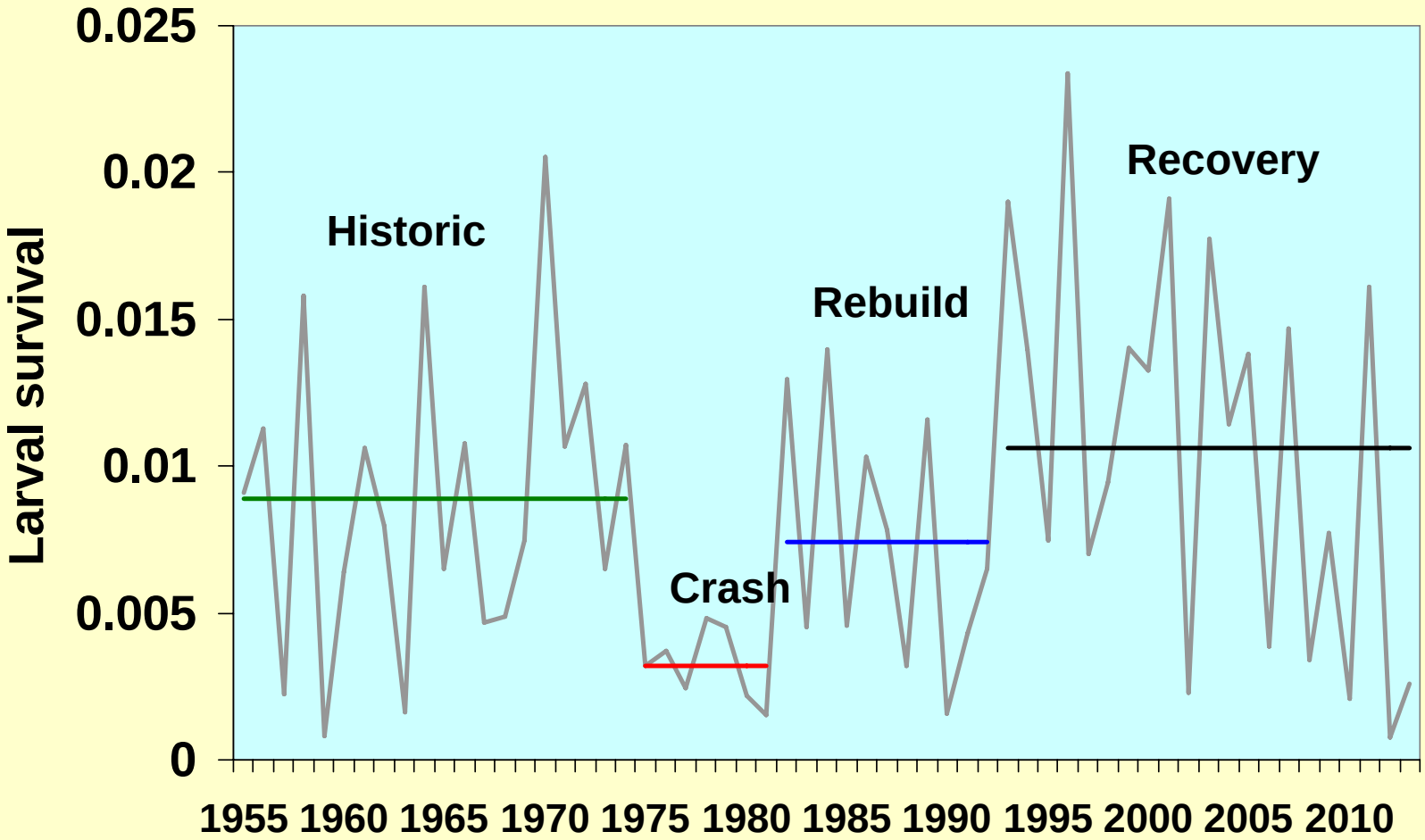
Contaminant / larval survival link was neglected.

In retrospect, it may link recovery and land use.

MD larval survival index (JI per egg index; 4 areas).

Time period averages qualitatively follow abundance.

If only overfishing, they should be random.



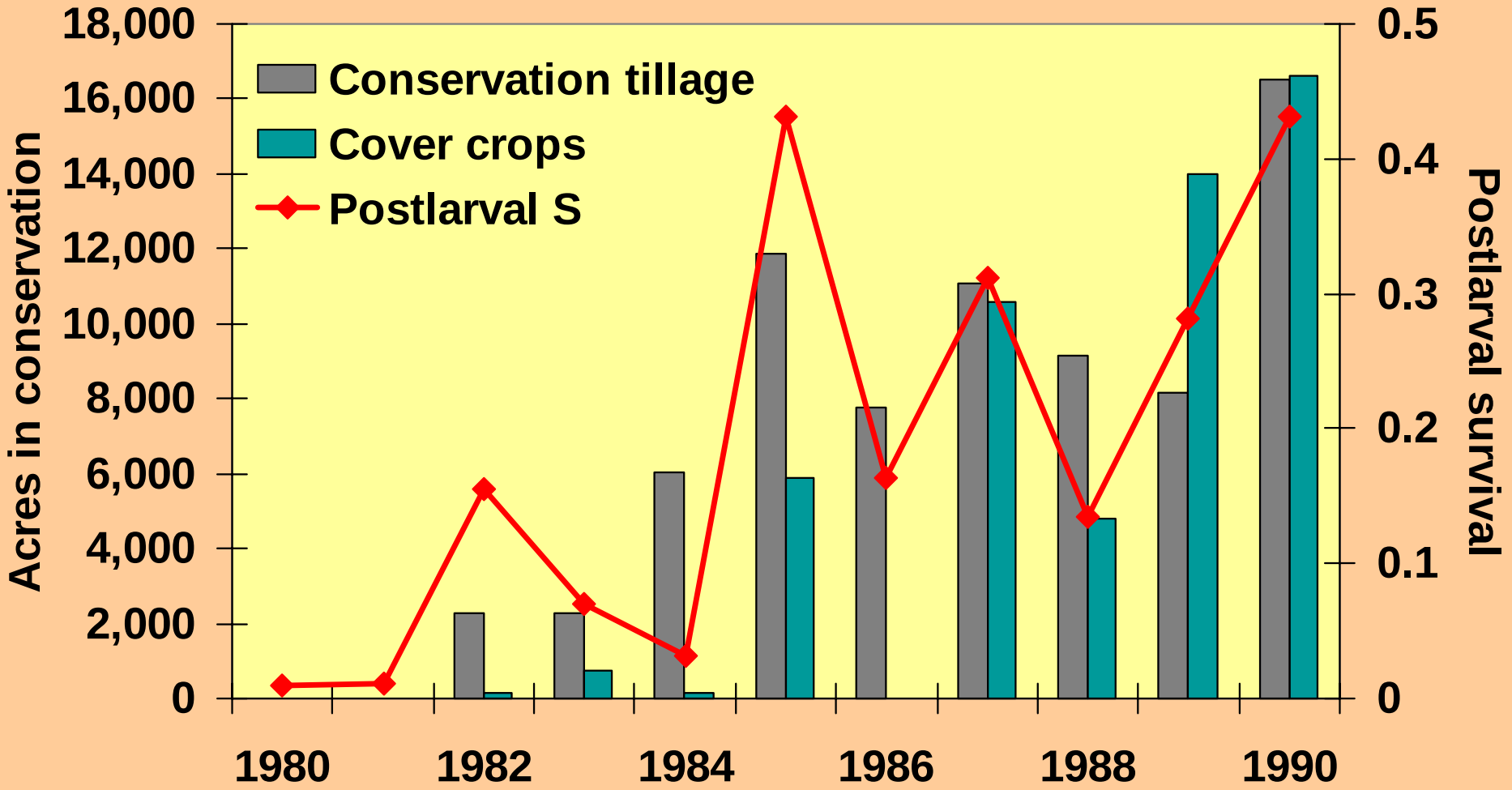
Why would agricultural conservation matter?

