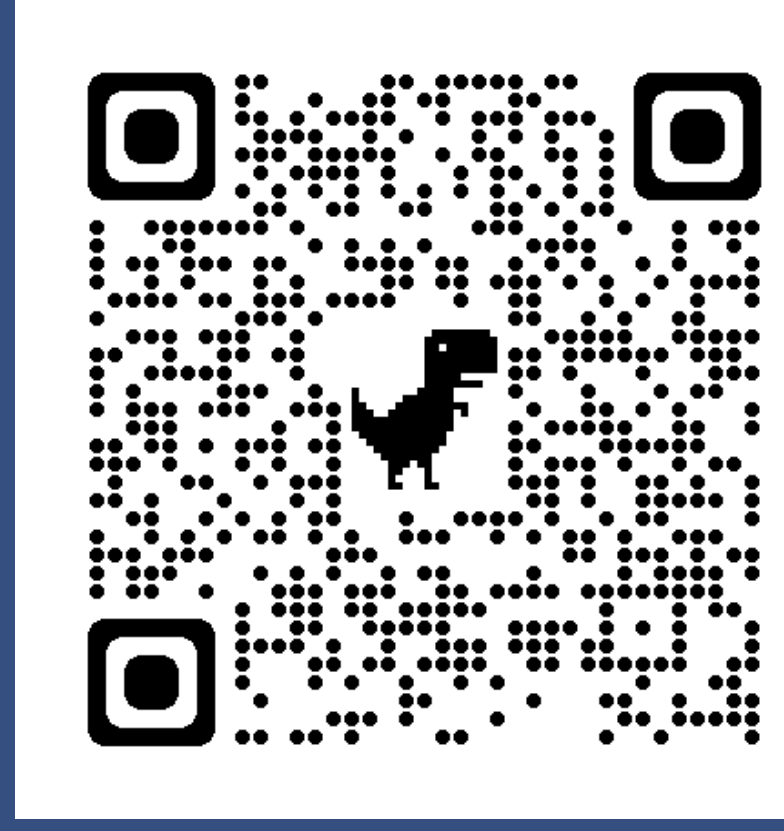


Improving Dissolved Oxygen and Aquatic Life Uses in the Delaware River Estuary

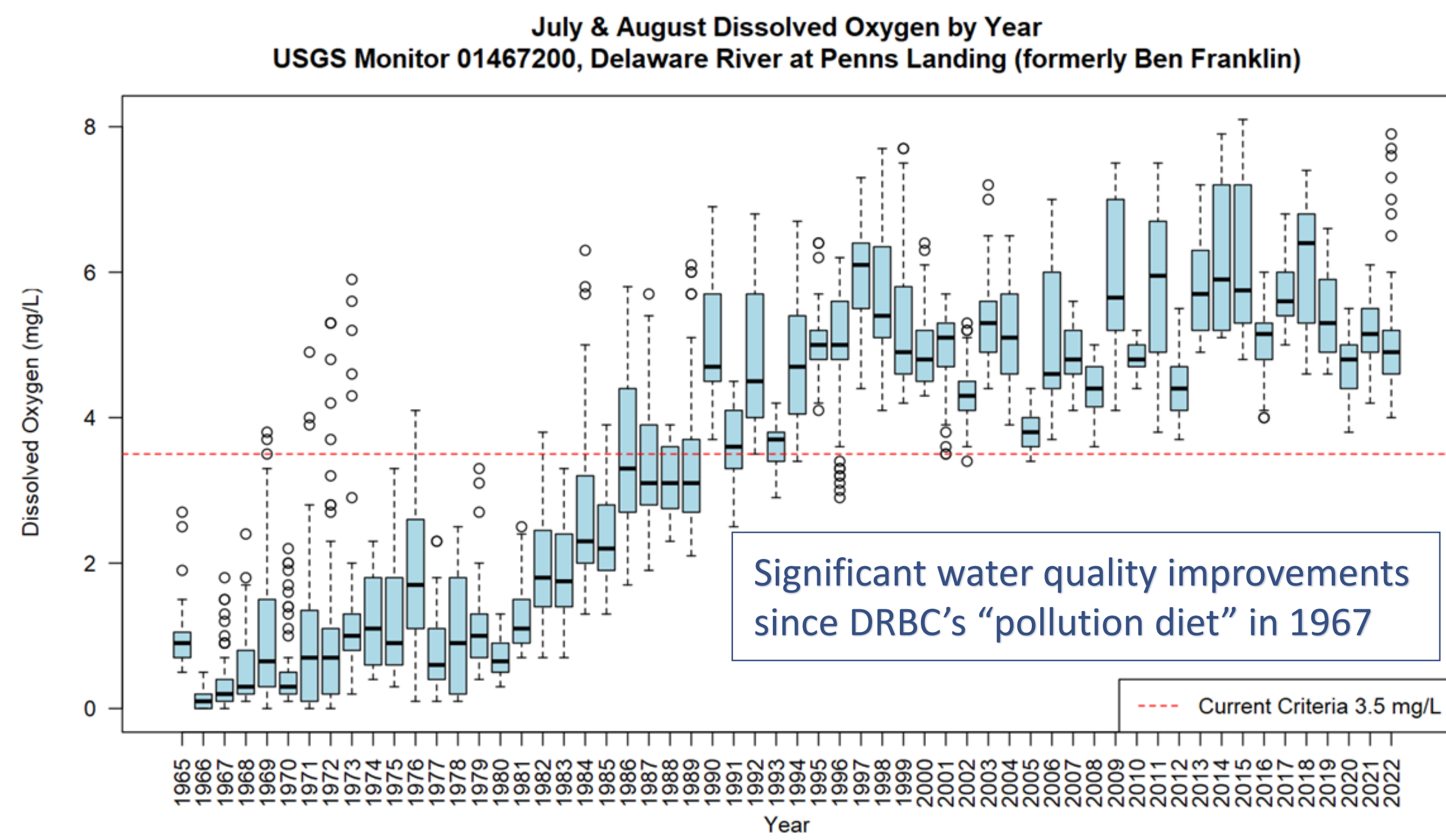
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 Delaware River Basin Commission, 25 State Police Dr., West Trenton, NJ 08628. Namsu.Suk@drbc.gov



