Managing Chesapeake Bay's Land Use, Fish Habitat, and Fisheries: Positive and Negative Case Studies

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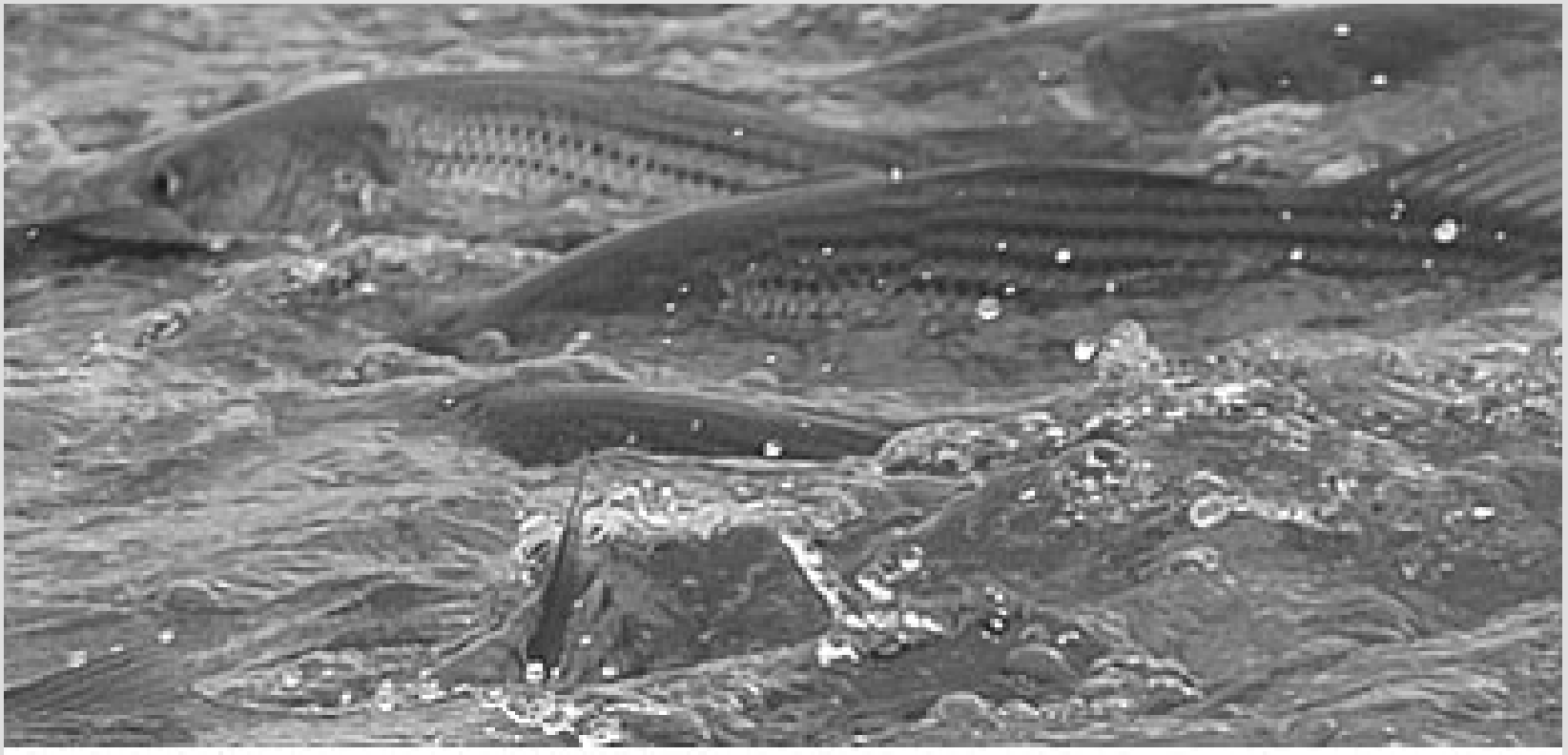
Maryland Fisheries Service has been looking at land use and fish habitat dynamics in Chesapeake Bay

- Goals:
  - Guidance for planning agencies
  - Public support for watershed conservation
  - Assessments and management strategies that reflect land-use impacts

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



Habitat hypothesis (contaminants kill larvae) was disregarded.