1. Spawning areas & nurseries aren't big (MD major ones plotted).
2. They receive nearly all watershed drainage.
3. Agriculture is the largest human land use (acreage).

Bay Watershed	
Land-use	Percent
Developed	3.6%
Agriculture	28.5%
Forest	60.0%
Other	7.8%

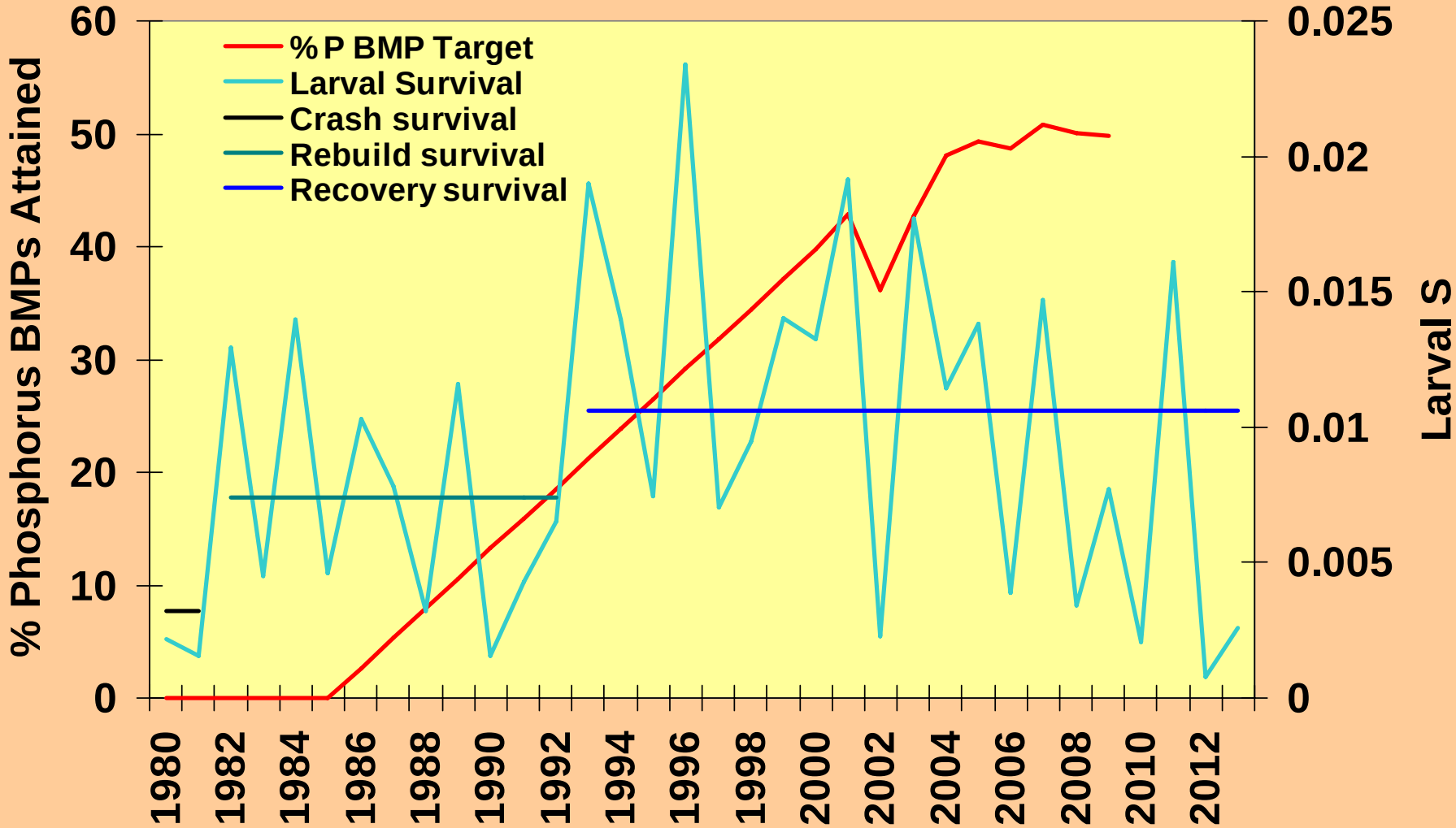
Choptank River postlarval survival improved with Caroline County BMPs that minimized erosion, pesticides, fertilizer.

Caroline County borders most of the nursery and had very good records.



