



**Testimony of Jeremy Cherson  
Legislative Advocacy Manager  
January 27, 2020**

**Joint Legislative Public Hearing on SFY2021 Executive Budget Proposal: Environmental Conservation**

Thank you to the chairs and members of the Senate and Assembly committees represented here for the opportunity to testify today.

Riverkeeper is a membership organization with nearly 55,000 members and constituents. Riverkeeper protects the environmental, recreational and commercial integrity of the Hudson River and its tributaries, and safeguards the drinking water of millions of New Yorkers.

Recent actions by the legislature have established New York State as a national leader on clean water and environmental protection including the passage of the historic Climate Leadership and Community Protection Act, a ban on single-use plastic bags, a phase-out of toxic PFAS in firefighting foam and the \$3 billion appropriated to the Clean Water Infrastructure Act since 2017. The FY2021 Executive Budget proposal includes proposals Riverkeeper enthusiastically supports such as the Restore Mother Nature Bond Act, polystyrene ban, increased freshwater wetland protections, and boosting staffing levels at the Department of Environmental Conservation. Riverkeeper urges the legislature to augment the programs and legislation announced by Governor Andrew M. Cuomo.

**1. Restore Mother Nature Bond Act**

Riverkeeper strongly supports the proposal for a \$3 billion Restore Mother Nature Bond Act. While the Hudson River Estuary has undoubtedly become cleaner in the past several decades, at the same time the Hudson's most iconic fish species have experienced dramatic declines. Of nineteen species examined, one species has left the Hudson completely, two are on the verge of extirpation, one shows a slight uptick, and the rest show significant to severe declines. These include species that have supported commercial fisheries in the past and species that support robust popular sports fisheries today. Most recently, declines have been reflected in the striped bass populations, which had made a previous comeback, but their recent negative trend has the Atlantic States Marine Fisheries Commission and anglers all along the coast concerned. The bond act presents an opportunity to make investments that will benefit New York's environment for generations to come.

The downward trend of the Hudson's most charismatic fish species is unfortunate as the Hudson River Estuary represents one of the planet's greatest migratory corridors. Each year millions of fish enter the Hudson River Estuary to renew their populations, but several hundred years of habitat alterations, toxic legacies, and over-harvest have taken their toll. Consequently, degradation of the environment has impacted every species in the estuary. In a natural environment, species are in constant interaction with their habitat and with each other. When these relationships are damaged or broken, the individual species suffer and subsequently the entire ecosystem becomes weakened. Moreover, if the ecological impact occurs to a species' particular life stage, then the species as a whole loses the ability to flourish. Species

will continue to decline without relief from stressors placed upon habitat or their populations. The Atlantic sturgeon is the only fish currently showing promise - only after all fishing was banned in the Hudson a quarter-century ago, and they were put on the federal Endangered Species list nearly a decade ago. We should not wait for species -- especially one that appears on every stream crossing in the Hudson Valley as the icon of our region -- arrive at the brink of extinction before we act.

The Restore Mother Nature Bond Act initiative is an opportunity to act now to restore important habitat and to protect species in decline. We hope the legislature will enthusiastically support the bond act proposal. Below we've included Riverkeeper's ideas within the broad framework of the proposal for how bond act funds could best be spent to achieve the core vision of the proposal: restoring the ecological of New York.

### ***Hudson River Species are in Decline***

For more information, please see appendix A attached digitally for greater detail on the status of Hudson River species.

- **Rainbow smelt (*Osmerus mordax*): Extirpated** from the Hudson River Estuary due to warming temperatures.
- **American eel (*Anguilla rostrata*): Long-term decline** and threatened by overfishing, habitat loss mainly due to dams, food web alterations, predation, toxins and an invasive parasite.
- **Atlantic sturgeon (*Acipenser oxyrinchus*): Endangered** due to prior overharvesting and slow reproductive rate as well as loss of habitat, water pollution and other anthropogenic disturbances. Shows signs of slow recovery.
- **Atlantic tomcod (*Microgadus tomcod*): Vanishing** and facing extirpation due to temperature changes and exposure to PCBs.
- **Bay anchovy (*Anchoa mitchilli*): Long-term decline**, cause unknown but may be related to changes in predation patterns.
- **Bluefish (*Pomatomus saltrix*): In decline**, due to species being overfished.
- **Eastern oyster: (*Crassostrea virginica*): 99% of the population lost** due to habitat alteration and over-harvesting.
- **Hog choker (*Trinectes maculatus*): In decline**, cause unknown
- **Lined seahorse (*Hippocampus erectus*): Vulnerable** to habitat disruption and poor water quality.
- **River herring and American shad (*Alosa spp.*) Stocks depleted by 95%**. In long-term decline due to overfishing, loss of river habitat, and dams that block access to spawning grounds.

#### ***A. Removing obsolete dams to reconnect habitat***

As the New York Times recently reported, the rivers and streams in the Hudson Valley, alone, are home to approximately 1,600 dams, the vast majority of which are both outdated and obsolete.<sup>1</sup> These dams don't just fragment waterways, they disconnect entire watersheds, alter ecosystems, and consequently cause some of the most significant negative impacts to the ecological health of our rivers and streams. Most migratory fishes are in a precipitous decline in the Hudson Valley, if not coastwide, and fragmentation caused by dams is a major reason. Dams delay or deny adaptive migration patterns and cause physiological stress as these fishes expend unnecessary amounts of energy attempting to pass artificial obstacles to access critical ancestral habitat.

<sup>1</sup> <https://www.nytimes.com/2020/01/20/nyregion/its-fish-vs-dams-and-the-dams-are-winning.html?smid=tw-nytmetro&smtyp=cur>

Removing outdated and obsolete dams can restore natural flow regimes, reconnect rivers with their floodplains, and allow free mobility of aquatic organisms into critical spawning & nursery habitat, which will support more robust and diverse populations assemblages for a wide variety of species.

New York State is several years into establishing a Dam Removal program, which the Restore Mother Nature initiative could take to an entirely new level. To obtain the highest biotic potential from dam removal, we need to create a criteria-based process designed strategically to target top priority removal opportunities, enable the greatest reduction of downstream blockage, open the largest stretches of high-quality habitats, and meaningfully enhance passage of migratory fish and brook trout.

**New York State could lead the nation in the removal of obsolete dams to restore habitat:**

- Provide reliable, continued funding for high-priority dam removal projects on non-state lands.
- NYS has a large inventory of publicly-owned dams and many are in states of disrepair. The State should begin removing obsolete dams on state property rather than continually maintaining & repairing them at taxpayer expense.
- Create a “best practices” guidance plan for the removal of dams to reduce cost, redundancy & improve efficiency of removal projects.
- Encourage NYSDEC Dam Safety to take an active role in encouraging & incentivizing dam owners to remove their dams collaboratively and efficiently.
- Take an active role in dam removal when owners create public safety risks by failing to maintain dams or abandoning them.

***B. Habitat Restoration through the Reconfiguration of Improperly Designed Culverts:***

Like obsolete dams, road culverts that are undersized or poorly designed act as barriers to a variety of aquatic organisms and also present hazards to human communities during storm events, when stormwater backs up behind under-sized culverts, causing flooding. Such culverts can fragment streams and wetlands, which then inhibits biological continuity and prevents organisms from accessing critical habitats. Poorly designed culverts can also act like dams by blocking or delaying migration patterns and causing the same physiological stresses. If crossing structures are not large enough, or lack dry passage, riparian wildlife may choose to cross over the road surface rather than pass through the structure. In the Hudson Valley, two-thirds of our road crossings are not passable to aquatic organisms.

Here are some of the measures that can be taken to address this issue:

- NYS needs to identify culverts & other roadway-based stream barriers that inhibit fish & wildlife passage, & establish a list of priority opportunities to reconfigure such barriers to restore habitat connectivity.
- Funds need to be allocated to address poorly-functioning culverts in priority river and stream corridors & targeted watersheds, by removing barriers, retrofitting culverts, & monitoring for presence of key species.

***C. Protecting and Restoring Wetlands and Riparian Habitat***

Wetlands habitat restoration and protection provides several key benefits worth investing in as part of the Restore Mother Nature Bond Act’s capital investments. Restoring wetlands not only increases biodiversity by improving areas for organisms to renew and restore their populations, it can also improve

coastal resilience and sequester carbon dioxide. In addition to spending state money to restore lost and degraded freshwater ecosystems, we must tighten regulations that protect existing small streams and wetlands -- a far cheaper strategy.

**Increasing Biodiversity:** Preserving and restoring wetlands, forests, fields, streams, underwater grasses and mudflats in the Hudson River watershed will provide thousands of species of plants, fish and wildlife with critical habitat to flourish. Habitat restoration supports increased resiliency which is critical to maintaining a functioning ecosystem during times of environmental stress such as periods of extreme weather, climate change and accelerated sea-level rise. In fragmented landscapes such as those predominating in NY today, protecting wetlands, riparian corridors, & critical habitat will facilitate biological connectivity and ecological integrity, which are essential to vibrant & diverse ecosystems.

**Improving Coastal Resilience:** A healthy ecosystem with greater biodiversity and variety of habitats is more adaptive in response to climate change. Preserving low-lying natural areas along shorelines to allow wetlands to ‘migrate’ and removing dams to restore sediment transport in tributaries will allow shallows and wetlands to continue to exist as sea-level rises. Implementing ecologically enhanced shoreline practices will allow communities to protect important properties and infrastructure from rising sea-levels and extreme storms while preserving habitat value.

Habitat protection and restoration will preserve critical functions these habitats contribute to the ecosystem, including fish spawning, nursery and forage habitats, and improved water quality. The construction of side channels in the upper estuary will increase spawning and forage habitats for many species. Side channels also provide critical low-flow refuge habitats for fish and wildlife during high flow periods associated with high discharge from extreme weather events.

**Flood control and mitigation.** Where watersheds have intact wetlands, undisturbed floodplains and free-flowing streams, the risks of extreme precipitation are mitigated. These natural features of the landscape have incredible capacity to absorb stormwater, preventing flooding downstream. The amount of precipitation falling in very heavy downpours has increased more than 70% between 1958 and 2010.<sup>2</sup> This trend is projected to continue and intensify. Communities and their drinking water supplies are therefore at an increased risk from flooding and runoff and flood-related pollution. Protecting small streams and wetlands is a proactive and necessary strategy adapt to climate extremes.

**Carbon Sequestration:** In restoring critical habitat we can also capture and sequester carbon to offset impacts of climate change. Forests and wetlands not only capture atmospheric carbon but forests, in particular, are sources of transpiration, which mitigates heat-island effects. Wetlands represent important carbon sinks in addition to the other ecological services they provide. Restored lands must not be converted to other uses and must be preserved for all perpetuity to protect against extreme weather events.