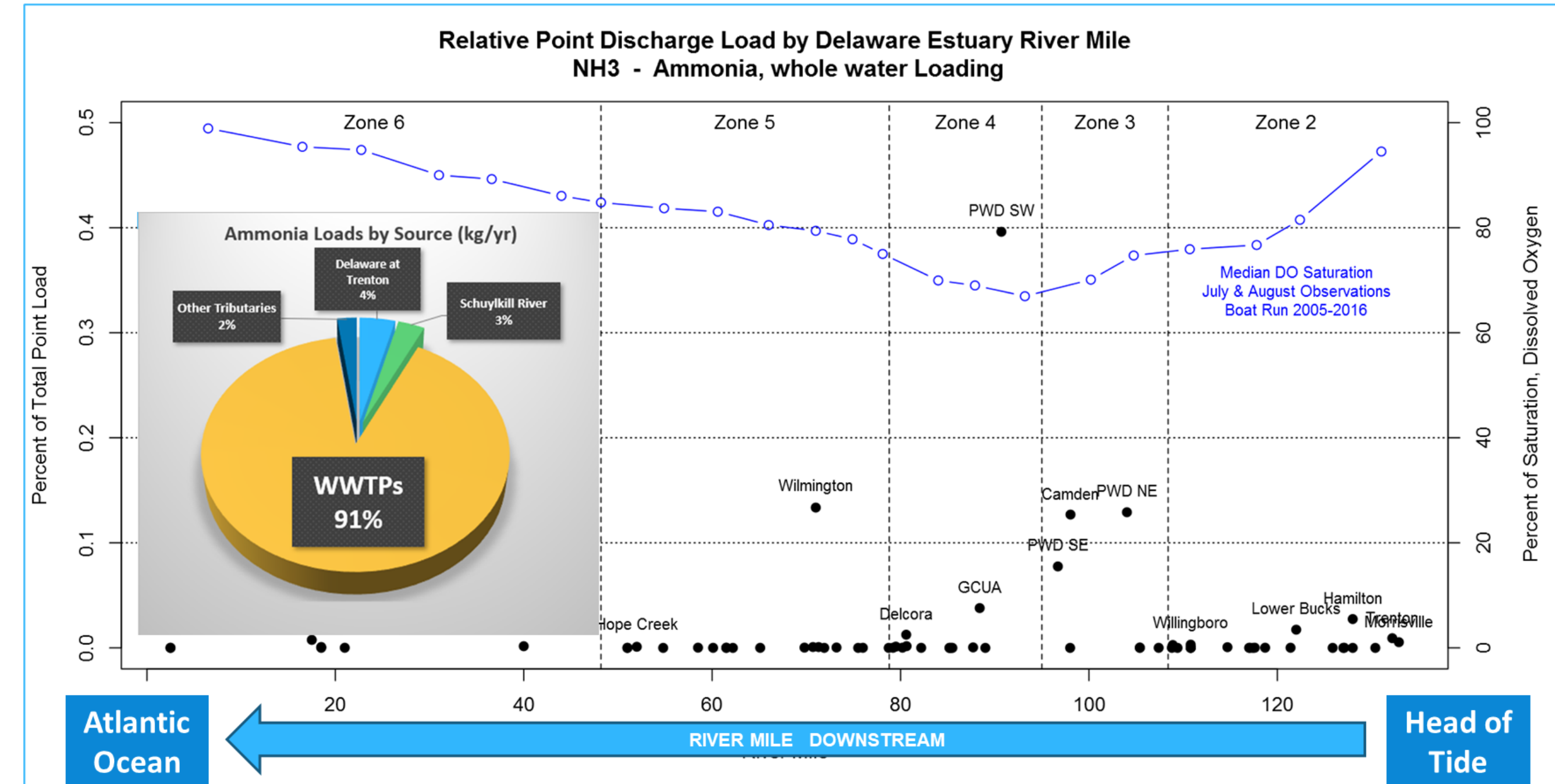
ABSTRACT

The Delaware River Basin Commission (DRBC), formed through a Compact in 1961 amongst the federal government and the States of NY, NJ, PA and DE, has worked with its state and federal partners to improve water quality, and the aquatic life that depends on it, within the Delaware Estuary for more than 60 years. The Commission reached an important milestone in September 2022 with the publication of a draft “Analysis of Attainability,” the purpose of which was to analyze how improved dissolved oxygen levels to support enhanced aquatic life uses may be attained within the portion of the estuary from Philadelphia/Camden to Wilmington that currently experiences occasional episodes of low dissolved oxygen during critical summer periods. The Analysis of Attainability provides a specific road map of ammonia allocations that will significantly improve dissolved oxygen such that fish maintenance and propagation is supported throughout the Estuary. The study represents the culmination of five years of intensive study involving scientific and technical expertise across multiple disciplines.