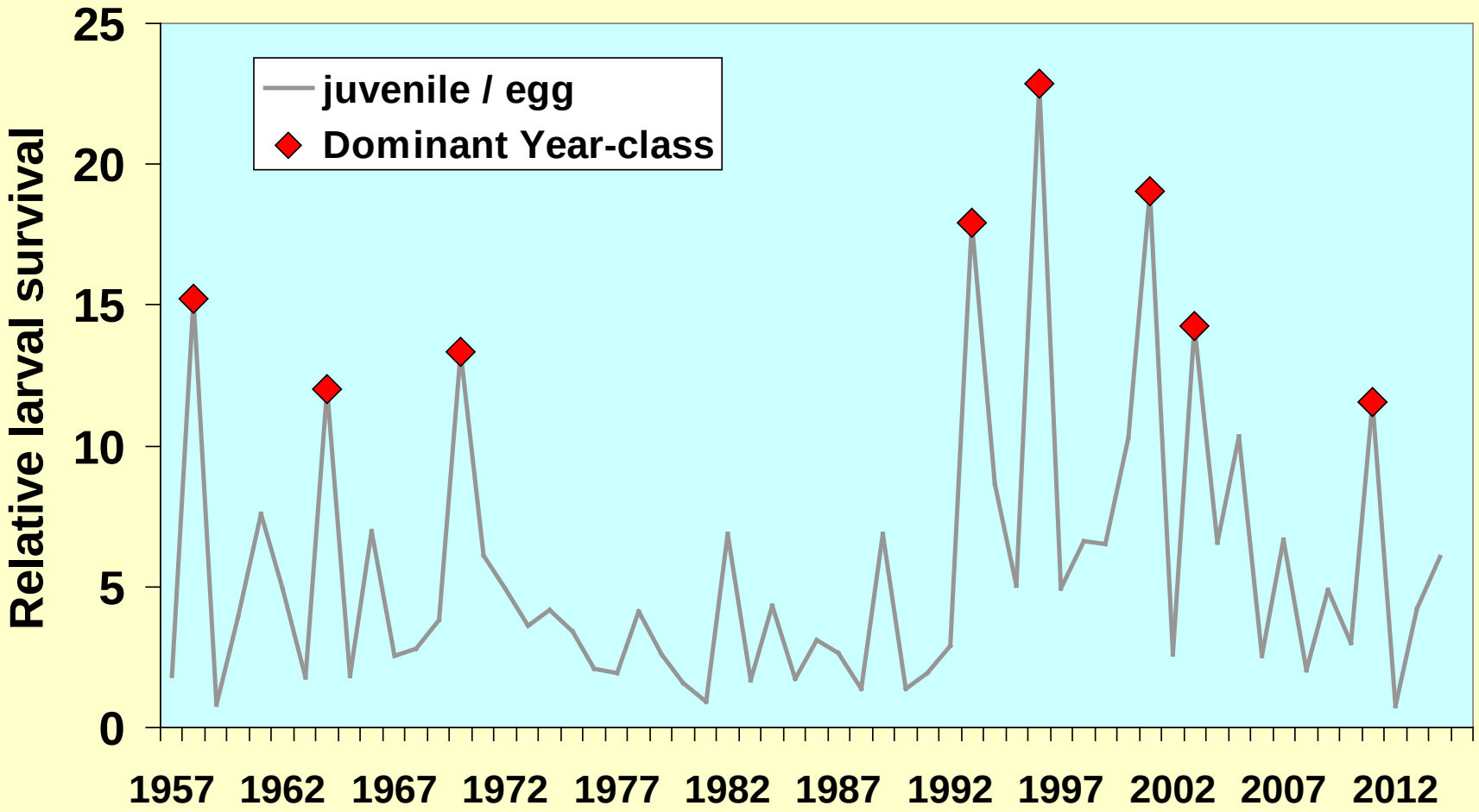
In retrospect, it was viable and <u>may</u> link recovery and land use.

MD larval survival index (juvenile index / egg index)

If only overfishing, why aren't they random?