**Improving and maintaining water quality:** Small streams are the arteries of our watersheds, and wetlands are the kidneys. Well protected streams and wetlands, with forested buffers, are the most fundamental strategies for maintaining and improving water quality, including water quality for public drinking water supplies and recreational waters. Protecting these natural features of the landscape are a mitigation against Harmful Algal Blooms, erosion, stormwater-related pollution and other increasingly common problems plaguing our waters.

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<sup>2</sup> NYS DEC, “Impacts of Climate Change in New York,” available at <https://www.dec.ny.gov/energy/94702.html> Accessed on January 19, 2020.

Here are the measures we recommend in the area of wetlands and riparian restoration:

- NYS needs to implement strategies for acquiring and restoring networks of land & water corridors to support priority species and to provide other public benefits, including enhanced water quality, climate resilience, carbon sequestration, recreation and scenic value across the watershed.
- Extend DEC's authority to protect class C streams from bed or bank disturbance under the DEC's Protection of Waters Program, ensuring these streams have a baseline of protection that may be lost with the finalization of the Trump Administration's Clean Water Rule rollback. This approach is outlined in A.8349/S.5612A of 2019, which passed with bipartisan support in the Senate 51 to 11 during the 2019 legislative session.
- Extend and modernize the state's program for protecting wetlands, as detailed later in this testimony.

#### ***D. Preventing the Spread of Invasives Through the Canal Systems***

The increasing presence of aquatic invasive species (AIS) is an enormous threat to biodiversity here in New York State. Invasive species can threaten native species and destabilize the ecosystem.

The spread of AIS occurs largely as a result of pathways for the movement of such species, like New York's expansive canal system, which grant access to areas that otherwise would have been inaccessible or impassable to them.

The greatest threat facing the Hudson River is Asian carp (bighead and silver), tench, & round gobies. Round gobies have been identified in the Mohawk River near Utica. Tench are in Lake Ontario and the St. Lawrence River systems. Major populations of both species of Asian carp are currently limited to the Mississippi basin. The goal should be a 100% effectiveness in blocking the migration of all life stages of aquatic invasive species through canals into the Mohawk-Hudson watershed. Eradicating an introduced species, once established, is in almost every case impossible, and managing the damage they do is costly. The only truly effective method to check the spread of introduced species is to completely deny their access to our ecosystems.

#### **To Prevent the Spread of Invasives Through the Canal System, We Recommend:**

- The spread of Asian carp, tench, round gobies and other species could have catastrophic consequences to the Hudson. The Reimagine the Canals Task Force recommended that DEC study the options for preventing invasive species migrations. We urge you to provide sufficient funding for this study, and ensure that it includes robust engagement of stakeholders in the Hudson Valley, and that it considers all options, including engineered solutions west of Rome.
- Early detection of AIS can aid response to prevent invasive species from spreading. Use of environmental DNA (eDNA) techniques, which screen for the presence of genetic materials from invasives in our riverine systems is effective at detecting these species at low population levels (ie, before their spread becomes irreversible).
- **Our recommendation is that eDNA monitoring of key waterways like the Hudson, Mohawk and Erie Canal begin immediately and that plans for the establishment of effective interdiction for Asian Carp and Round Gobies be implemented at the earliest opportunity. The cost of such measures is uncertain, but it is without question vastly lower than the impacts to our ecosystems and recreational fisheries that would result if these species were to reach our waterways.**



### ***E. Improving Water Quality to Fight Harmful Algal Blooms (“HABs”)***

Without swift and proper management, HABs will increasingly occur in our waterways, threatening drinking water and reducing the viability of aquatic habitat. Any successful effort to prevent HABs must utilize a range of measures to protect water quality and reduce conditions causing such blooms, including: land acquisition or conservation easements; restoring forest buffers in priority watersheds; and comprehensive approaches to stream management and pollution control.

Such a comprehensive program to fight HABs would yield many benefits for local communities including: the improvement of water quality, reduction and mitigation of flooding, protection of wildlife habitat and the maintenance and enhancement of public access and recreational activities.

#### **To Prevent HABs We Recommend:**

- Fund and foster best management plans for farmland, such as establishing natural vegetative buffers consisting of trees and shrubs and berms between farm fields and developments that border water bodies; and, providing incentives for curtailing farm and development runoff and the planting of cover crops between cash crops seasons.
- Identify pollution reduction targets by watershed area and include a schedule of actions to be taken to achieve the reductions, including:
  - Better control of contaminants from regulated point sources of pollution such as sewage treatment plants, stormwater systems and CAFOs and other sources such as discharges and polluted runoff from agricultural lands, towns and septic systems.
  - Development and implementation of programs and policies that reduce impacts from septic systems.
- Identify and implement cost-effective urban stormwater retrofits and implement appropriate practices to control stormwater runoff from developed areas and reduce, prevent or control erosion from unpaved roads, trails and ditches.
- Modernizing New York State’s Water Quality Standards for nutrients, a key tool of the Clean Water Act that needs to be put to more effective work.
- Ensure DEC funding is adequate to complete and implement Clean Water Plans for waters impaired by excess nutrients and/or plagued by Harmful Algal Blooms - including rivers like the Mohawk River and Wallkill River.
- Protect and restore small streams and wetlands, as detailed elsewhere in this testimony.

## **2. Protecting New York’s Freshwater Wetlands (Part TT TED)**

Riverkeeper strongly supports the proposal included in the executive budget to reform New York’s regulatory program for freshwater wetlands in Article 24 of the Environmental Conservation Law. We encourage the legislature to wholeheartedly support this proposal. New York must take action to ensure our state’s natural resources aren’t compromised by the Trump administration’s attacks on the Clean Water Act. New York now must act to address these new gaps, and protect these valuable clean water resources and wildlife habitats. Just last week, on January 23, 2020 the Trump administration published its replacement rule for the Clean Water Rule, rolling back Clean Water Act protections championed over decades by both Republican and Democratic administrations. There is an urgent need to include this change in this year’s budget.

The proposal fundamentally improves NYSDEC’s ability to protect freshwater wetlands 12.4 acres or larger or wetlands of unusual local importance by amending the requirement that wetlands appear on

NYSDEC promulgated maps in order to receive protection. This red tape has prevented nearly 50,000 acres of wetlands deserving protection in the Wallkill, Genesee and Oswego watersheds. Many of these DEC wetlands maps have not been updated in decades, and therefore do not identify wetlands that meet current regulatory thresholds and therefore may not receive the protection they are afforded under current state law. Changing the law to make the mapping requirement to one that provides an educational resource for communities and developers, not a regulatory prerequisite, will ensure wetlands of 12.4 acres or larger are protected along with the clean water and flood control benefits they provide.

Riverkeeper has strongly supported A.3658/S.7366 (Englebright/Harckham) to vastly expand protections to New York's threatened freshwater wetlands for years and we are grateful for Assemblyman Englebright's longtime advocacy and support for comprehensive changes. Riverkeeper will continue to advocate for legislation to increase protection for freshwater wetlands in New York from the current 12.4 acres to 1 acre or larger - a threshold more in line with protections long afforded wetlands in neighboring states. New York has already lost at least 60% of its wetlands -- well over 1.5 million acres.<sup>3</sup> We encourage the legislature to work with the governor on this proposal to ensure we take a strong step in the right direction as the federal government steps back.

**Riverkeeper strongly encourages the legislature to support part TT of the TED as a down payment on comprehensive freshwater wetlands reform.**

### **3. Department of Environmental Conservation Staff and Funding**

Riverkeeper strongly supports the executive proposal to add 47 full time staff members at NYSDEC and increase the agency's budget by 10 percent. Riverkeeper cannot overstate the importance of countering the assault on federal environmental protections, and the holes it will leave in New York's ability to protect its environment, including our water, particularly with the latest assaults on the Clean Water Act. For example, under President Trump, EPA criminal referrals to the U.S. Justice Department for environmental crimes are at a 30 year low.<sup>4</sup>

In addition to acting as a bulwark against federal rollbacks, increased staffing and budget for the DEC is necessary for the agency to successfully implement important programs, including new programs like the Drinking Water Source Protection Program, and those to be developed under the Climate Leadership and Community Protection Act.

**Riverkeeper supports Governor Cuomo's proposal for staff and funding increases at the NYSDEC.**

### **4. Clean Water Infrastructure Act Investments**

The infrastructure investments made through the Water Infrastructure Improvement Act (WIIA) via the Clean Water Infrastructure Act (CWIA) are the biggest New York State investment in this critical priority in a generation. The governor's doubling of the commitment to the CWIA to \$5 billion marks a historic commitment to protect New York's surface and drinking waters. The legislature's strong support for this

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<sup>3</sup> Association of State Wetlands Managers, "ELI State Wetland Protection Status, Trends, & Model Approaches - New York," 2008, available at <https://www.aswm.org/aswm/58-wetland-programs/state-summaries/781-new-york>

<sup>4</sup> Vox, How Trump's EPA is Letting Environmental Criminal Off the Hook, in on Chart, available at, <https://www.vox.com/2019/1/16/18183998/epa-andrew-wheeler-environmental-policy-enforcement>

program is greatly appreciated. We appreciate the governor's proposed \$500 million addition to this program and continue to ask for \$1 billion in new funds this fiscal year to address the dire water infrastructure needs across the state.

The investment, on top of existing disbursements helps address the nearly \$80 billion documented need for water infrastructure investment in New York, the largest in the nation. The lion's share of the \$4.8 billion in documented wastewater projects in the Hudson River Watershed are needed in and around New York Harbor. But we need nearly \$1.4 billion in our watershed upstream of New York City.<sup>5</sup> For example, the 44 municipally owned wastewater treatment plants that discharge directly to the Hudson River Estuary, rely on at least 1,500 miles of sewer pipe, half of which are over 60 years old.<sup>6</sup>

In Appendix B, you will find the wastewater infrastructure needs for legislative districts in both the Senate and Assembly for much of the Hudson River watershed. The highest need for infrastructure investment outside New York City in the Senate is district 47 represented by Senator Joseph Griffo with \$324,906,668 in projects identified in the 2020 Intended Use Plan published by the New York Environmental Facilities Corporation. The highest need outside New York City is Assembly district 113 represented by Assembly member Carrie Woerner with \$323,763,980 worth of investments identified.