MD Larval survival (4 areas) and attainment of phosphorus BMPs in Bay watershed

%BMP (Best Management Practices) attainment from Bay Program



Positive role for agricultural practices in management of striped bass possible

- **Best Management Practices or BMPs – designed to reduce erosion, nutrients, and pesticides would also reduce toxic metals**

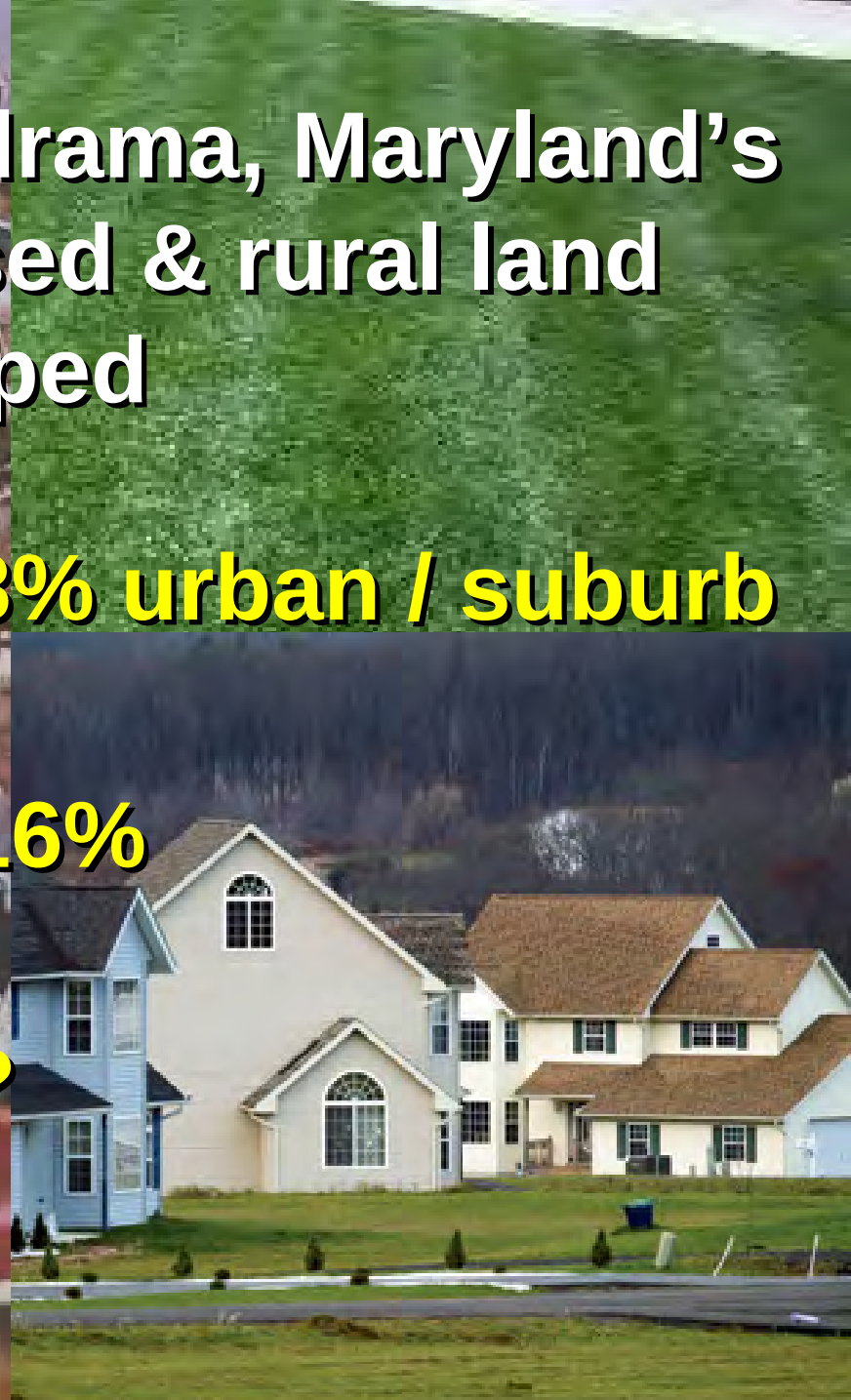
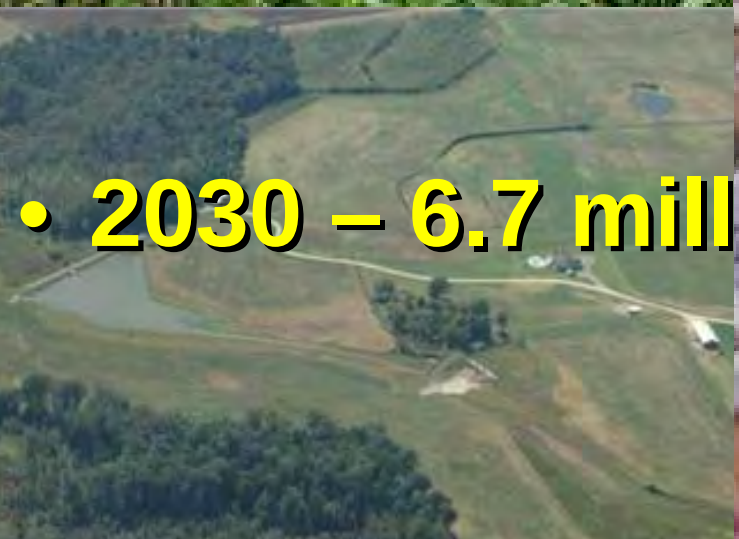
- **1970s – Before BMPs. Decreased larval survival precedes overfishing**
- **Mid-1980s & 1990s – Larval survival rises with BMPs, then levels off. Fishing mortality cut drastically. Stock increases.**

- **Increased larval survival reinforced fishing restrictions - more bass per egg.**

During striped bass drama, Maryland's population increased & rural land developed

- 1973 – 3.9 million & 8% urban / suburb
- 2000 – 5.3 million & 16%
- 2030 – 6.7 million & ?



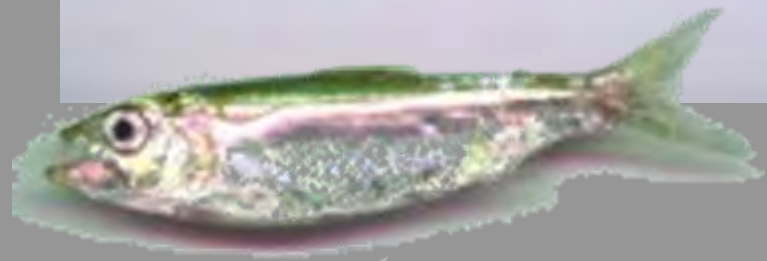
Fisheries Service has examined subestuaries to determine

“What is the fish habitat value of suburban watersheds?”

