

## The History and Restoration of American Shad in the Potomac River

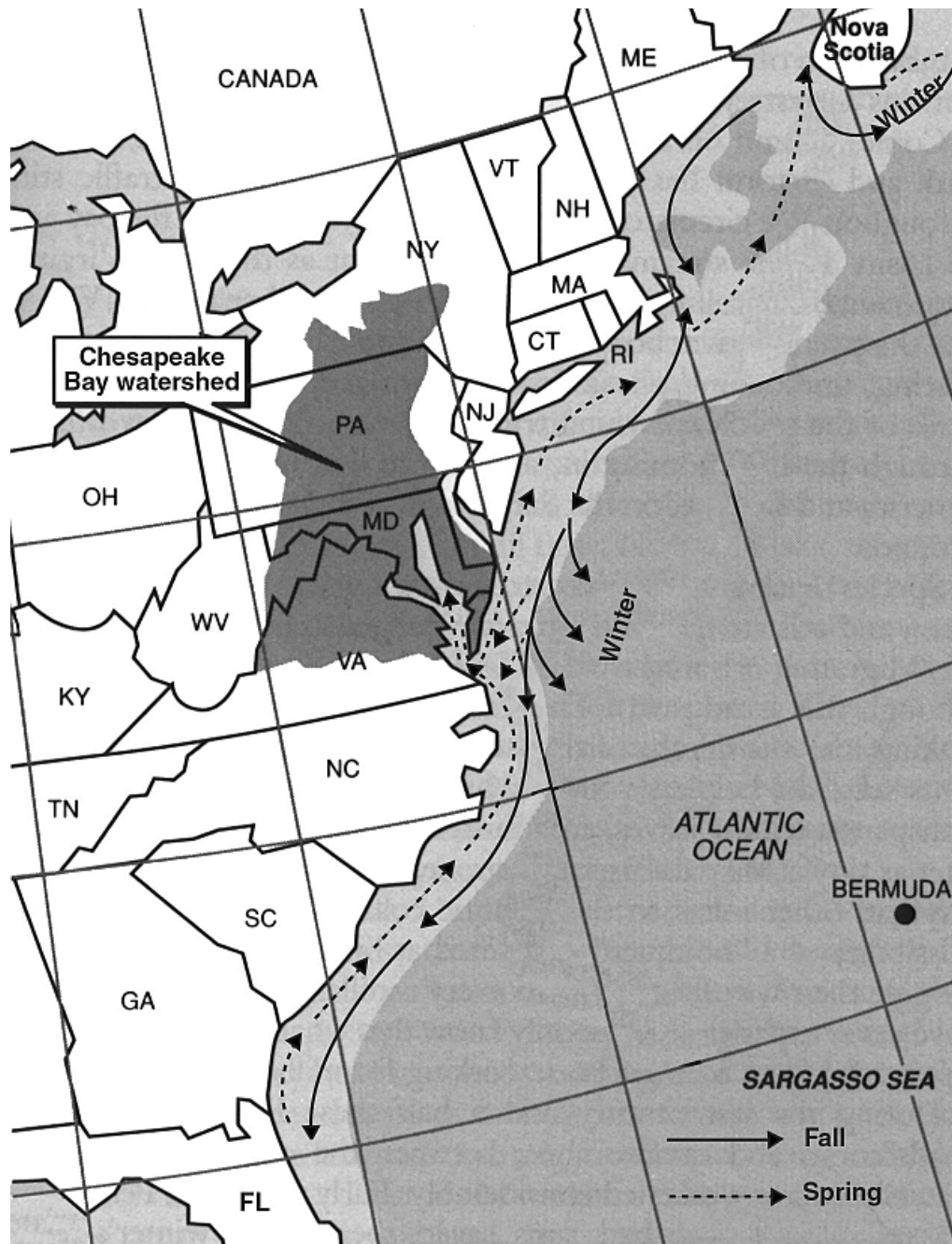
Delivered to the National Capitol Chapter of Trout Unlimited

March 9, 2016

by Jim Cummins (301-274-8106)

The Interstate Commission on the Potomac River Basin

This talk and other resources are available at our website "[potomacriver.org](http://potomacriver.org)"  
 Click "Focus Areas," then "Aquatic Life," then go to American Shad Restoration"



### The American shad: A Forgotten Fish

The world's largest herring.

The beautiful fish makes a 12,000 mile journey.

Summers in Canada, Winters near Florida.

Overall, a pretty good strategy.