We don't want to lose momentum on clearing the tremendous backlog of clean water projects while we make significant and necessary new investments in advanced treatment of drinking water supplies contaminated by PFOA, PFOS and 1,4-dioxane. (The investment in state grants announced in December to help Long Island communities treat 1,4-dioxane exceeded the total investment in state grants to help all of the Hudson River Watershed invest in drinking and wastewater infrastructure, source water protection and watershed restoration.)

Some highlights of the December 2019 announcements for places where Riverkeeper works intensively include:

- \$17 million to improve water quality by fixing up sewer pipes, pump stations and treatment in communities bordering the Hudson River estuary – including reducing the impact of combined sewer overflows (CSOs) in the Capital District and Kingston
- \$14 million to improve water quality in the Mohawk River, the Hudson's largest tributary; and \$10 million to improve water quality in the Upper Hudson River
- \$3 million to study and improve the Sparkill Creek, where Riverkeeper has worked with the Sparkill Creek Watershed Alliance for more than a decade to bring attention to water quality concerns. Riverkeeper itself won \$50,000 from the Hudson River Estuary Program for a water quality monitoring project partnered with the state.
- \$3 million to study and improve water quality in the Saw Mill River and the massive sewer system that underlies its watershed
- Drinking water source protection projects benefiting Ossining, Cornwall, Warwick, Hudson, Albany and Bethlehem.

The Sewage Pollution Right to Know Law has exposed the frequency of sewage overflows and leaks. Most sewage treatment infrastructure is built assuming a useful life of 30-40 years. Robust investment

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<sup>5</sup> Riverkeeper, "Municipal Wastewater Infrastructure" 2018, available at <https://www.riverkeeper.org/wp-content/uploads/2018/11/Wastewater-Handout.pdf>

<sup>6</sup> Hudson River Comprehensive Restoration Plan, 2018, "Storm and Wastewater Target Ecosystem Characteristic report," available at <http://thehudsonweshare.org/wp-content/uploads/2018/08/Storm-and-WasteWater.pdf>



paired with asset management, water conservation and equitable pricing will best alleviate today's crisis and prevent its recurrence. Consider a few of the facts:

- 10% of wastewater treatment plants that discharge directly to the Hudson River are at or above 75% capacity, and roughly 1 in 4 is at risk of inundation from sea-level rise, storm surge or both.<sup>7</sup>
- Four in 10 communities that own sewage infrastructure in the 10-county Hudson River Estuary Watershed region have not identified a project in need of Clean Water State Revolving Fund support<sup>8</sup>; therefore, any needs in these communities are unquantified;
- Source water protection needs for public drinking water supplies have not been estimated;
- NYS DOH has estimated that the cost will be in the billions to treat for PFOA, PFOS and 1,4-dioxane as it establishes Maximum Contaminant Levels for these toxic contaminants, but because most public water systems serving fewer than 10,000 people have not yet tested for them, and they are found ubiquitously, the full cost of protecting public health from these chemical scourges remains incompletely quantified;
- The cost of upgrades to remove nutrients, pharmaceuticals or other unregulated contaminants has not been estimated for most, and therefore is not included in the overall estimate of needs for the watershed, or the state as a whole.

New York has the greatest need of any state in the nation, and the federal government's once-robust funding for water infrastructure is a memory. Therefore, the state's investments are crucial and extending the time horizon of the

**Riverkeeper supports the governor's proposal for an additional \$500 million appropriation to the CWIA but urges the legislature to go bigger with a \$1 billion appropriation.**

## **5. Environmental Protection Fund**

**Riverkeeper is a member of the broad We Love New York coalition that supports growing the Environmental Protection Fund (EPF) at least \$350 million and ultimately \$500 million over the next five years.** The legislature have been strong champions of the EPF, and we urge you to grow your commitment to this important source of funding. Within the EPF, Riverkeeper supports expanding funding for the Hudson River Estuary Program. Like many of our colleagues, we are disappointed to again see language included that would allow for the offloading of EPF capital funds to cover staff costs at agencies. Riverkeeper does not believe the EPF is an appropriate fund by which to grow agency capacity. We hope the legislature will push back, as you did successfully in last year's budget. We should be talking about increasing the EPF, not raiding it.

### ***A. Hudson River Estuary Program and Mohawk Basin Program***

**The Hudson River Estuary Program is the state's only program dedicated to protecting the Hudson River and its watershed.** Recognizing it as an indispensable source of technical advice, community grants and planning expertise, this executive budget proposal maintains FY2020 funding at \$6.5 million after increasing it by \$1 million in the FY2019 budget, and we are grateful for this ongoing commitment. We are seeking an increase of \$500,000 to \$7 million, inclusive of the \$1 million for the Mohawk Basin

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<sup>7</sup> Riverkeeper, "How's the Water?" 2017; *ibid*

<sup>8</sup> *ibid*.

Program to support critical climate change response planning, public grants, education and water management planning.

The Estuary Program's celebrated accomplishments include investing in local watershed protection efforts and state-leading regional efforts in support of source water protection; creating new parks, boat launches and fishing piers; collaborating with over hundreds of nonprofit and regional partners; providing training to 7,000 local leaders, educational opportunities to 19,000 students, educators, and members of the public, \$2.6 million in projects in 83 communities, and helped communities access nearly \$7 million in grants since 2015.<sup>9</sup> This work has resulted in lasting benefits to communities from the Capital District to New York City, and helps to support the region's \$5.3 billion annual tourism economy.

The needs of the Hudson Valley region served by the Estuary Program are considerable and increasing. They include planning and implementing programs such as drinking water source protection and harmful algal bloom prevention; advancing dam removal and culvert right-sizing initiatives; promoting climate resiliency planning and implementation at locally and regionally. The Estuary Program will publish its next Action Agenda in 2020, setting an ambitious agenda for the next decade supported by a wide variety of stakeholders. Among the goals in the draft Action Agenda is the first-ever water quality assessment of the Hudson River Estuary -- a task that is at once ambitious, necessary and overdue.

If the Environmental Protection Fund is increased by \$50 million, as our coalition is advocating, we urge the legislature to double funding for the Estuary Program to support the extensive needs of the region. Should the EPF remain at current levels, we urge the legislature to ensure the Estuary Program is boosted by \$500,000 to \$7 million.

**Riverkeeper calls on the legislature to increase Hudson River Estuary Program funding by \$500,000 to \$7 million.**

***B. Drinking Water Source Protection Program***

The EPF is a critical funding source for the new state Drinking Water Source Protection Program. We anticipate that communities that will benefit from the first round of this important new program will be announced early in 2020. These communities will benefit both from new Source Water Assessments, which should clearly identify risks to their water supplies, and a robust planning process to prioritize and identify actions to address those risks. For decades, New York and its communities under-invested in the planning and implementation of source water protection, and we have unfortunately seen the consequences as communities face drinking water pollution and health concerns as a result. The cost of treating or replacing public drinking water supplies, and of treating illnesses that result from drinking contaminated water far outweigh the cost of protecting drinking water at its source. In addition to other programs previously identified in this testimony -- such as the protection of small streams and wetlands, and investments via the Clean Water Infrastructure Act -- Riverkeeper urges the legislature to champion this essential new state program.

We also urge the legislature to examine the NYS DOH's welcome and recent commitment to update Watershed Rules and Regulations as part of a comprehensive approach to protecting drinking water at its source. The legislature had the foresight to establish the state's authority to set these rules nearly a century

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<sup>9</sup> NYSDEC, The 2018 Annual Hudson River Estuary Program Coordinators Report, available at, [https://www.dec.ny.gov/docs/remediation\\_hudson\\_pdf/hrep2018report.pdf](https://www.dec.ny.gov/docs/remediation_hudson_pdf/hrep2018report.pdf)

ago; and yet, while they are the bedrock of New York City's world-renowned protection program, these rules have been put to use effectively in most communities around the state. In many cases these rules and regulations should be seen as part of promoting environmental justice, as they help to empower downstream communities to protect the sources of their drinking water upstream. In Newburgh, for instance, that would mean empowering a community that is 35% white and that has a poverty rate exceeding 30%, compared to its neighbors where as much as 75% of the population is white and the poverty rate is 7% or lower. While the NYS DOH has indicated a willingness to exercise its discretion to update Watershed Rules and Regulations, there is still much uncertainty about process, timelines and requirements that communities should expect in order to use this tool. We urge the legislature to help ensure that the NYS DOH holds itself to aggressive timelines, updates Watershed Rules and Regulations with a reasonable and transparent process, and prioritizes the interests of those drinking the water above all others.

**Riverkeeper calls on the legislature to maintain funding for Source Water Assessments at \$5 million.**

## **6. Ban on Polystyrene in Food Service and Packing Peanuts by January 2022**

Riverkeeper is thrilled that the Governor has embraced the fight long championed by members of this legislature against polystyrene pollution with his proposal to ban polystyrene in food service and packing peanuts by January 2022. This effort builds on the groundbreaking legislation going into effect in March 2020 to ban single-use plastic bags in New York.

Styrofoam packaging is one of the most common types of pollution found along the New York City and Hudson Valley shorelines, based on data collected during the annual Riverkeeper Sweep cleanup event. Styrofoam packaging accounted for a significant portion of the pollution found along the shores of the Hudson in 2019.<sup>10</sup>

Polystyrene plastic is produced from petrochemicals and causes health and environmental hazards. Polystyrene is derived from styrene and benzene, both of which are neurotoxins and probable carcinogens posing a human health hazard.<sup>11</sup> Polystyrene is the only plastic used in food packaging that is based on a carcinogen. Styrene leaching from polystyrene products increases with temperature and particular foods such as alcohol, oils and fats. Therefore, polystyrene products raise a human health risk necessitating their removal from use as a food packaging material.

Styrofoam is particularly harmful to the environment because it easily breaks apart into smaller pieces making it extremely difficult to clean up. The product is also nonbiodegradable, therefore it persists in the environment indefinitely. In addition, there currently exists no viable market for Styrofoam recycling. This has led multiple communities and states across the country to ban Styrofoam use .