Spring spawning & larval habitat: egg-larval collections.

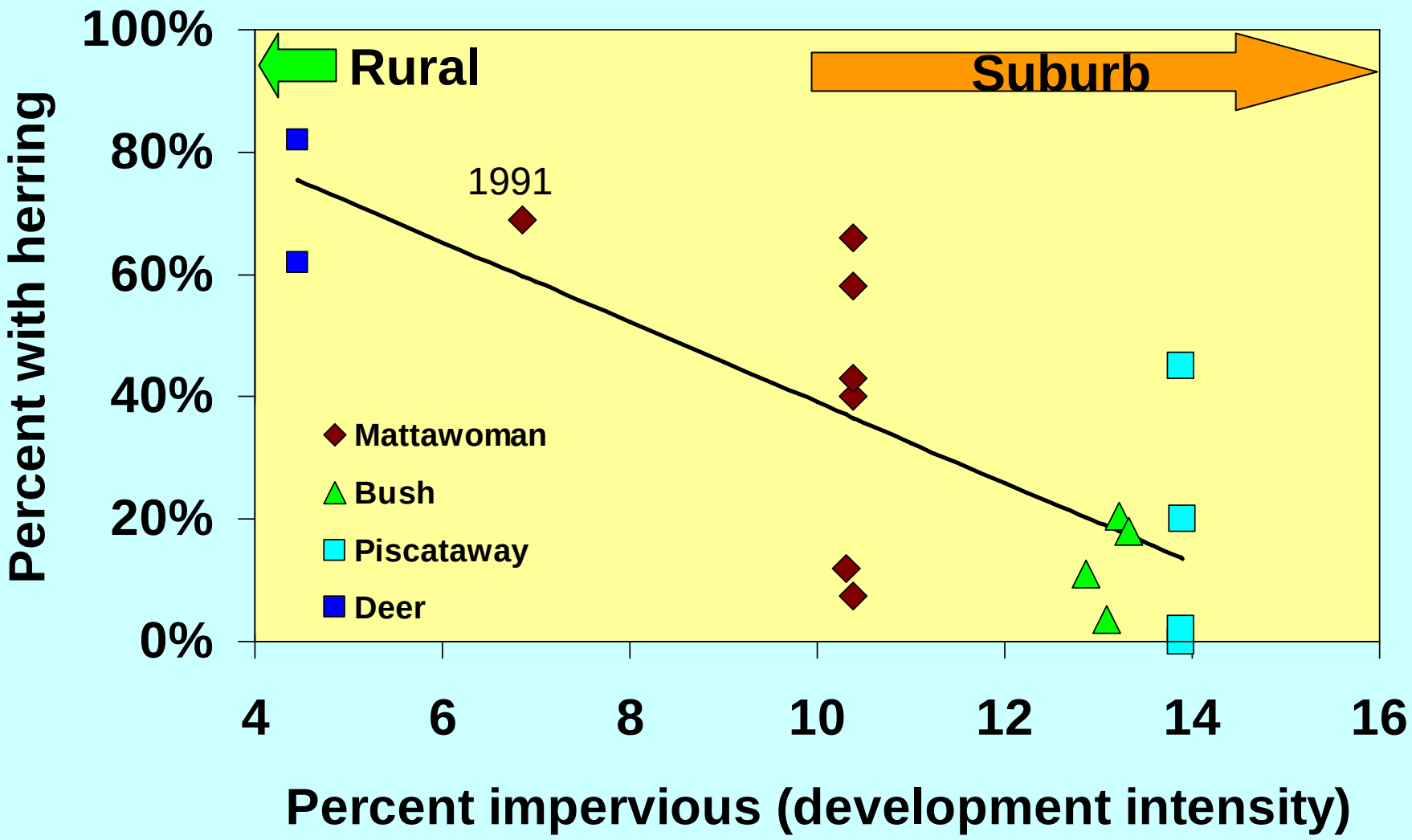
Summer habitat: Juvenile-adult & DO

Focus is on “iconic”managed species i.e., keep the common species common

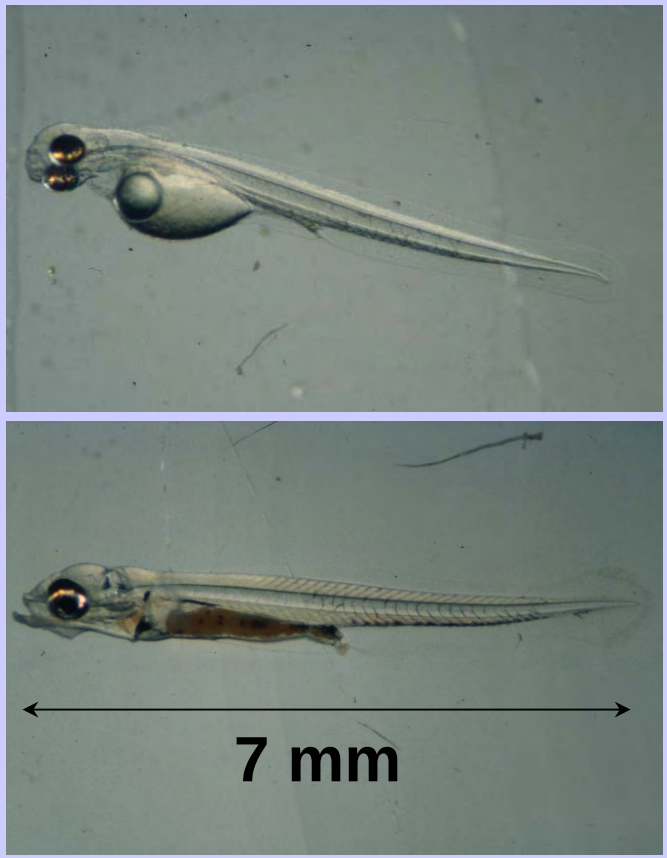



Anadromous fish stream spawning surveys during 2005-2012 have explored development's effect.