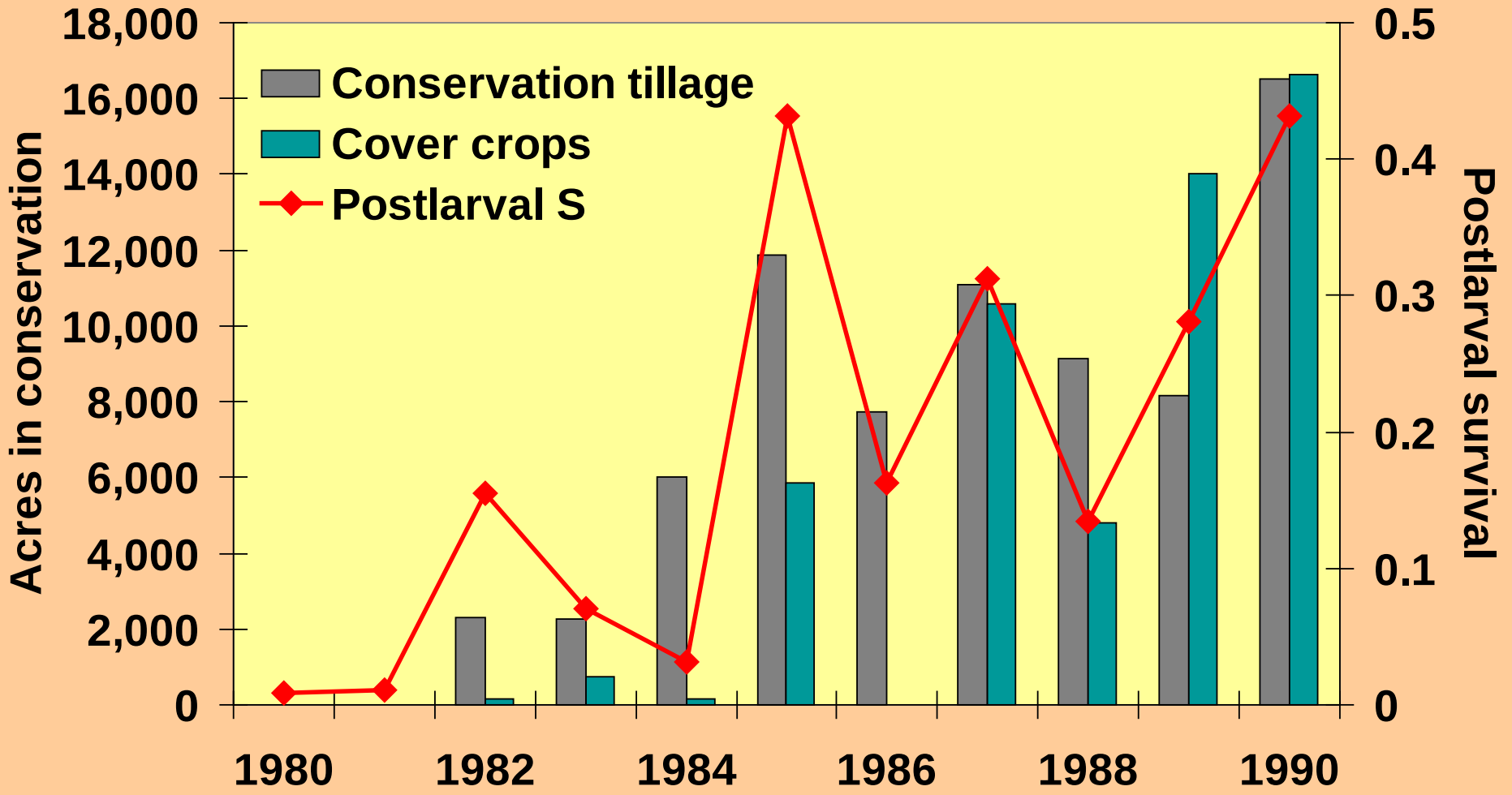
Why did other species (perch) have the same pattern?

AMO doesn't explain it.