Communities across the state have already placed bans on polystyrene products including New York City, Suffolk County, Albany County, and Ulster County. Other cities across the country that have banned

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<sup>10</sup> Riverkeeper, "Plastic pollution in the Hudson: Detailed data from Riverkeeper Sweep 2019", available at <https://www.riverkeeper.org/blogs/ecology/plastic-pollution-in-the-hudson-detailed-data-from-riverkeeper-sweep-2019/>

<sup>11</sup> Sierra Club, "Regulating the Use of Polystyrene Food Service Items" available at, [https://www.sierraclub.org/sites/www.sierraclub.org/files/sce-authors/u1997/polystyrene\\_fact\\_sheet\\_MA-SC-2015%281%29.pdf](https://www.sierraclub.org/sites/www.sierraclub.org/files/sce-authors/u1997/polystyrene_fact_sheet_MA-SC-2015%281%29.pdf)

Styrofoam products include San Diego, Miami Beach, Seattle, and Washington DC.<sup>12</sup> Maine announced a ban on Styrofoam containers statewide beginning in 2021. Maryland also initiated a Styrofoam ban going into effect in 2020 and Connecticut is also now considering a ban.<sup>13</sup>

**Riverkeeper urges the legislature to support the governor’s proposal to ensure that New York pursues a policy to eliminate the use of polystyrene products by January 2022.**

## **7. Long Island - NYC Water Supply System Feasibility Study**

Riverkeeper is interested to learn more about a proposed study on connecting Long Island to New York City’s world renowned water supply system. As an organization with a decades-long history protecting New York City’s water supply we have some considerations that will need to be addressed in any study.

The Bureau of Water Supply for New York City’s Department of Environmental Protection (DEP) has invested significant time, cost and expertise to develop predictive modeling to guide the City’s reservoir operations. This Operations Support Tool is used to predict the probability that the City’s drinking water reservoirs will be filled to full capacity by June each year, then gradually drawn down to 90 percent capacity during summer and fall before refilling during spring stormwater runoff and snowmelt. DEP has strived to keep its reservoirs within this narrow margin in the event that drought shortages increase in frequency due to climate change, leaving questionable surplus for diversion to Long Island.

In addition, the City’s reservoir releases to downstream watercourses are mandated by law and consent order, so any reduction or interruption of the releases in order to supply Long Island with NYC reservoir water would violate release protocols. It is unclear then, how the City will have enough surplus water to service Long Island while maintaining the reserved capacity it claims to need for drought mitigation and without reducing downstream reservoir releases. These issues must be addressed in the proposed feasibility study.

### **Conclusion**

New York State’s actions in recent years to support water infrastructure, drinking water quality and source water protection represent national leadership at a time when the Trump administration is eliminating safeguards.

Governor Cuomo’s proposed budget is a great step forward and we encourage the legislature to support the Restore Mother Nature Bond Act, wetlands reform, and the Clean Water Infrastructure Act outlined by the governor, and go even further to protect clean water and our environment. Thank you for your consideration, and for the opportunity to present this testimony.

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<sup>12</sup>CNN Business, “New York will start enforcing its styrofoam ban today. Here’s where else it’s banned”, available at <https://www.cnn.com/2019/07/01/business/new-york-styrofoam-ban-trnd/index.html>

<sup>13</sup> *Id.*

## Appendix A



### **The Hudson River's Species are in Decline**

The Hudson River Estuary (HRE) represents one of the planet's greatest migratory corridors as each year millions of fish enter the estuary to renew their populations. While the HRE has undoubtedly become cleaner in the past several decades, several hundred years of habitat alterations, toxic legacies, and over-harvesting have taken their toll on every species in the estuary.

**Of 16 species that use the HRE that Riverkeeper examined, one (rainbow smelt) has disappeared from the Hudson completely, two (Atlantic tomcod and winter flounder) are on the verge of extirpation, and the rest show significant to severe declines.** This downward trend of the Hudson's most charismatic fish species is alarming, and we must act now.

Striped bass populations had made a comeback some years ago, but now are declining due to overfishing. The Atlantic States Marine Fisheries Commission (ASMFC) and anglers all along the coast are concerned about this trend. The decline in striped bass has raised alarms because it highlights the complex relationships between species and that reductions in one species can impact others.

In a natural environment, species interact constantly with their habitat and with each other. When these relationships are damaged or broken, individual species suffer, and the entire ecosystem is weakened. And when ecological impacts occur in any of its life stages, the species as a whole cannot flourish. The Hudson River's iconic fish will continue to decline if we do not act now to protect them and their natural habitat.

Atlantic and short-nosed sturgeon are the only species currently showing any signs of promise, due to decades of protection under the Endangered Species Act and a moratorium on fishing. However, they remain endangered because the species are slow to mature, and they have not yet recovered from decades of overharvesting.

**Governor Cuomo's Revive Mother Nature initiative is an opportunity to act now to restore important habitat and to protect species in decline.** The information provided below is intended to strengthen the case for the initiative and help target investments now and into the future.



## Appendix A

### Key Species in Decline

- **Rainbow smelt (*Osmerus mordax*): Extirpated** from the Hudson River Estuary due to warming temperatures.
- **American eel (*Anguilla rostrata*): Long-term decline** and threatened by overfishing, habitat loss mainly due to dams, food web alterations, predation, toxins and an invasive parasite.
- **Atlantic sturgeon (*Acipensor oxyrinchus*): Endangered** due to prior overharvesting and slow reproductive rate as well as loss of habitat, water pollution and other anthropogenic disturbances. Shows sign of slow recovery.
- **Atlantic tomcod (*Microgadus tomcod*): Vanishing**, facing extirpation due to temperature changes and exposure to PCBs.
- **Bay anchovy (*Anchoa mitchilli*): Long-term decline**, cause unknown but may be related to changes in predation patterns.
- **Bluefish (*Pomatomus saltrix*): In decline**. The species is overfished.
- **Eastern oyster: (*Crassostrea virginica*): 99% of population lost** due to habitat alteration and over-harvesting.
- **Hog choker (*Trinectes maculatus*): In decline**, cause unknown
- **Lined seahorse (*Hippocampus erectus*): Vulnerable** to habitat disruption and poor water quality.
- **River herring and American shad (*Alosa spp.*) Stocks depleted by 95%**. In long-term decline due to overfishing, loss of river habitat, and dams that block access to spawning grounds.
- **Shortnose sturgeon (*Acipensor brevirostrum*): Endangered** due to overharvesting and slow reproductive rate. Shows signs of recovery.
- **Striped bass (*Morone saxatilis*): In decline**. The species is overfished.
- **Weakfish (*Cynoscion regalis*): Depleted**, cause unknown and in long-term decline.
- **White catfish: (*Ameiurus catus*): Vanishing**, cause unknown.
- **White perch (*Morone americanus*): In decline**, cause unknown.
- **Winter flounder (*Pseudopleuronectes americanus*): Depleted, Vanishing** due to overfishing, habitat alteration, inbreeding depression, pollution, predation, and climate change

## Key Species in Decline in the Hudson River Estuary

### Rainbow Smelt (*Osmerus mordax*): **Extirpated**

- Rainbow smelt have not been seen in the HRE since 1995.
- Rainbow smelt are a cold-water fish and it is believed that warming temperatures forced the rainbow smelt out of the HRE.

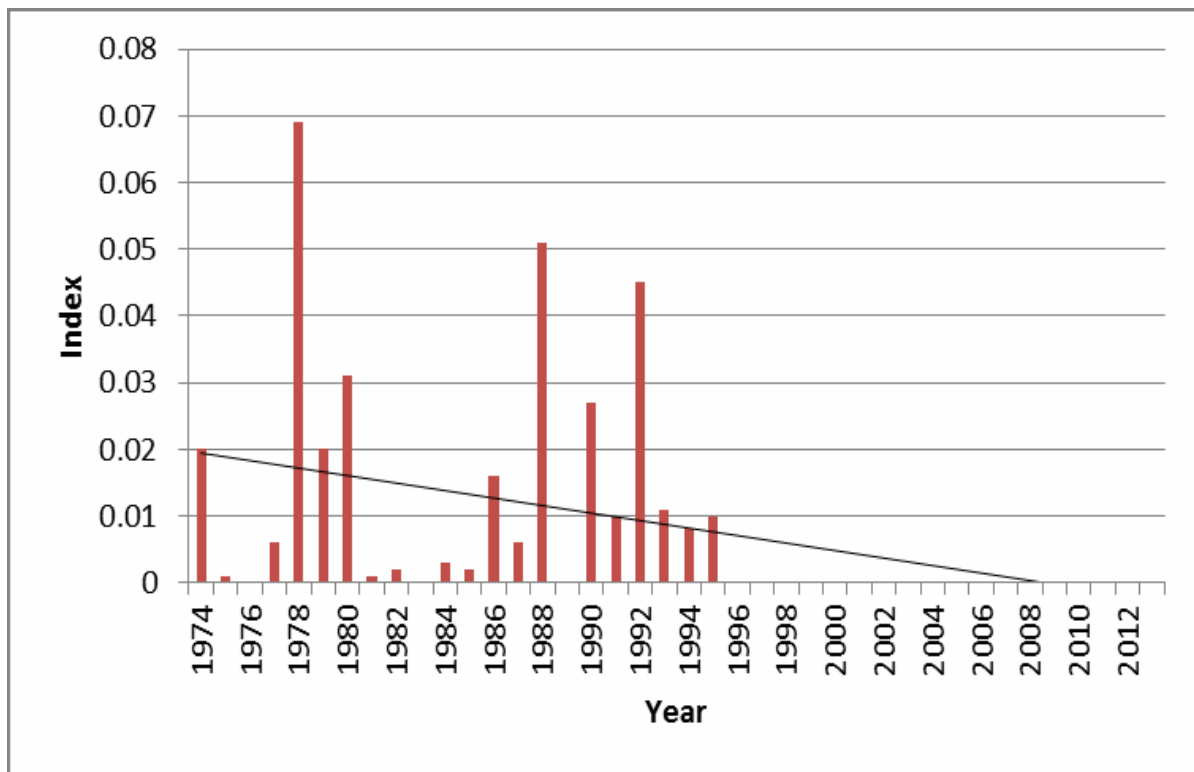


Figure 1. The juvenile index for rainbow smelt in the Hudson, showing a decreasing trend through time. No fish have been recorded since 1995. (Henderson and Seaby 2015)

## Appendix A

### American Eel (*Anguilla rostrata*): Long-term decline and threatened

- American eel populations are depleted throughout US waters, and their range has declined by 30%.
- American eel populations are suffering due to a synergistic combination of overfishing, habitat loss mainly due to dams, food web alterations, predation, turbine mortality from hydroelectric dams, toxins and contaminants, and an invasive parasite.
- American eels live as adults in the HRE, spawn once, and die.
- Habitat loss in the HRE due to dams in the tributaries is particularly damaging to eel populations as Studies have shown that each dam blocks 90 percent of upstream eel movement within tributaries.
- In Hudson River tributaries, 50 percent of American eels are infected with Japanese swim bladder parasites, known as *Anguillicoloides crassus*, which may impact their return to the Sargasso Sea to spawn.