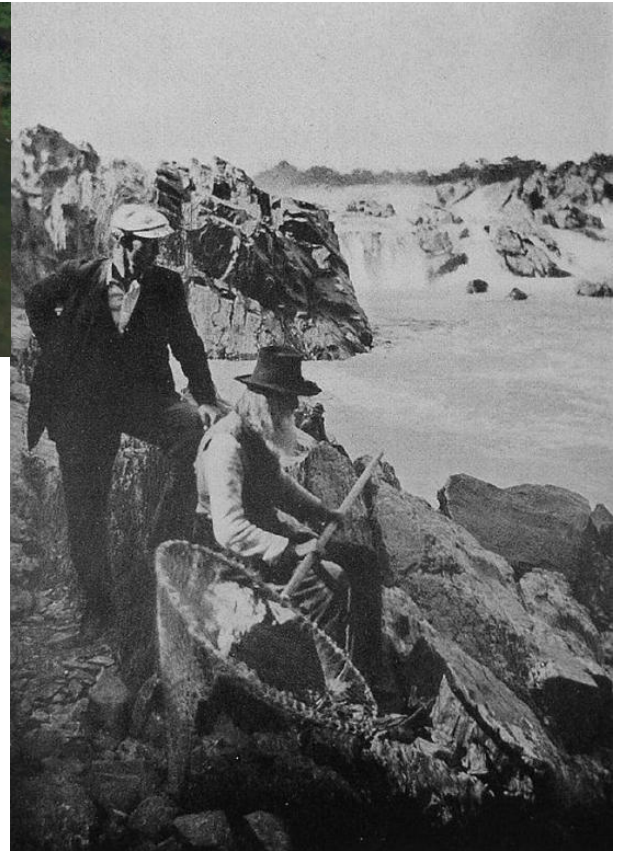
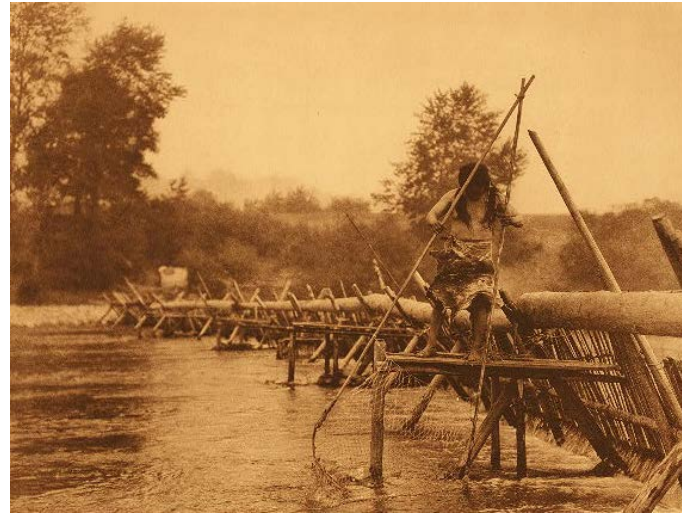
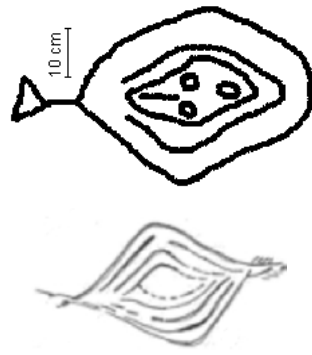


Throughout their journey, shad are important to the ecosystem - food for a lot predators.

In rivers they are especially important, as a “clock-spring species,” powering the system.







A little history and background on shad fishing in the Potomac. Images, clockwise from above left:

**Petroglyph** of shad at Great Falls, artist rendering top, Spanish cave art below

**Hupa Indians**, Trinity River, CA, bow-netting at weir and on rocks (by E.S. Curtis) - techniques like these were used on the Potomac.

**Shad dippers** at "Shad Rock," 1912.

Remains of fish weirs "close" to Little Falls.

Lithograph of **fishing at Great Falls**, 1801 (Library of Congress).





Shad were important to new Americans. George Washington had a shad fishery at Mount Vernon. In 1778, shad saved the starving Continental Army at Valley Forge (See "The Valley Forge Fish Story" at [http://www.cbr.washington.edu/shadfoundation/shad/JOURNAL4.2/vol4n2.htm#\\_Hlk475790295](http://www.cbr.washington.edu/shadfoundation/shad/JOURNAL4.2/vol4n2.htm#_Hlk475790295))