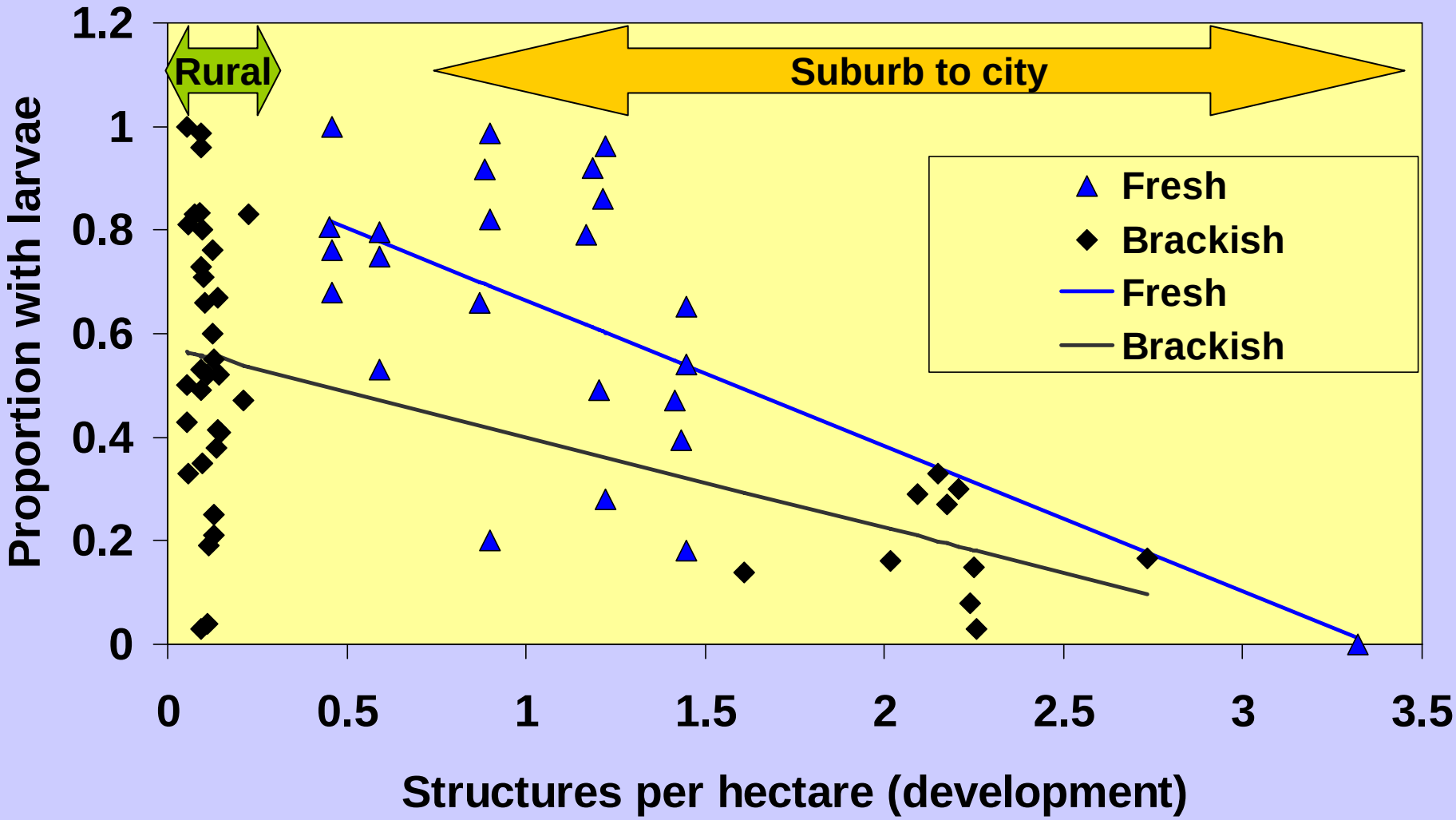
Percent of stream samples with herring eggs and larvae falls with impervious surface