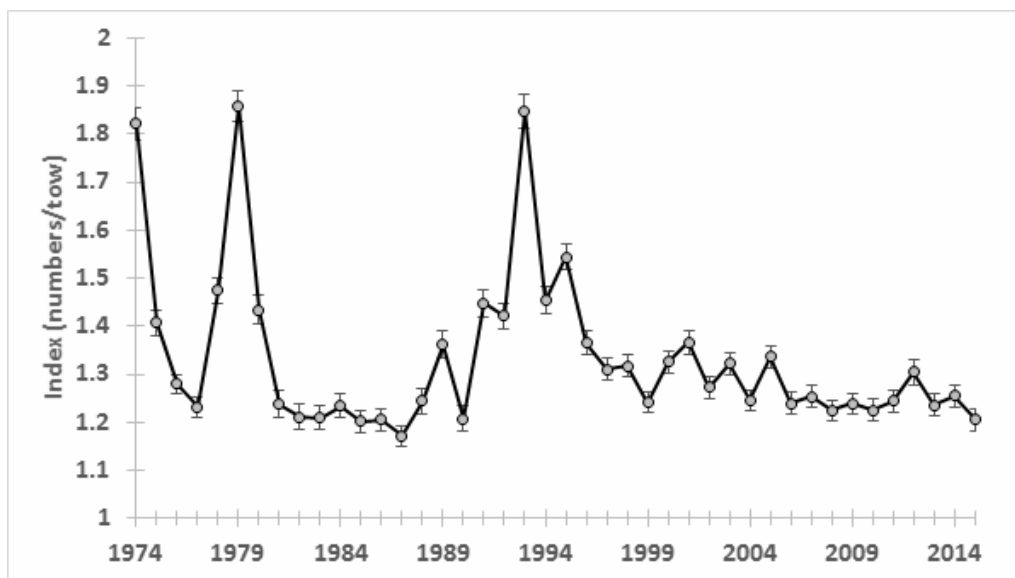


Figure 2. GLM-standardized index of abundance for Young of Year (YOY) American eels in the Hudson River Estuary 1974–2014. GLM is used with statistics when numbers are based upon compounded calculations. (ASMFC 2017)

## Appendix A

### Atlantic Sturgeon (*Acipensor oxyrinchus*): **Endangered**

- 2017 stock assessment concluded that Atlantic sturgeon stock was depleted coastwide.
- There has been slight positive trend in sturgeon recruitment in the HRE, but that news is overshadowed by the loss of adult fish during Tappan Zee Bridge construction.
- Populations of Atlantic sturgeon have declined primarily due to overfishing (directed and incidental), loss of habitat, habitat alteration, limited access to spawning areas, water pollution, ship strikes, water withdrawals and other anthropogenic occurrences.
- During the 1800s and early 1900s, the HRE, served as dumping ground for pollutants that lead to major oxygen depletions and resulted in high fish losses.
- High demand for sturgeon eggs (caviar) and the fish's smoked flesh resulted in overexploitation of sturgeon stocks.
- Damming of the Hudson River for hydroelectric and navigation purposes cut sturgeon off from their upriver spawning grounds.
- Maintenance dredging of the Hudson's navigation channel and trapping of sturgeon eggs and larvae in turbines of power plants are also considered problems.

#### Coastwide Atlantic Sturgeon Commercial Landings and Dead Bycatch, 1880–2014

Source: ASMFC Atlantic Sturgeon Benchmark Stock Assessment, 2017  
inserted graph provides same information but for a more recent timeframe, 1950–2014

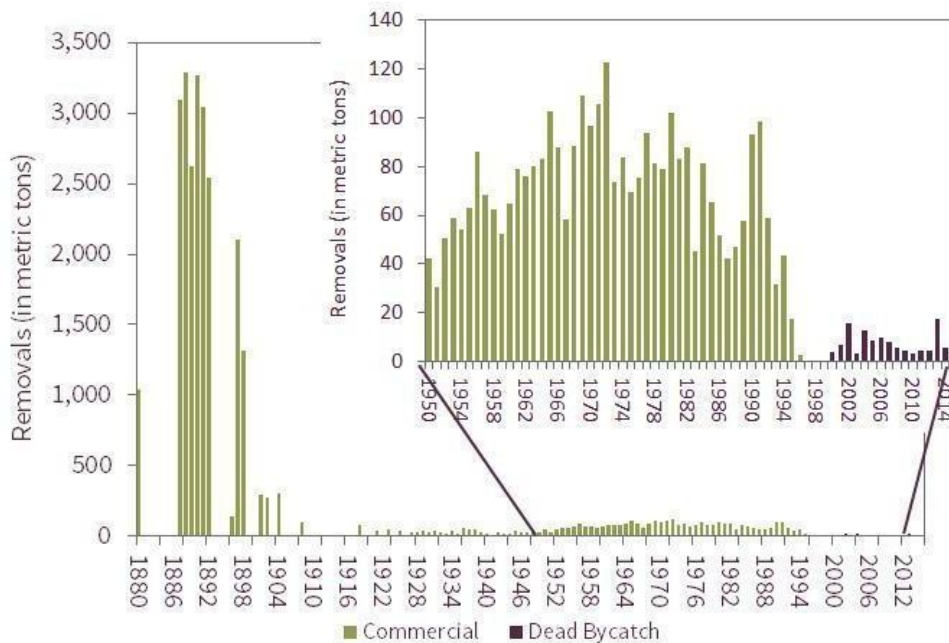


Figure 3. Sturgeon populations were severely overfished beginning in the 1880s until 1997, when the ASMFC called for a coastwide moratorium through at least 2038, in order to rebuild the stock. (ASMFC 2018).

## Appendix A

### Atlantic Tomcod (*Microgadus tomcod*): **Vanishing, facing extirpation**

- Tomcod is a cold-water anadromous fish that returns to the HRE to spawn.
- The HRE is the southern spawning limit for this species.
- Tomcod is in long-term decline in the Hudson and suffering from exposure to PCBs.
- Because the HRE is at the southern extremity of the tomcod's geographic range, sensitivity to climatic factors, particularly temperature would be anticipated.
- The tomcod population shows year-to-year variation but is in long-term decline.

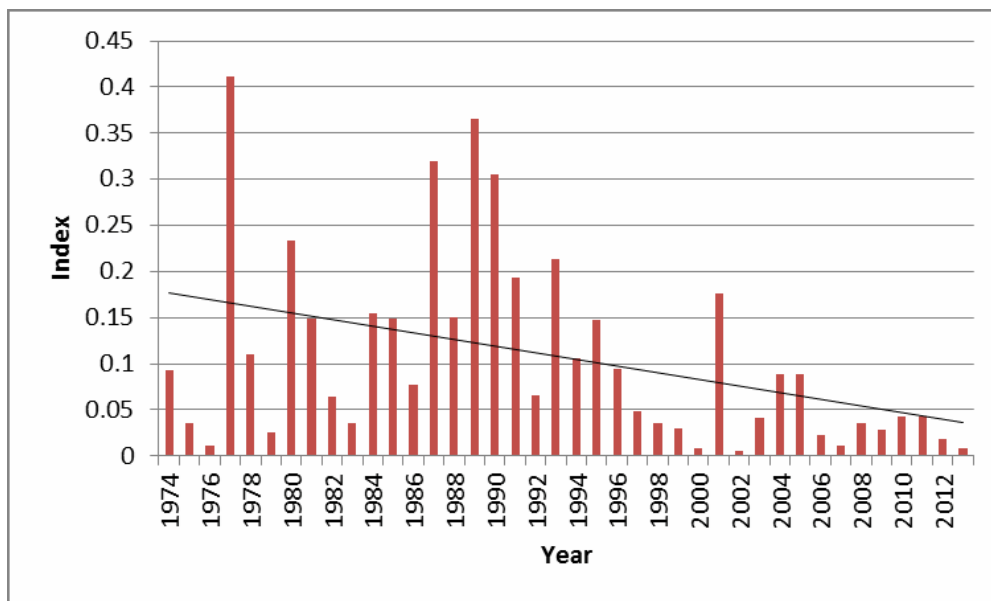


Figure 4. The juvenile index for Atlantic tomcod in the Hudson, showing a decreasing trend through time. Data is from the 2013 year class report. (Henderson and Seaby 2015)



## Appendix A

### Bay Anchovy (*Anchoa mitchilli*): Long-term decline

- Bay anchovies are an important forage fish especially for fish-eating birds and juvenile piscivorous fishes such as striped bass, bluefish, summer flounder, and weakfish.
- Bay anchovies are in long-term decline and their populations have dropped 10-fold. This is possibly linked to increased predation by striped bass and other factors, as yet unknown, which impact fecundity.
- Water withdrawals causing entrainment and impingement from power plants could have a significant impact on small fish such as the bay anchovy.

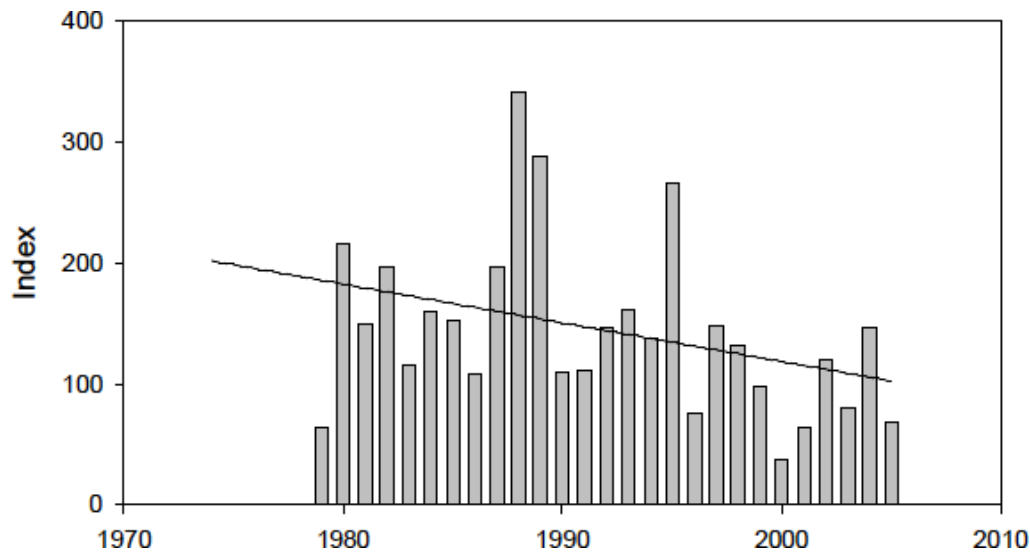


Figure 5. Juvenile index of bay anchovy in the Hudson River over time (Seaby and Henderson 2008)

## Appendix A

### Bluefish (*Pomatomus saltrix*): In decline

- Bluefish are an Atlantic coastal migratory species managed by the ASMFC
- They are prized marine fish known for their fighting ability, but populations have contracted mostly due to the recreational fishery.
- Latest surveys by ASMFC show bluefish populations to be overfished.
- Bluefish biomass has declined significantly since the 1980s.