Choptank River: postlarval survival improved as agricultural BMPs increased in Caroline County, MD

(borders most of the nursery and had very good records)



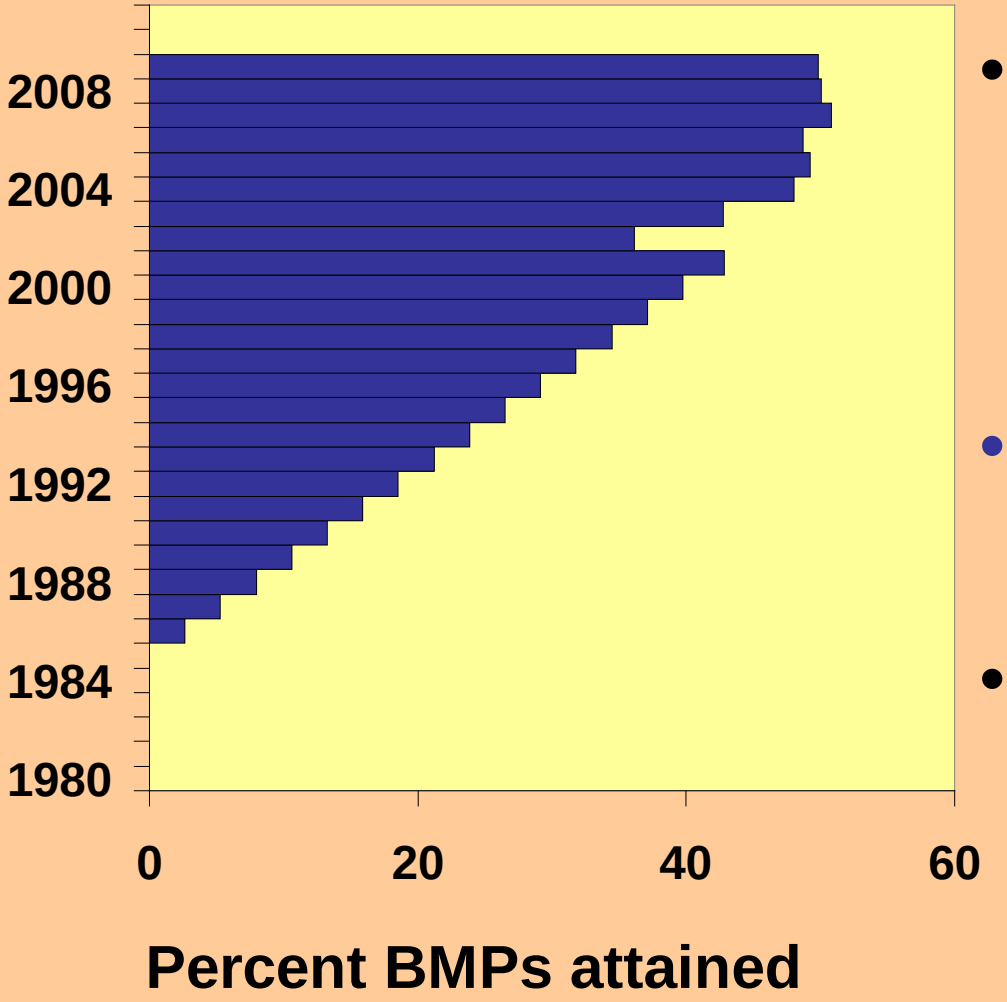
Why would agricultural conservation matter?