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

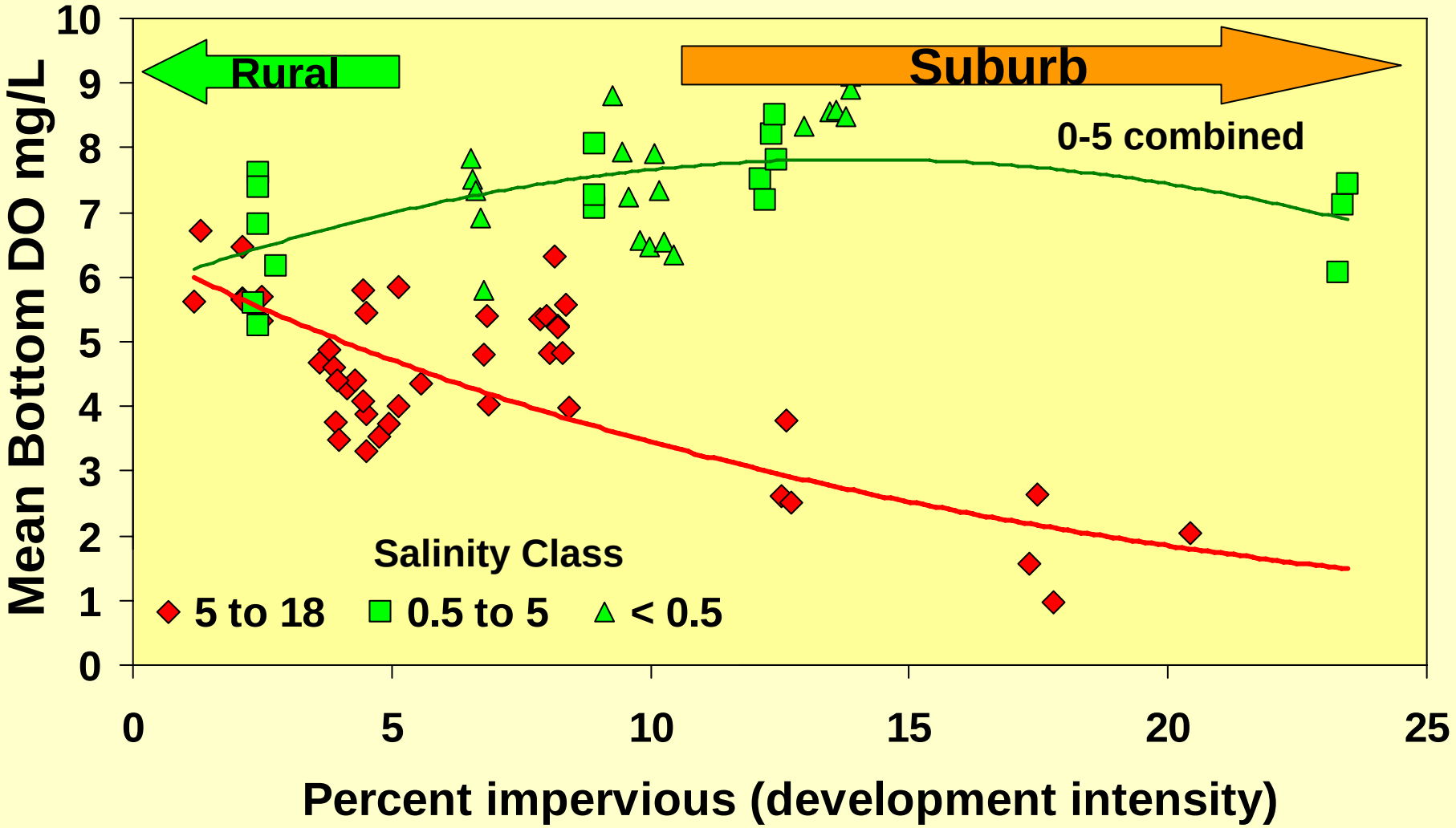


Proportion of tows with yellow perch larvae versus development

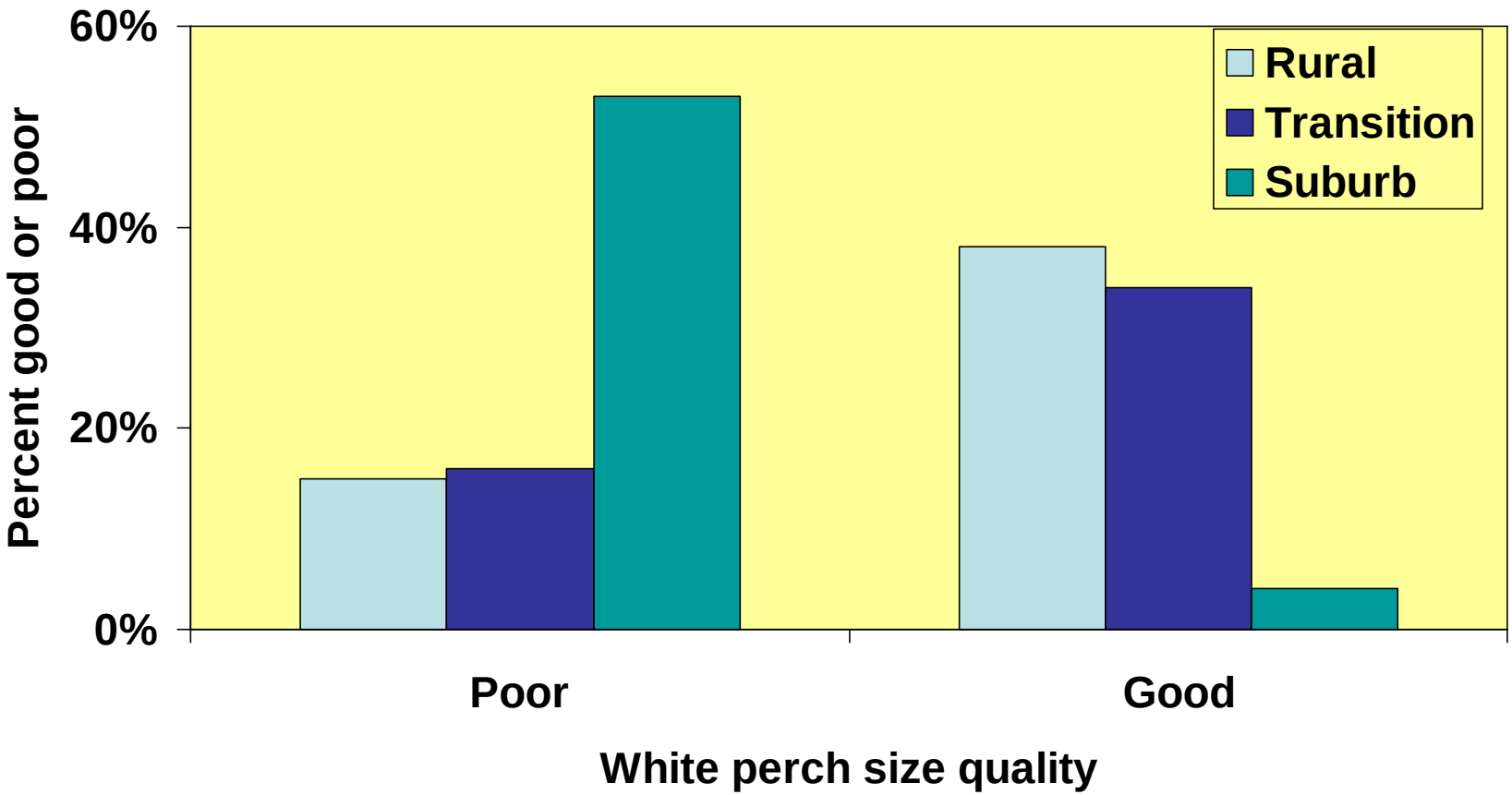


Summer estuarine habitat: habitat occupation and dissolved oxygen

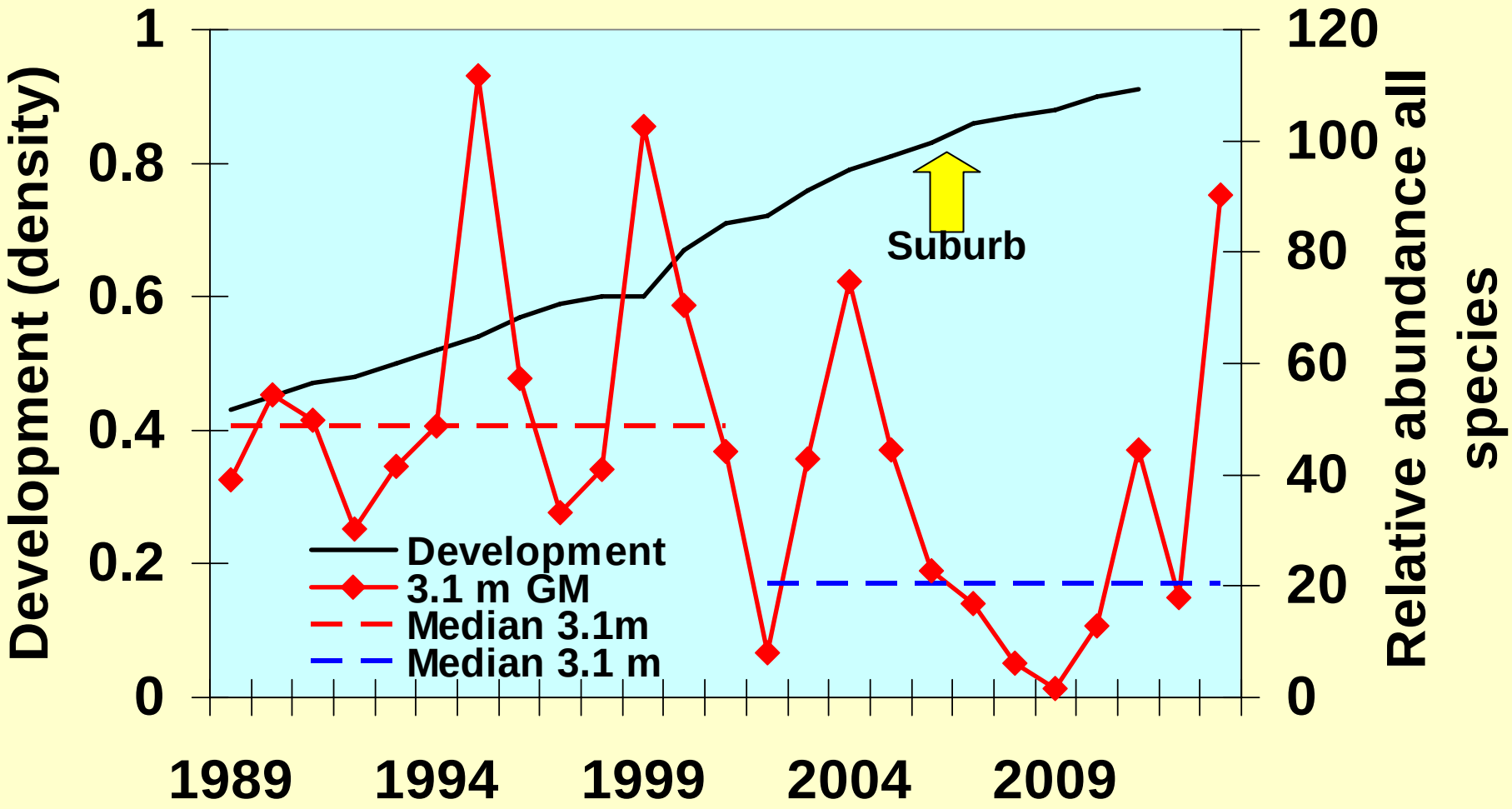