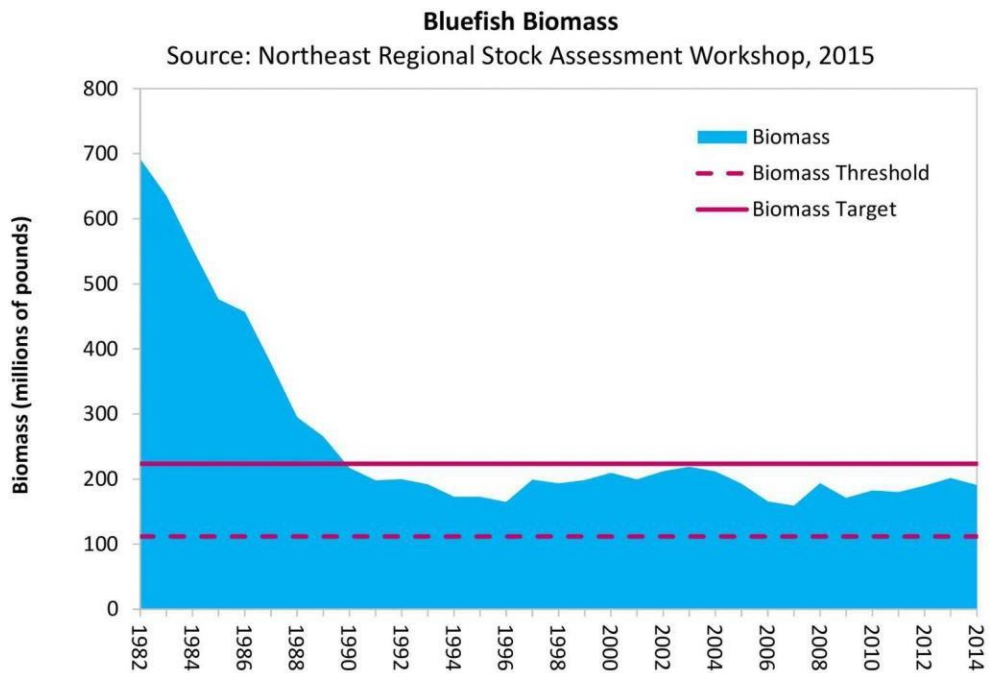


Figure 6. Bluefish are overfished and their biomass has been in decline since the 1980s (ASMFC 2019)

## Appendix A

### Eastern Oyster (*Crassostrea virginica*): **In severe decline, 99% of the population lost**

- Oysters have been devastated by centuries of pollution, habitat degradation and over-harvesting.
- The HRE was reported to have had 350 square miles of oyster reefs, all of which have been lost. The New York Harbor alone contained nearly half of the world's oysters.
- The loss of oysters and other shellfish to the Hudson River Estuary is incomprehensible and incalculable due to their ecosystem function and service.
- 25 million oysters have been planted in NY Harbor, but the population is not yet self-sustaining.

### Hog Choker (*Trinectes maculatus*): **In decline**

- Hogchoker were once one of the most abundant fishes in the HRE.
- Recent abundance estimates of hogchoker are low and recruitment has been poor.

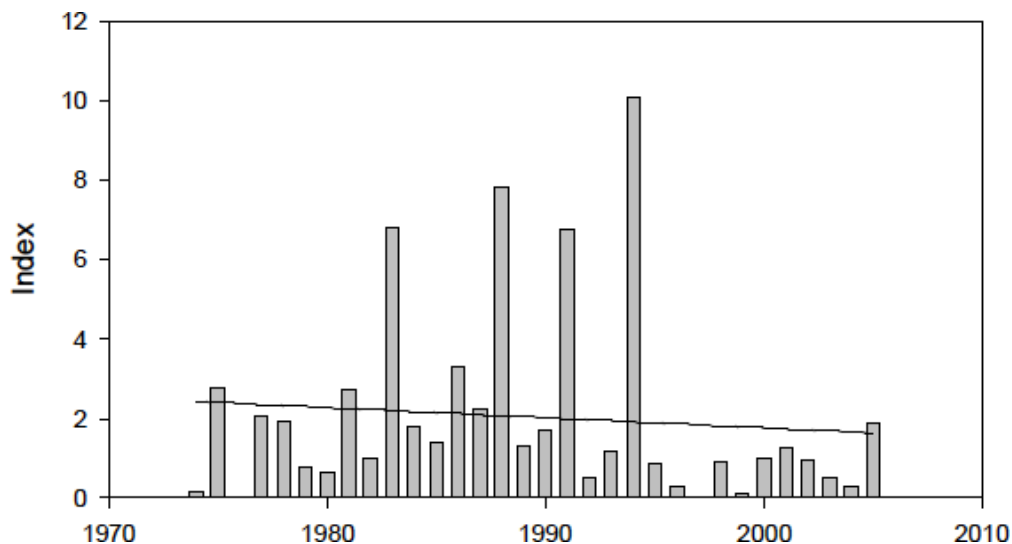


Figure 7. Hogchoker showing a slight downward trend (Seaby and Henderson 2008)

### Lined seahorse (*Hippocampus erectus*): **Vulnerable**

- There are no definitive numbers for seahorse populations in the HRE.
- The species is an indicator for the water quality and health of our waterways.
- Lined seahorses have been listed as vulnerable since 1996 by the (IUCN).
- They have lost habitat to pollution and coastal development.

## Appendix A

### River Herring and Shad (*Alosa spp.*): Stocks depleted, in long-term decline

- River herring and shad include blueback herring (*Alosa aestivalis*), alewives (*Alosa pseudoharengus*), American shad (*Alosa sapadissima*), and hickory shad (*Alosa mediocris*).
- These species have been devastated by decades of overfishing (directed and incidental), and centuries of habitat loss due to channelization, dredging and instream construction, filling of spawning grounds, and dams (including hydropower dams) that impede their upriver migration and block them from spawning habitat.
- American shad stocks are not recovering. Recent assessments show that current restoration actions need to be reviewed and new efforts need to be identified and applied.
- American shad have been declining in the HRE for many years. The 2017 Young of the Year (YOY) index for American shad shows multiple consecutive years of recruitment failure.
- The 2017 stock assessment indicates that river herring remain depleted at historic lows on a coastwide basis.
- Hickory shad are poorly monitored, with very little is known about them, but they are in significant decline, likely for the same reasons as American shad.

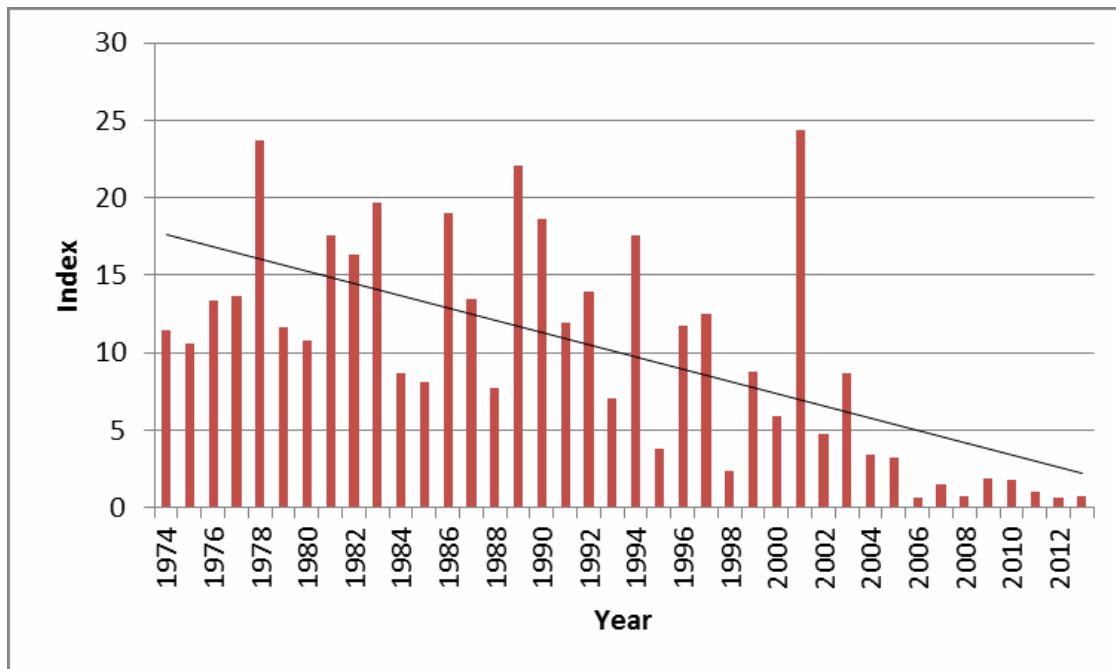


Figure 8. The juvenile index for American shad in the Hudson showing a decreasing trend through time. (Henderson and Seaby 2015)

## Appendix A

### Shortnose Sturgeon (*Acipensor brevirostrum*): **Endangered**

- Shortnose sturgeon are endangered for many of the same reasons as Atlantic sturgeon.
- While the shortnose sturgeon was rarely the target of a commercial fishery, it often was taken incidentally in the commercial fishery for Atlantic sturgeon.
- In the 1950s, sturgeon fisheries declined on the east coast which led the US Fish and Wildlife Service to conclude that the fish had been eliminated from all the rivers in its historic range except the Hudson River and was in danger of extinction.
- River-wide population estimates in the 1990's showed the spawning population had increased substantially from those observed in the 1970's.

### Striped Bass (*Morone saxatilis*): **In decline**

- Since 2004, striped bass have been in steady decline.
- Most mortality is related to recreational fishing pressure and dead discards.
- Periods of poor and variable recruitment have contributed to the decline.
- The HRE is the second largest spawning ground for striped bass.
- Robust striped bass populations cannot be sustained by a declining forage base (such as river herring, shad, eels, and anchovies).