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%

BMPs in Bay watershed became widespread

% Phosphorus BMP estimates from Bay Program



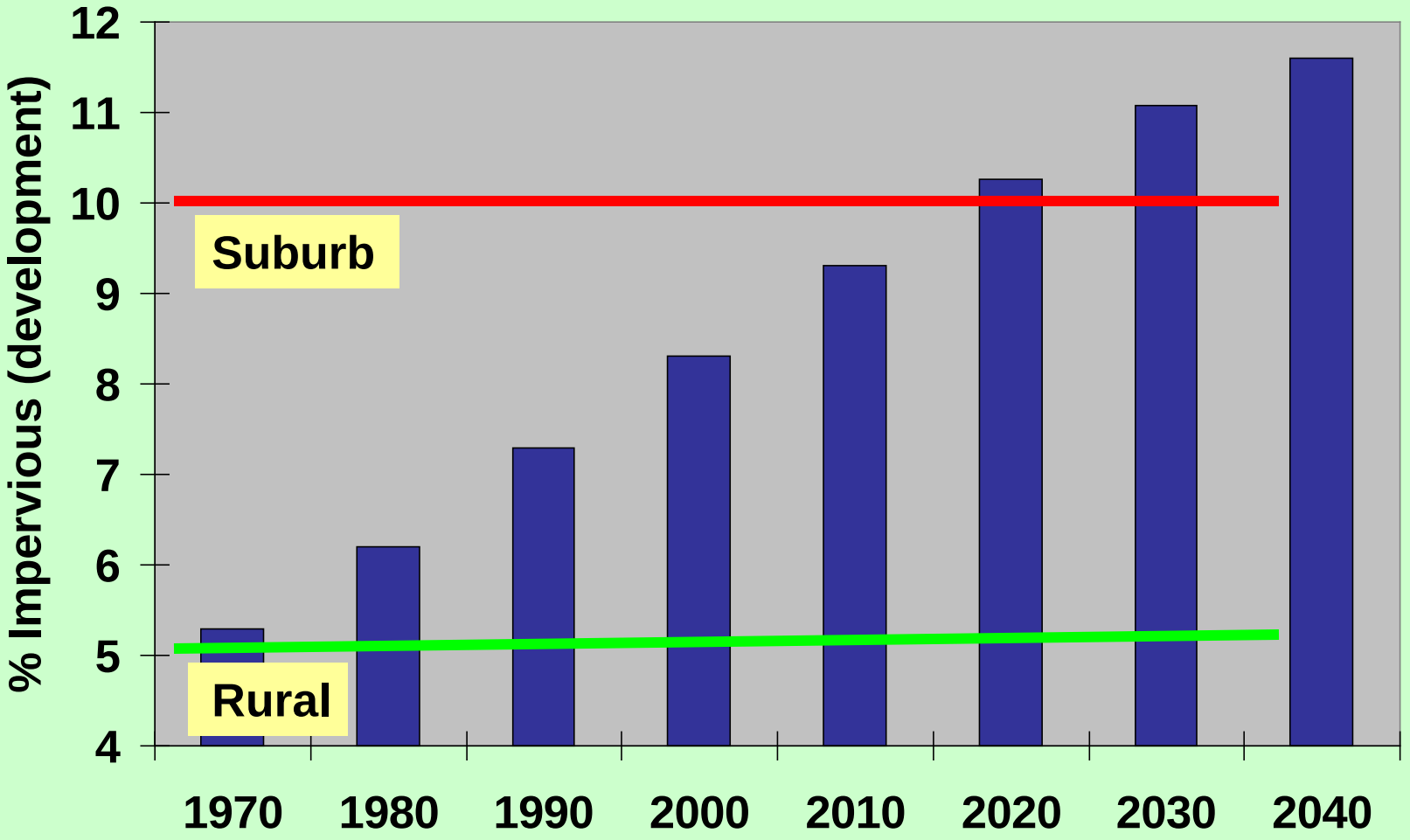
- **Acid rain, inorganic fertilizer, & pesticides suspected sources of toxics**
- **BMPs reduce runoff, erosion, fertilizer, and pesticides**
- **<u>Possible</u> that BMPs increased larval survival & reinforced fishing restrictions - more bass per egg.**

Large scale 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
- Agricultural best management practices aid Chesapeake striped bass restoration

Suburbs are a new & expanding ecosystem in MD. What does this mean for fish habitat?