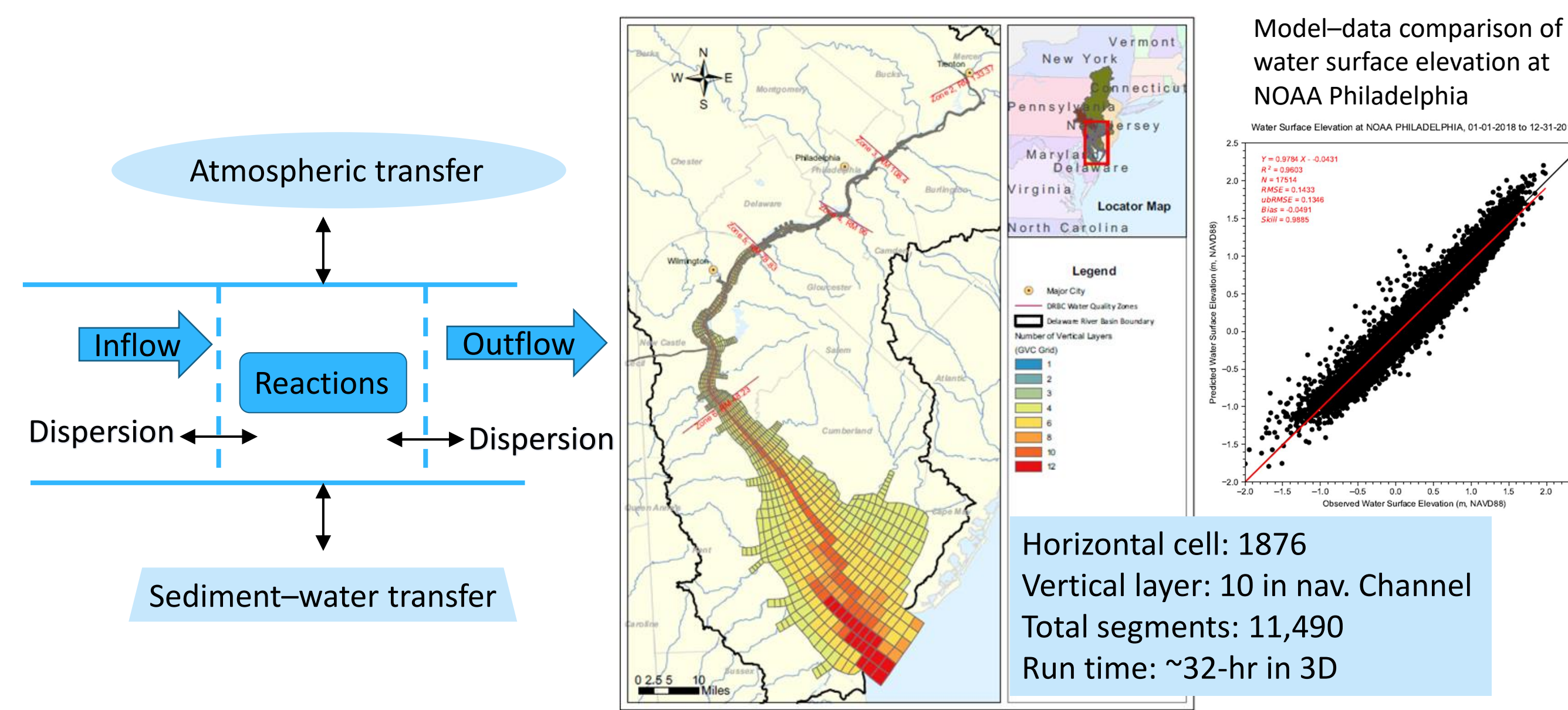
BACKGROUND



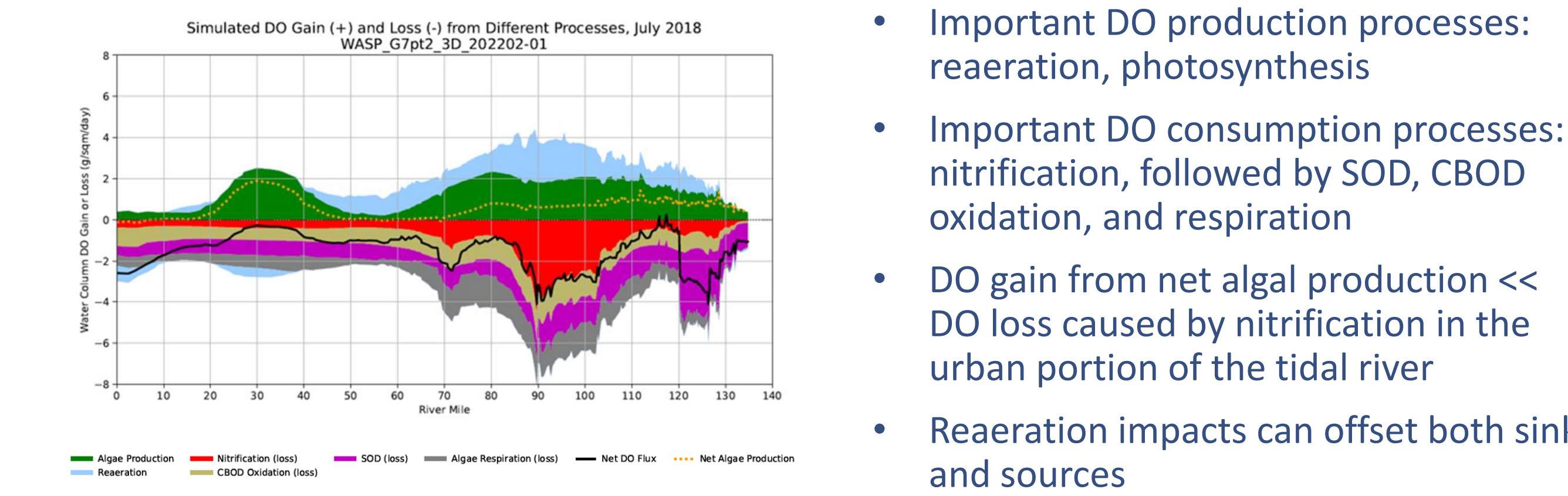
UNDERSTANDING THE PROBLEM



WATER QUALITY MODEL