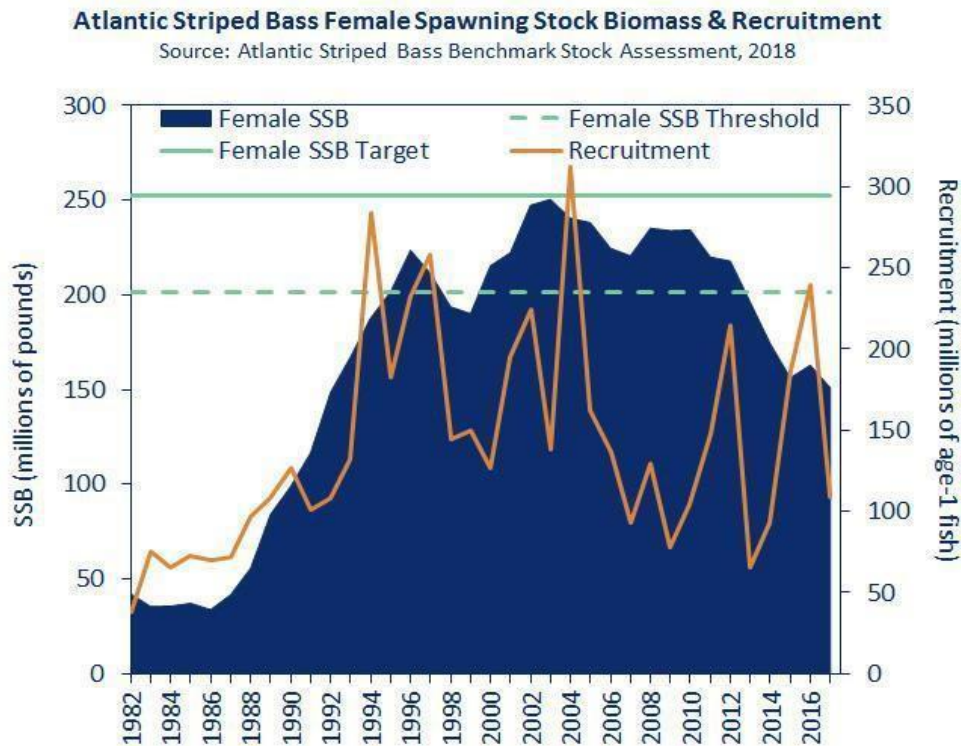


Figure 9. Spawning stock biomass of Atlantic is below ASMFC thresholds (dashed line) and well below optimal target population levels (solid line). (ASMFC 2018)



## Appendix A

### Weakfish (*Cynoscion regalis*): Depleted, long-term decline

- Latest stock assessment indicates weakfish are depleted and in long-term steep decline.
- Assessments indicate natural mortality has been increasing.
- The weakfish population has been experiencing very high levels of total mortality (including fishing mortality and natural mortality), which prevents the stock from recovering.

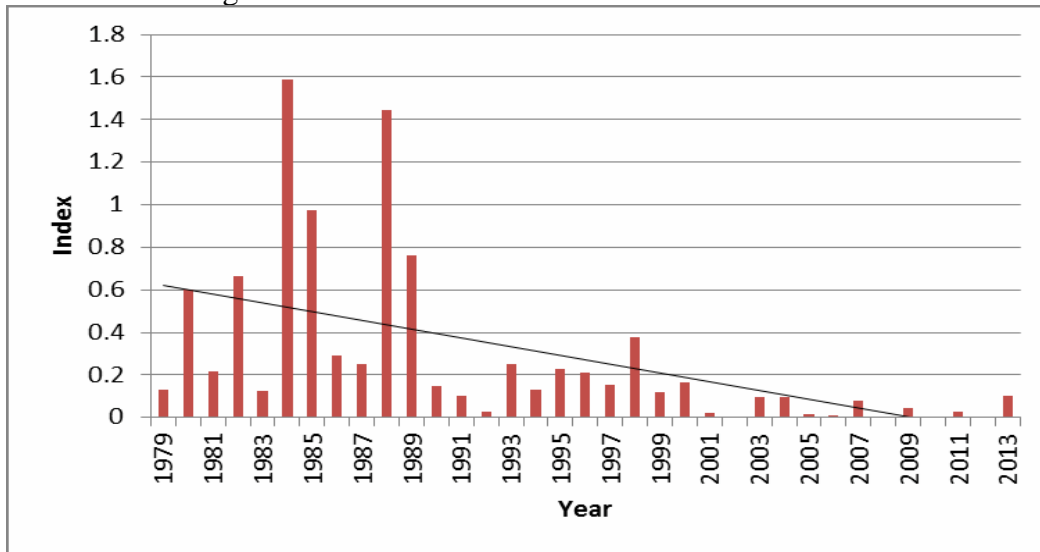


Figure 10. The juvenile index for weakfish in the Hudson, showing a decreasing trend through time (Henderson and Seaby 2015).

### White catfish: (*Ameiurus catus*): Step decline

- White catfish are found in estuaries along the Atlantic coast from the Hudson to Florida.
- They are slow growing, maturing at 3-4 years old.
- White catfish have been in steep decline in the HRE since 1990.

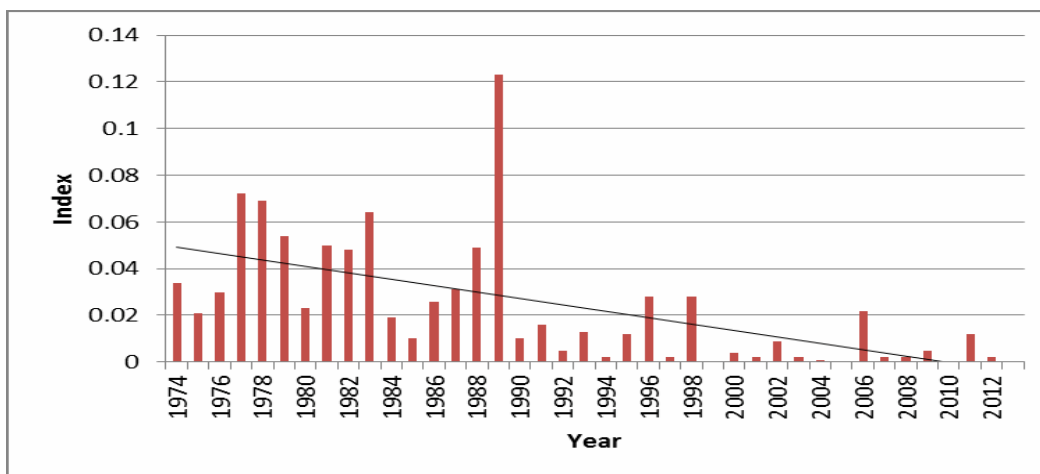


Figure 11. Juvenile index of white catfish in the Hudson River showing a long-term decline. (Henderson and Seaby 2015)

## Appendix A

### White Perch (*Morone americanus*): In decline

- White perch are in decline and the present population size has declined by 60% since 1970s and 1980s.
- It is believed that impingement and entrainment associated with water intake from power plants and increased striped bass predation have impacted white perch.
- Predatory shifts by piscivores such as striped bass and bluefish highlight the inter-relatedness of all species. When populations of one forage fish species declines, predators will shift their attention to other species.
- More research is needed to identify the reasons for the white perch declines.

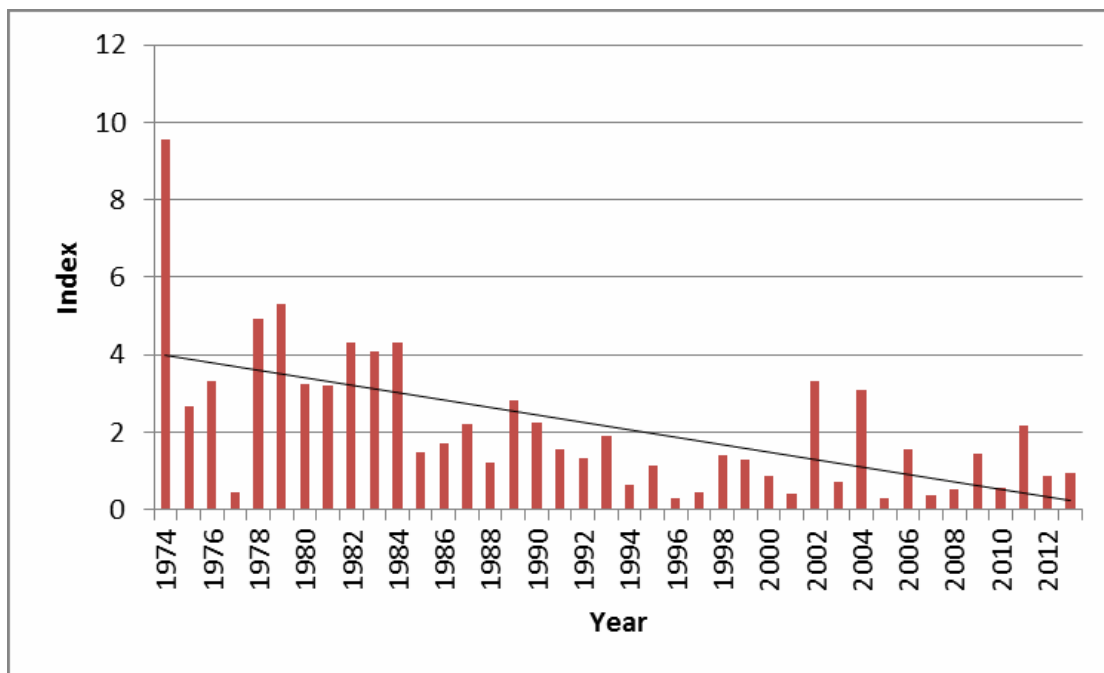


Figure 12. Yearling white perch showing a long-term decline. (Henderson and Seaby 2015)

## Appendix A

### Winter Flounder (*Pseudopleuronectes americanus*): Depleted, in long-term decline

- Populations of the Southern New England/Mid-Atlantic Bight stock are depleted.
- Commercial moratoriums & draconian restrictions have been implemented to no avail.
- Winter flounder enter the HRE in winter to spawn and migrate back to deeper waters in response to thermal conditions and trophic availabilities.
- Winter flounder declines are linked to overfishing, habitat alteration, pollution, predation, & climate change.
- Inbreeding depression has been found in winter flounder populations.
- Winter flounder are near the southern edge of their range in the HRE so climate changes will be a concern.