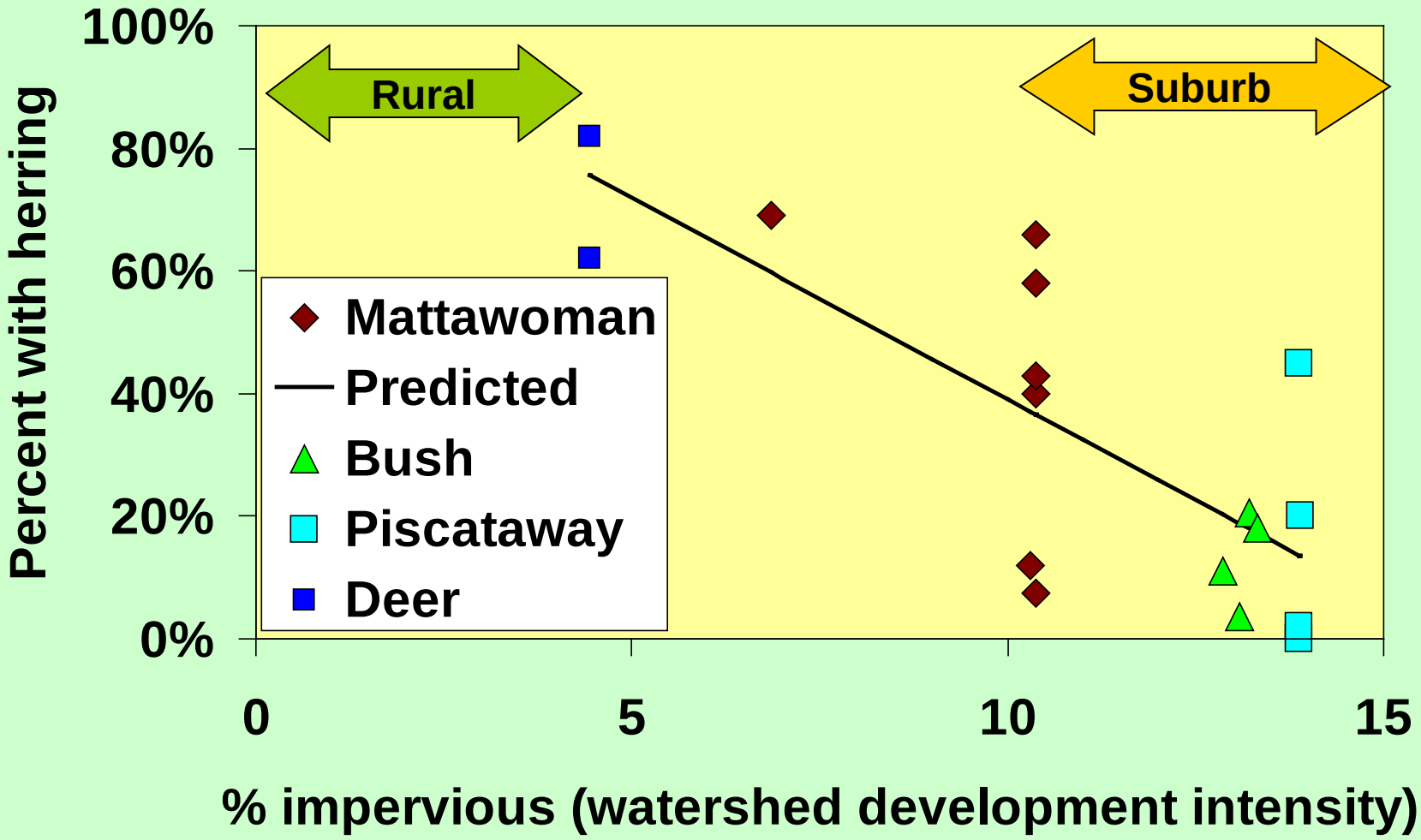
MD population growth (Dept of Planning) prediction of MD Bay watershed development