Mean summer bottom DO and percent impervious, by salinity classification (ppt), during 2003-2011.



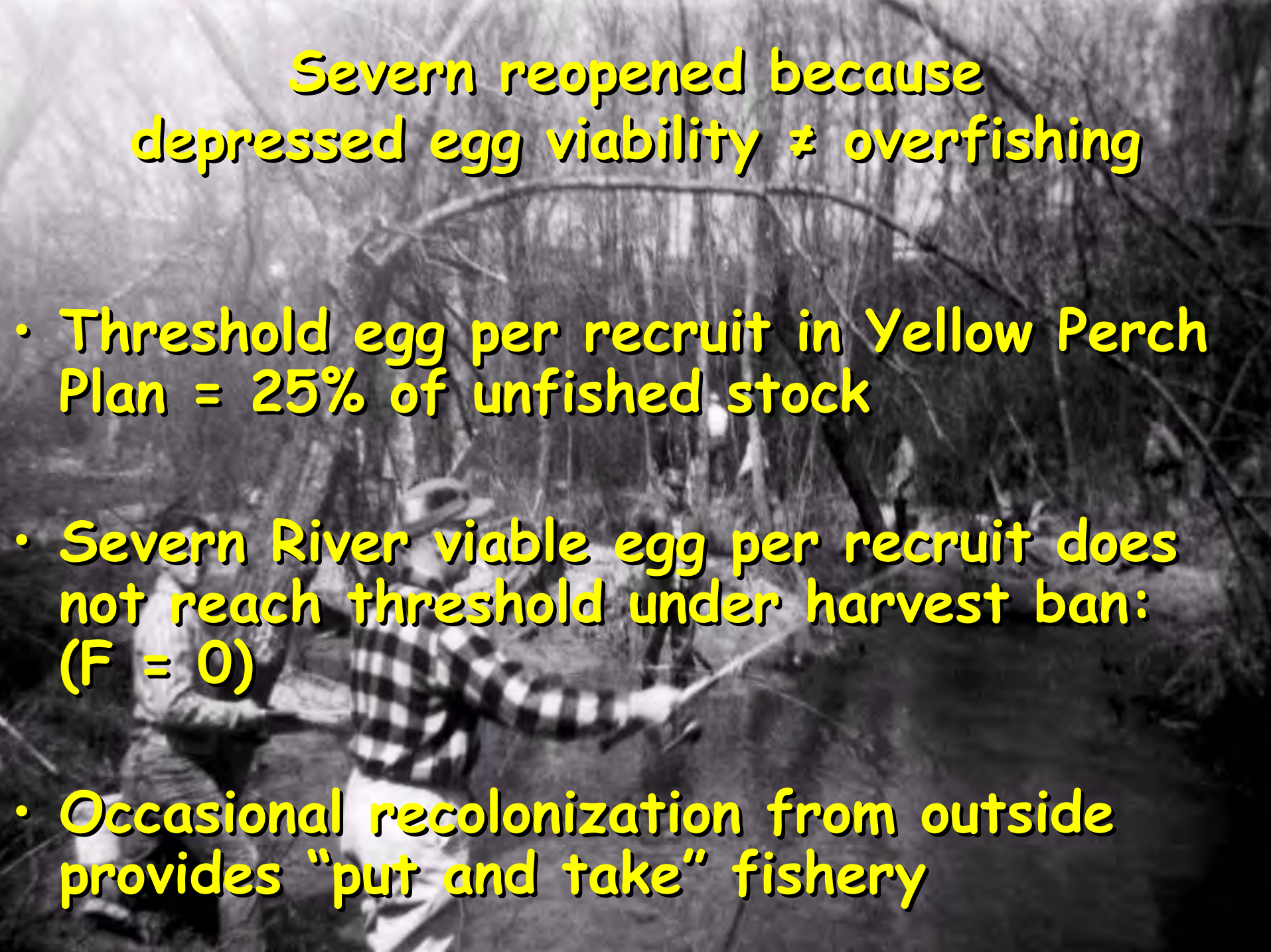
Development influences quality of White Perch available. Percent of annual subestuary estimates with poor or good availability of White Perch greater than 8 inches.



