TETRA TECH

MICROPLASTICS ECOLOGICAL RISK ASSESSMENT: BIOLOGICAL ENDPOINT CONSIDERATIONS

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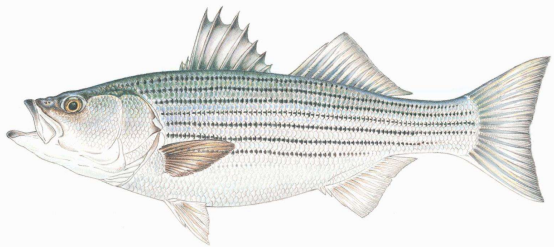

Biological Endpoint Identification

Criteria

1. Upper trophic level
2. Represented in Chesapeake Bay Agreement, directly or indirectly
3. Data rich (ecologically)
4. Common enough to be recognizable to non-specialists
5. Wide distribution

Biological Endpoint Identification

- **Upper Trophic Level**
  - Potential for bioaccumulation
  - Can automatically include lower trophic level, but important species
  - Likely consumed by humans

Biological Endpoint Identification

2014 Chesapeake Bay Agreement

- Oysters
- Forage Fish
- Blue Crabs
- Wood duck

Biological Endpoint Identification

Data Rich

- Chesapeake Bay fisheries resources well- surveyed
- Habitat associations well-known for many species
- Adequate data to detect population fluctuations;
  - Fish mortality estimation
  - Natural vs Fishing

Biological Endpoint Identification

Common and Recognizable

- Blue crab - Iconic bay species
- Oysters - Known for water quality benefits as well as habitat and as a direct fishery
- White perch - Ubiquitous
- Striped Bass – Poster child for aggressive fisheries management; highly sought after game fish

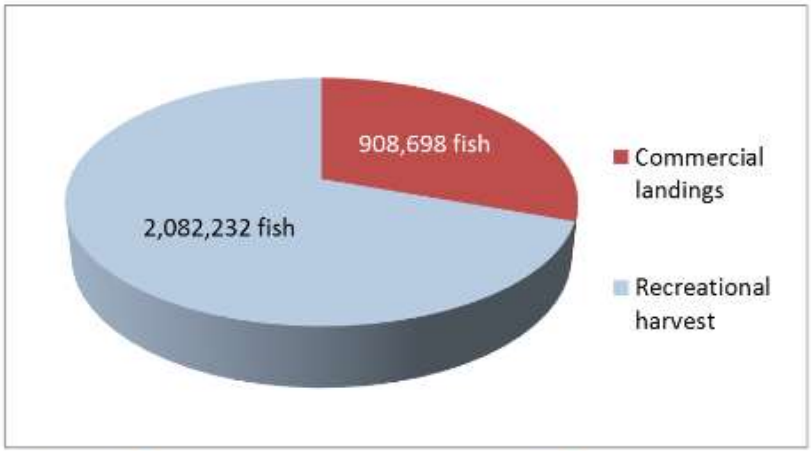

Figure 3. *Average annual harvest of striped bass (numbers of fish) across all states and by sector during the last 10 years, 2006-2015. Adapted from ASMFC 2016.*

Fabrizio et al 2017

Biological Endpoint Identification

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Wide distribution

- White perch
- Striped bass
- Blue crab
- Forage fish

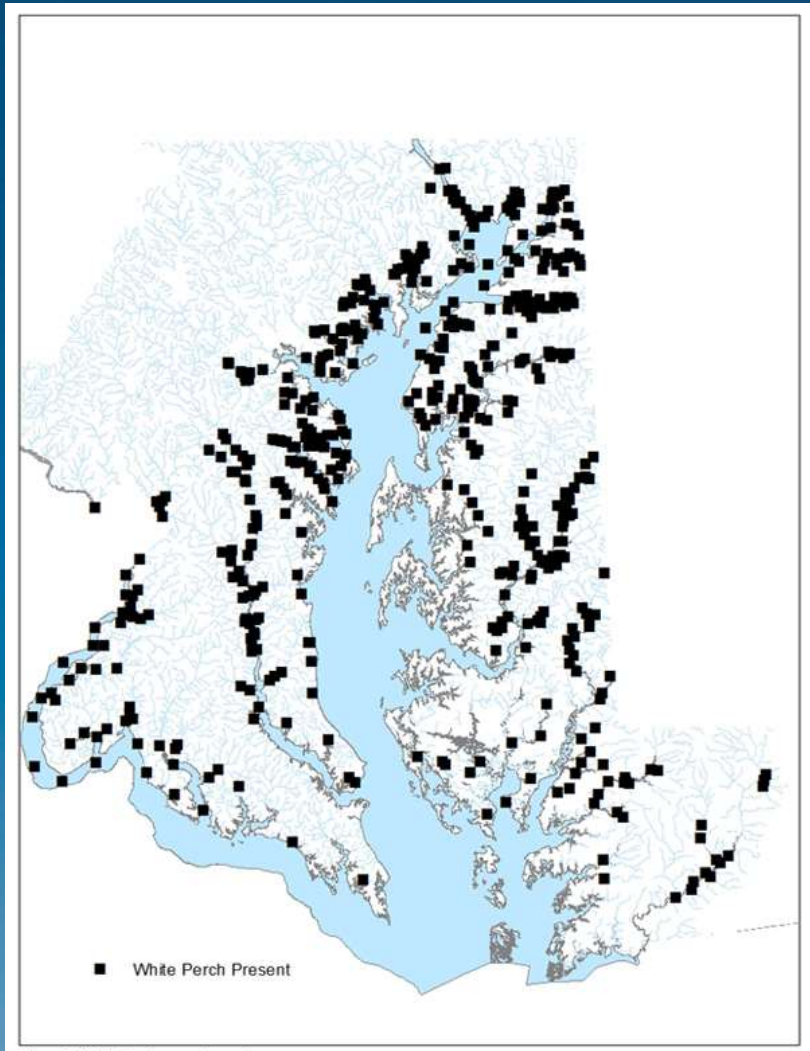

Figure 2. White Perch spawning and nursery areas.