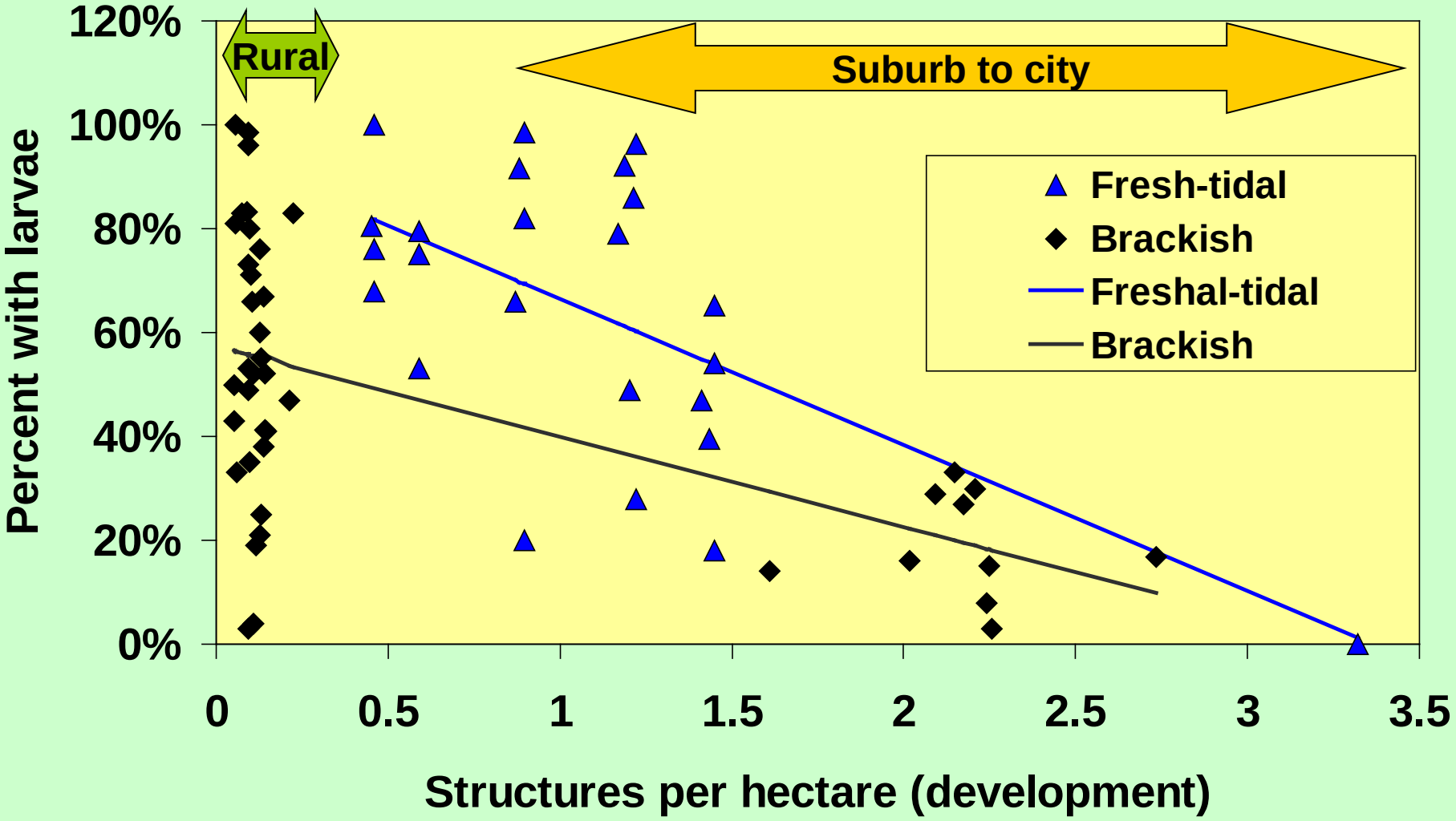
Multiple stressors from urbanization degrade habitat from stream to estuary