Mattawoman Creek (1989-2002 & 2009-2013) suggests fresh-tidal fish threshold. Abundance of all fish declines with suburban onset



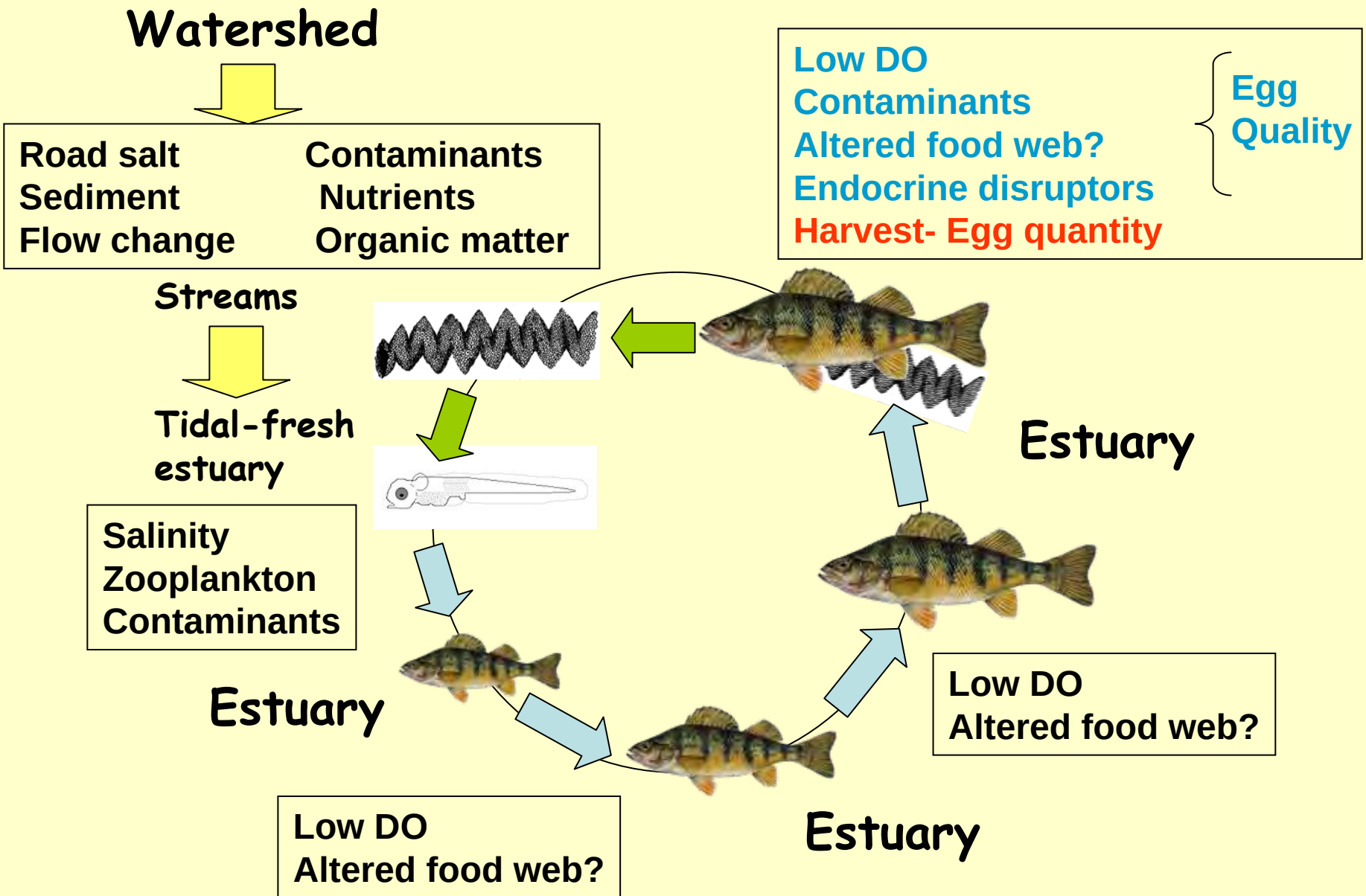
Severn River (brackish) yellow perch fishery & development, 1950-2009



Severn reopened because depressed egg viability ≠ overfishing

- Threshold egg per recruit in Yellow Perch Plan = 25% of unfished stock
- Severn River viable egg per recruit does not reach threshold under harvest ban: (F = 0)
- Occasional recolonization from outside provides "put and take" fishery

Fish encounter multiple development-related stressors (Wheel of Misfortune)



Impervious surface reference points for fisheries on resident species

- **< 5% impervious - harvest restrictions & stocking; conserve watershed**
- **5-10% - option to decrease harvest & stocking to compensate. Conserve & revitalize watershed**
- **10-15% - Conserve & reconstruct degraded watershed**
- **>15% - options limited and localized**

Planning and zoning is fisheries management!!!

- Local development plans are a proactive approach to managing land use and fish habitat
- Work with other DNR units, state and federal agencies, local planners and stakeholders to conserve fish habitat through "resource friendly" plans
- First applied to Charles County Comprehensive Plan and Mattawoman Creek Watershed in 2012

The promise of cooperative comprehensive planning for growth in Charles County…

- Favorable convergence of stakeholders, county staff, elected officials (or so we thought)
- State and federal agencies contribute to DNR "Natural Resource Friendly Plan"
- Delivered to County and used for 1 of 3 scenarios
- Great public support

…yields to ugly reality

- Scenarios go to pro-development Planning Commission
- "Natural Resource Friendly" thrown out
- New "Property Rights Plan" picked (very damaging)
- State agencies unified in opposition
- Plan dropped, final pending