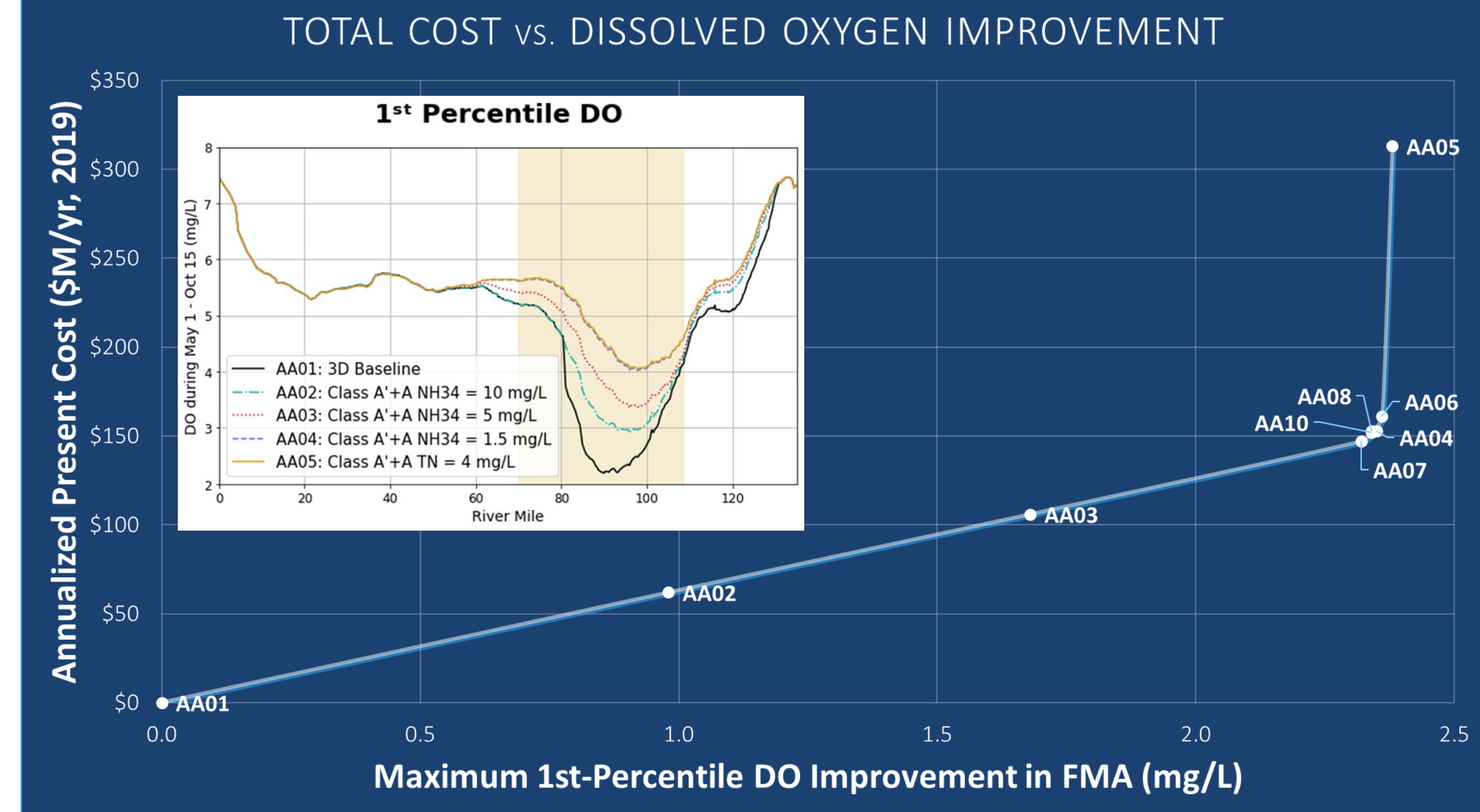
WHAT MATTERS AND WHAT DOESN'T



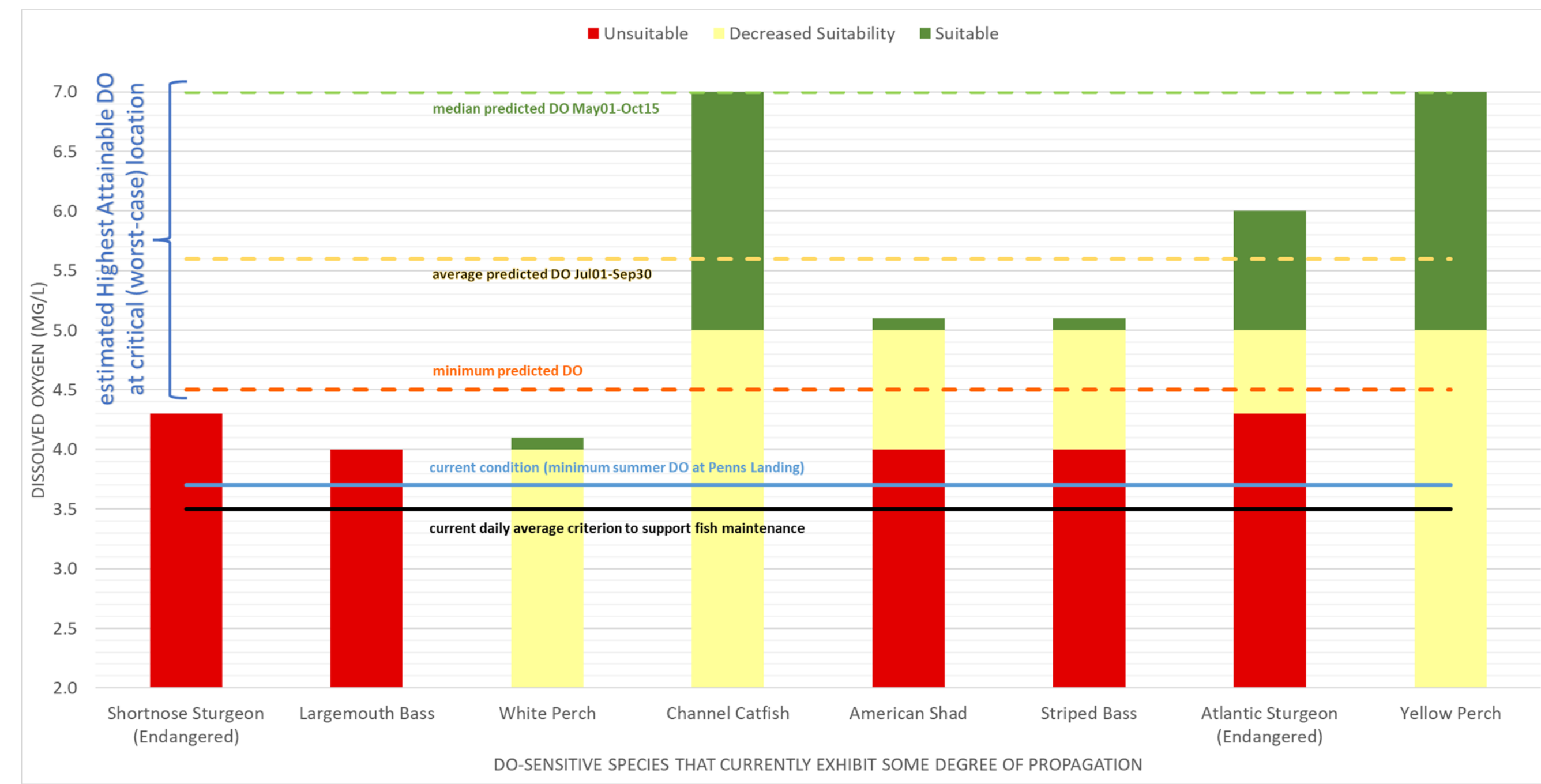
- Important DO production processes: reaeration, photosynthesis
- Important DO consumption processes: nitrification, followed by SOD, CBOD oxidation, and respiration
- DO gain from net algal production << DO loss caused by nitrification in the urban portion of the tidal river
- Reaeration impacts can offset both sinks and sources