- Nutrients
- Contaminants
- Sediment
- Water supply & flow
- Organic matter

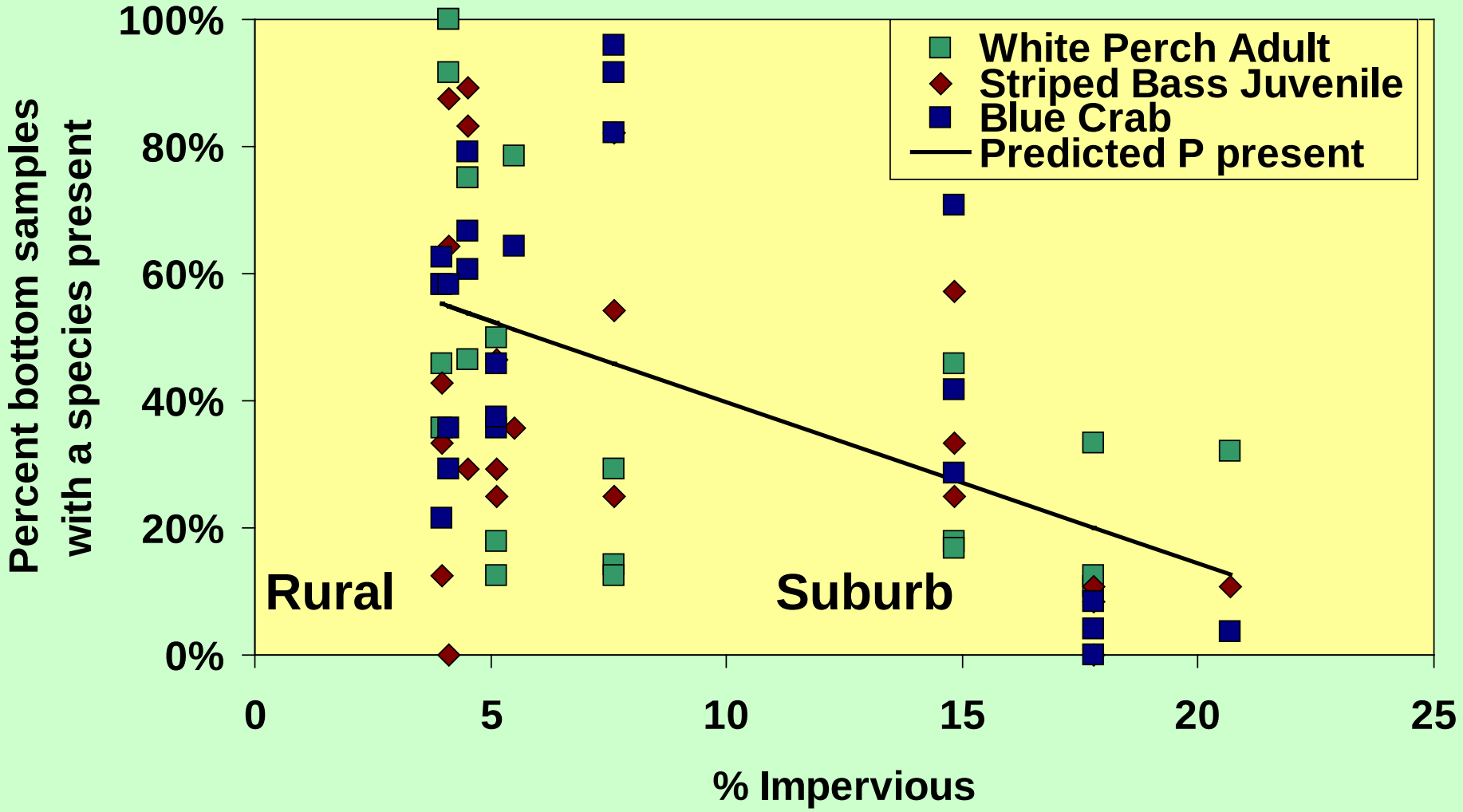
Stream: Percent of stream samples with herring eggs and larvae falls with development



Upper subestuary: Percent of plankton tows with yellow perch larvae falls with development



Subestuary: Bottom habitat occupation by juvenile & adult fish and crabs decreases with development



Habitat deterioration undermines harvest management – Blueback Herring spawning potential example

Impervious surface	Decrease in eggs & larvae	F for spawning target
5% development target	**0%**	**0.16**
10% development threshold	**- 46%**	**0.05**
15%	**- 91%**	**Not possible**

Development reference points: habitat stress dictates fisheries management (1)

- **< 5% impervious target - harvest restrictions & stocking; conserve watersheds (top priority)**
- **5-10% - option to decrease harvest & stocking to compensate. Conserve & revitalize watershed**

Development reference points: habitat stress dictates management (2)

- **10% threshold- conserve & reconstruct degraded watershed**
- **>15% - options limited and localized**

Managing fish habitat in urbanizing coastal watersheds

Focus on conserving best watersheds left (least developed) since $ are limited.

Consider development status when attempting "restoration"

Planning and zoning is fisheries management!!!

- **In MD, local development plans provide an approach for managing land use for fish habitat**