#### Winter Flounder Southern New England/Mid-Atlantic Spawning Stock Biomass

NEFSC Operational Assessment of 19 Groundfish Stocks, 2017

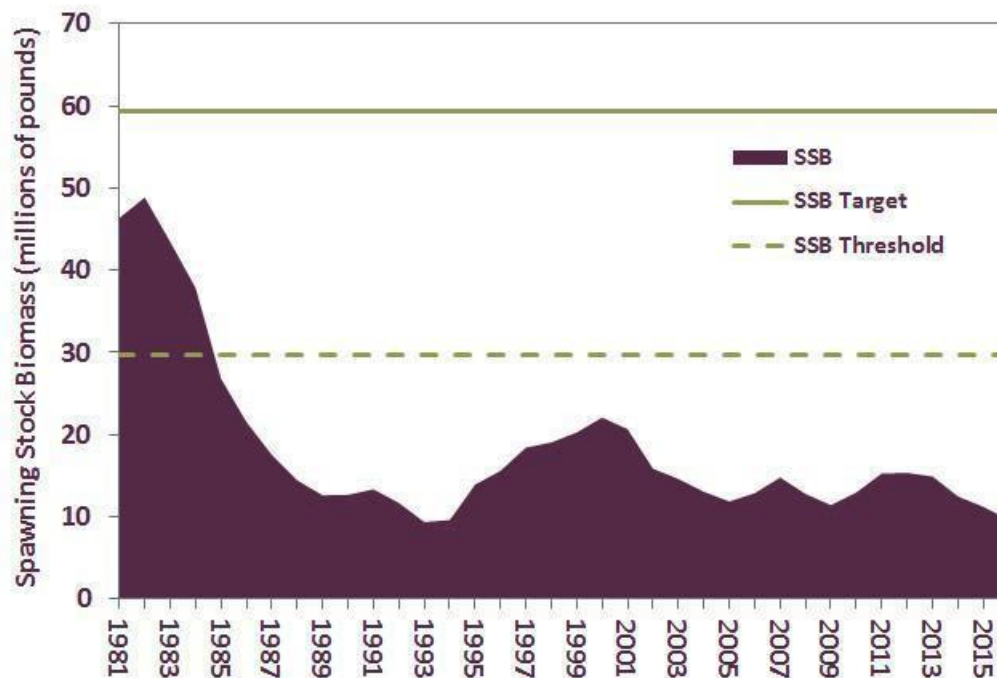


Figure 13. the spawning stock biomass of winter flounder from the Southern New England/Mid-Atlantic stock of winter flounder shown well below sustainable thresholds (dashed line) and far below optimal spawning stock biomass targets (solid line) (ASMFC 2019)

## Appendix A

### Related Environmental Conditions

The physical environment is the foundation upon which the biological world is supported, and we must consider these factors when examining declines in fishes. Temperature and dissolved oxygen are indirectly linked, and both strongly impact aquatic life. The temperature regime in the HRE is notably extreme for a temperate estuary, exhibiting one of the widest seasonal ranges for an estuary of its size. The natural temperature regime has a strong influence on the fish community, and makes the species present in the HRE particularly vulnerable to changes associated with climate change or the localized effects from power plant discharges. The mean annual temperature in the Hudson River is now about 4° F warmer than those recorded in the 1960s and recent observations show that seasonal variations are becoming more extreme.

Increased temperature can affect survival, growth, and metabolic activity, swimming performance and behavior. Rising temperatures also impact reproductive timing and rates of gonad development, egg development, hatching success, and morphology and additionally influences the survival of fishes stressed by other factors such as toxins, disease, or parasites. Many of these effects will occur well below the upper lethal temperatures.

Increasing water temperatures are linked to decreases in dissolved oxygen concentrations, which results in many fish and other aquatic organisms living in sub-optimal conditions during warmer months. The changing environmental conditions we are already experiencing in the HRE are sufficient to negatively impact temperature-sensitive fishes, while also stressing other members of the aquatic community. Compounding the chemical and thermal changes in the Hudson River is a toxic legacy of PCBs and other contaminants, whose residual chemicals move through food chains, becoming concentrated in fish and affecting their survival, growth, and reproduction.

### Rising Water Temperatures in the Hudson River

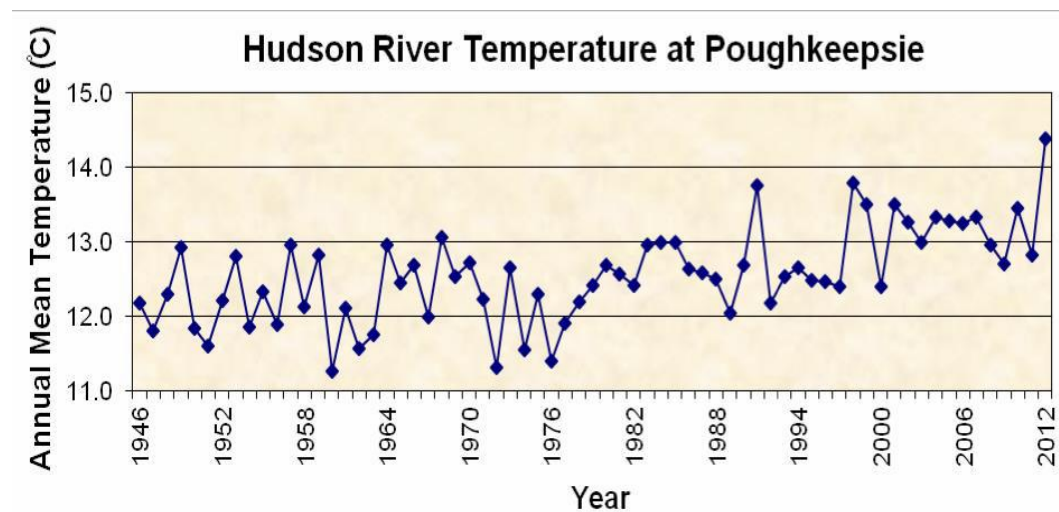


Figure 14. Statistically significant increase in mean average annual water temperature measured at the Poughkeepsie Water Treatment Facility. The mean annual temperature in recent years is about 4° F above that recorded in the 1960s. (Seaby and Henderson 2008)

## Appendix A

### Declines in Dissolved Oxygen in the Hudson River

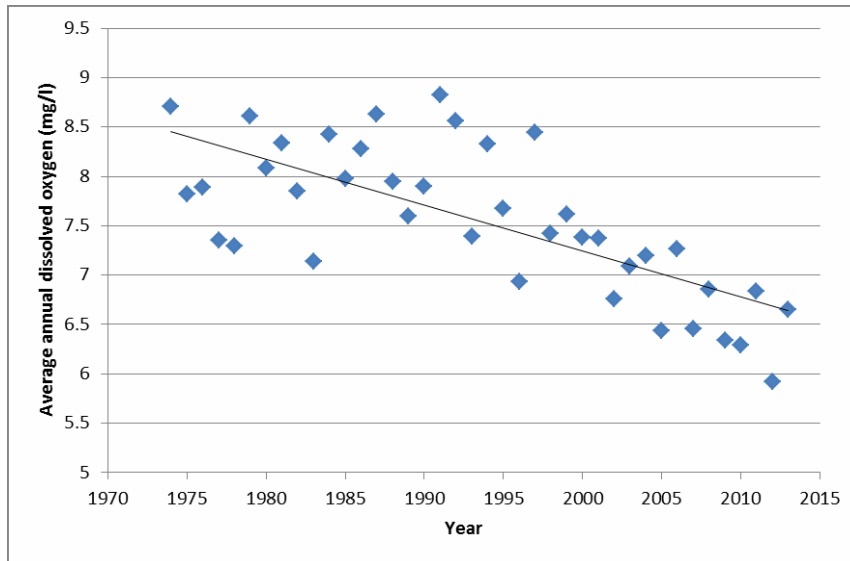


Figure 15. Average Annual Dissolved Oxygen (mg/l) from Beach Seine surveys, 1974 to 2013 (Henderson and Seaby 2015)

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- Atlantic States Marine Fisheries Commission (2018). Atlantic Striped Bass Benchmark Stock Assessment Update.
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- Seaby RMH and Henderson PA (2008) The status of fish populations and the ecology of the Hudson. Pisces Conservation Ltd.

Appendix B



**Assembly Districts Wastewater Needs**

Assembly District Number	Count Of SPDESID	Sum Of Estimated Amt	Sum Of Miles Of Line	Min Of Est Age Of Lines	Max Of Est Age Of Lines
16	1	\$30,539,667.00			
27	1	\$226,916,647.00			
35	1	\$215,026,440.00			
50	1	\$192,857,668.00			
64	1	\$143,238,966.00			
65	1	\$34,529,800.00			
68	1	\$211,624,400.00			
71	1	\$349,631,911.00			
84	1	\$453,397,740.00			
89	1	\$117,366,998.00	100	87	87
93	2	\$0.00	3	64	64
94	12	\$1,298,000.00	123	0	65
95	5	\$38,995,750.00	41	40	105
96	1	\$0.00			
97	2	\$37,719,892.00	319	55	67
98	2	\$9,187,500.00	39	40	55
99	17	\$28,524,034.00	249	26	100
100	7	\$22,685,575.00	153	40	92
101	12	\$21,980,000.00	124	37	83
102	26	\$32,863,573.00	89	0	85
103	14	\$13,863,950.00	161	0	85
104	11	\$31,993,796.00	287	26	114
105	15	\$11,998,000.00	65	0	76
106	9	\$51,842,229.00	62	26	96
107	9	\$14,863,365.00	67	26	90

108	9	\$79,266,825.00			
109	7	\$7,142,000.00	446	26	63
110	4	\$109,950,072.00			
111	10	\$36,002,383.00	8	26	26
112	2	\$24,012,797.00			
113	5	\$24,410,500.00			
114	6	\$65,564,173.00			
117	2	\$0.00			
118	9	\$25,391,635.00			
119	4	\$323,763,980.00			
121	2	\$1,142,688.00			



Appendix B



**Senate Districts Wastewater Needs**

Senate District Number	Count Of SPDESID	Sum Of Estimated Amt	Sum Of Miles Of Line	Min Of Est Age Of Lines	Max Of Est Age Of Lines
7	1	\$30,539,667.00			
11	1	\$226,916,647.00			
13	1	\$215,026,440.00			
18	1	\$192,857,668.00			
23	1	\$143,238,966.00			
26	1	\$34,529,800.00			
29	1	\$211,624,400.00			
31	1	\$349,631,911.00			
32	1	\$453,397,740.00			
35	1	\$117,366,998.00	100	87	87
37	1	\$0.00			
38	3	\$40,419,892.00	327	40	67
39	23	\$61,703,330.00	400	37	114
40	18	\$37,593,750.00	167	0	65
41	23	\$70,824,384.00	193	0	105
42	25	\$36,909,075.00	337	26	100
43	22	\$110,281,812.00	125	26	96
44	11	\$92,832,042.00	152	26	63
45	5	\$55,119,673.00			
46	39	\$74,272,578.00	527	0	85
47	6	\$324,906,668.00			
49	12	\$73,689,634.00			
51	13	\$35,909,879.00	8	26	54
53	3	\$0.00			