MD DNR

Biological Endpoint Identification

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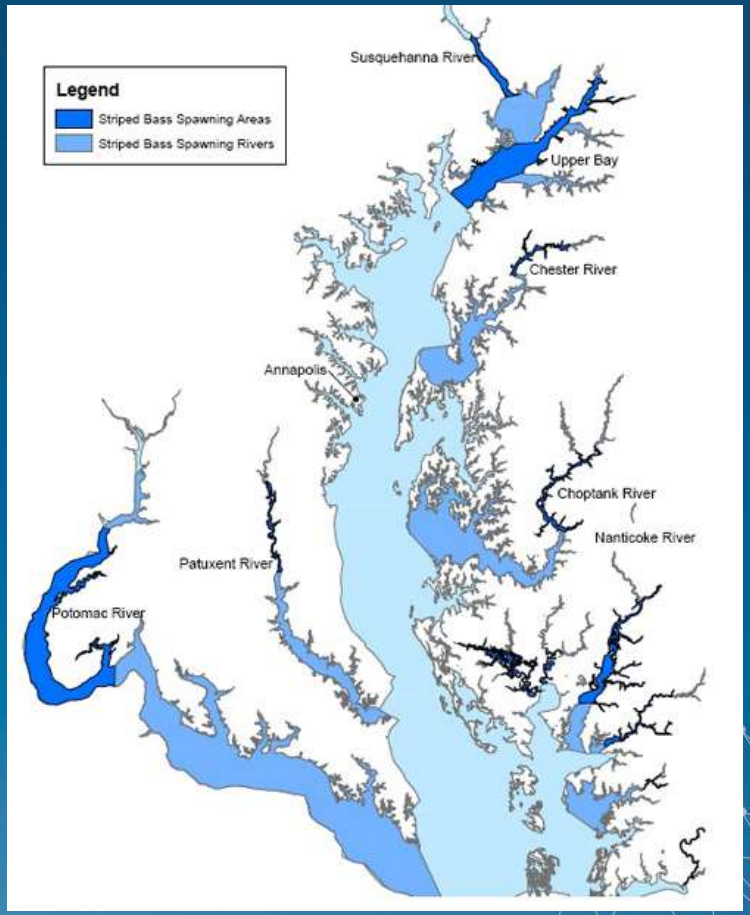
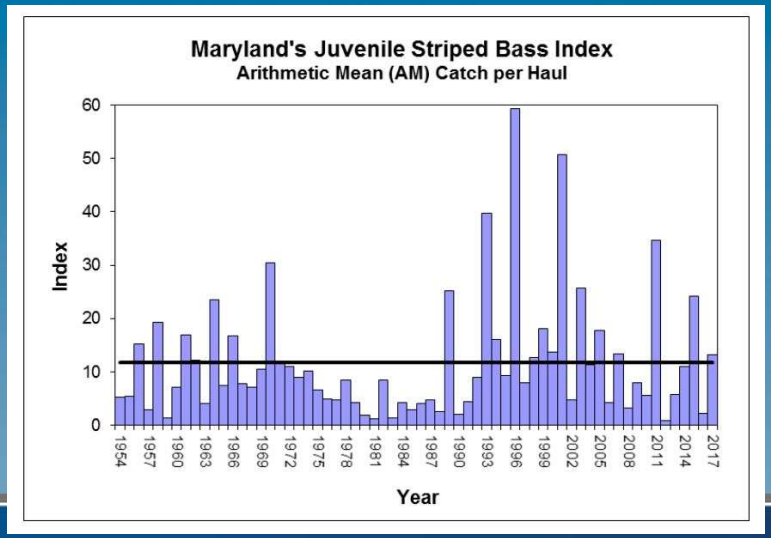
Striped bass (0-2)

- High trophic level
- Common
- Iconic
- Data rich
- ERA with striped bass as endpoint will capture several targets of the 2014 Agreement





Fate of Microplastics

Other stressors

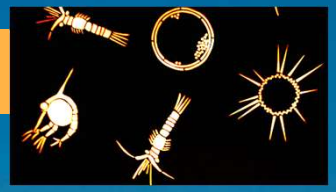
MPs

Water column

SAV

sediments

Plankton



Larval fish

Striped bass juvenile abundance/health/reproductive capacity

Biological Endpoint Identification

Assessment Endpoint	Measurement Endpoint
Healthy striped bass population	Instantaneous growth rates
Abundant striped bass juveniles	CPUE of striped bass juveniles in surveys
Strong recruitment to fishery	Estimation of mortality (component of Z) attributable to microplastics
Strong reproduction	Spawning stock biomass