Factors that can most improve DO in the FMA	Factors that can slightly improve DO in the FMA	Factors that cannot measurably improve DO in the FMA
<ul style="list-style-type: none"> • Summer (May–Oct) ammonia loads from specific point-source discharges • Carbon loads from Delaware River at Trenton 	<ul style="list-style-type: none"> • Combined sewer overflows (CSOs) • DO concentration in treated effluent from the largest point-source discharges • Carbon loads from Schuylkill River 	<ul style="list-style-type: none"> • Nutrient (C, N, P) loads from tributaries, except C loads from Delaware River at Trenton and Schuylkill River • Winter (Nov–Apr) ammonia, CBOD, and TN from all point-source discharges • Summer (May–Oct) ammonia loads from many point-source discharges • Direct stormwater runoff into the Delaware Estuary

COSTS AND BENEFITS



BENEFITS FOR AQUATIC LIFE USES



ONGOING / NEXT STEPS

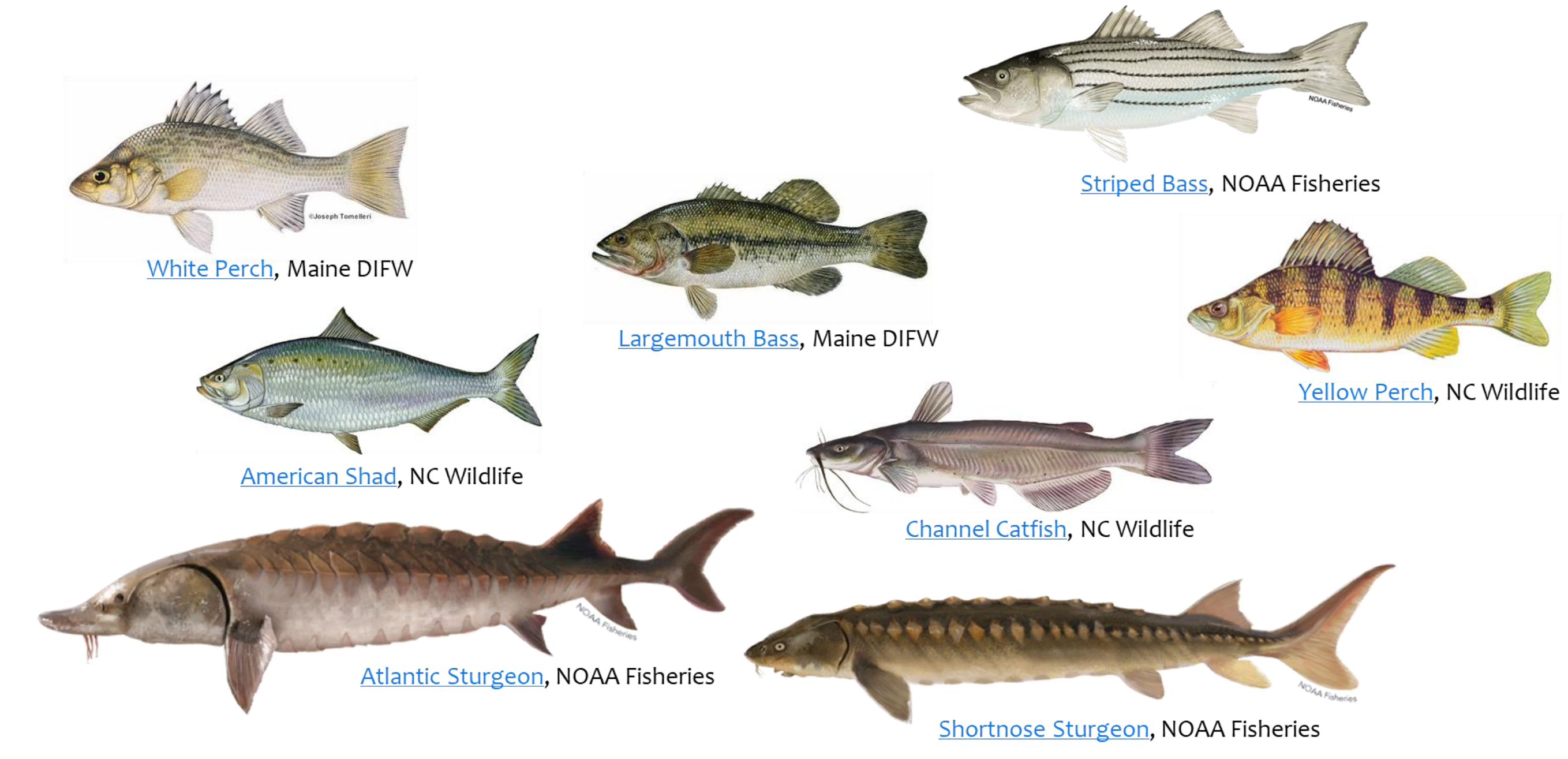
- DRBC is working together with USEPA in collaboration with estuary States to develop Estuary-specific water quality standards
 - Upgrade Aquatic Life Use to include propagation
 - Develop DO criteria to support aquatic life in freshwater Delaware River estuary
 - Rule proposal expected December 2023; adoption no later than March 2025
- Establish wastewater allocations to meet criteria
 - Implement through State NPDES permits or DRBC dockets

ACKNOWLEDGMENTS

Special thanks: the Delaware River Estuary co-regulator agencies; Members of the DRBC Water Quality Advisory Committee; The Delaware River Estuary wastewater dischargers; Model Expert Panel, Steven C. Chapra, Carl Cerco, Robert Chant, and Tim Wool; modeling consultants, Victor Bierman and Scott Hinz of LimnoTech; Vince DePaul (JFA with USGS's New Jersey Science Center).

Vital funding: DRBC signatory member funding by the States of Delaware, New Jersey, and New York and the Commonwealth of Pennsylvania; Grant funding from NJDEP, PADEP, USEPA, William Penn Foundation, and National Fish and Wildlife Foundation.

OBJECTIVE



To determine whether water quality can be enhanced to fully support maintenance, migration, and propagation of resident and diadromous fish inhabiting the freshwater Delaware River Estuary.