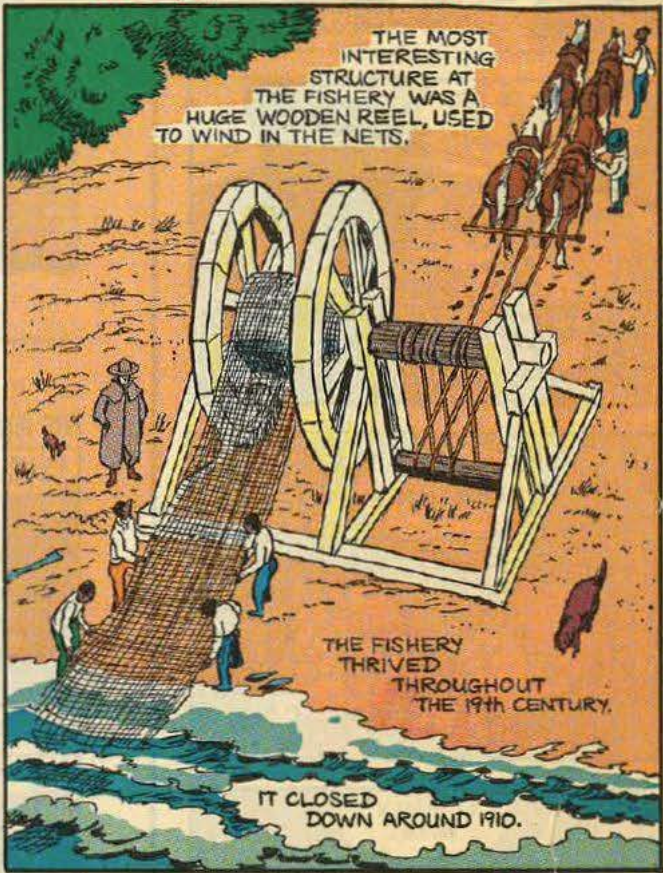
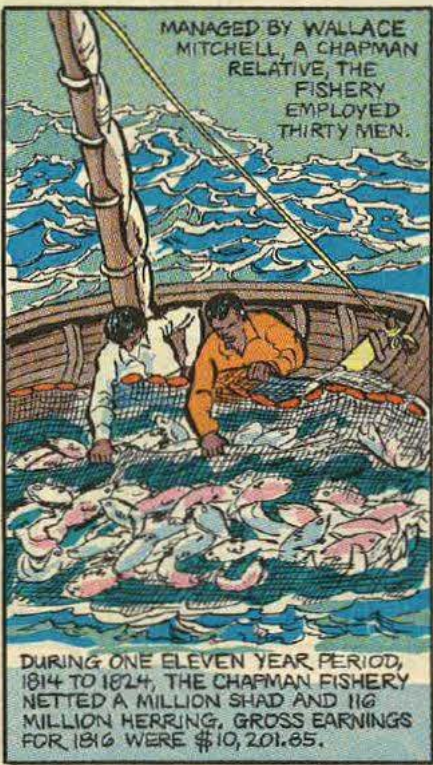
Commercial fishing, with the American shad the Potomac River's and Chesapeake Bay's most economically important fish, grew in complexity with the onset of the industrial revolution and increasing human demand. The Chapman fishery, illustrated below, was located in Maryland across the river from the Mason Neck area of Virginia, another site of large-scale commercial fisheries.

# FLASHBACKS

by Patrick M. Reynolds

# Gone Fishing

Wash Post 9-15-96 Section 2





# Traditional Shad Fisheries on the Potomac River, circa 1860s to 1890s



*Shad  
Engine House Stony Point  
Fishery Potomac River.*





Shad Fishery  
Commencing to boat seine.  
Stony Point  
Potomac River



### Black History:

Black watermen are abundant in the photographs or art of historic shad fisheries of the Potomac and other mid-Atlantic rivers.





A similar story for the Delaware - Thomas Eakins' from Shad Fishing Gloucester DE, 1881



**If you are interested in more information on black watermen, please see my presentation entitled  
“American Shad and Black Watermen: A Heritage Nearly Forgotten**

**Available at the ICPRB website “[potomacriver.org](http://potomacriver.org)”  
Click “Focus Areas,” then “Aquatic Life,” then go to American Shad Restoration”**



The American shad was once remarkably, even outstandingly, abundant in the Potomac River.

From Spencer F. Baird, left, first Director of the US Fish Commission\*, in their report for 1886:

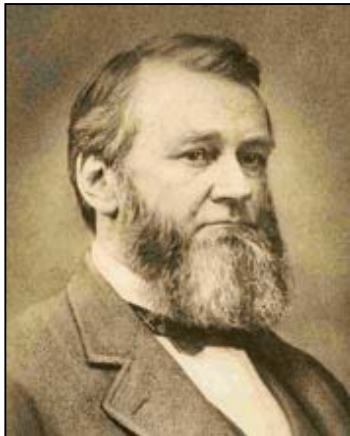
“No better illustration of the numbers in which anadromous fish enter the rivers can be given.... than a presentation of the case as it relates to the Potomac River in the short distance between its mouth and the Great Falls of the Potomac, only twelve miles above Washington.”

An estimated 22,500,000 shad (110,000,000 lbs) were harvested from the Potomac River in 1832. = 50,000 tons = 1/10 of all fish and shell fish currently harvested in North America.

“Approximately 995,000 barrels of salt were used to cure them.”

That many barrels would make a pyramid with a base the size of a football field from endzone to endzone and a height of 300’.

One barrel of salt is used to make 5 barrels of shad/herring, so the shad-barrel pyramid [Δ] is 5X larger!



\*Appointed in 1871, Baird was also the Smithsonian’s 1<sup>st</sup> Curator (apt: 1850) and 2<sup>nd</sup> Secretary (appt:1878).

Preparing shad and other herrings were substantial industries, employing over ten thousand on the Potomac alone.

They were smoked, then salted in barrels.

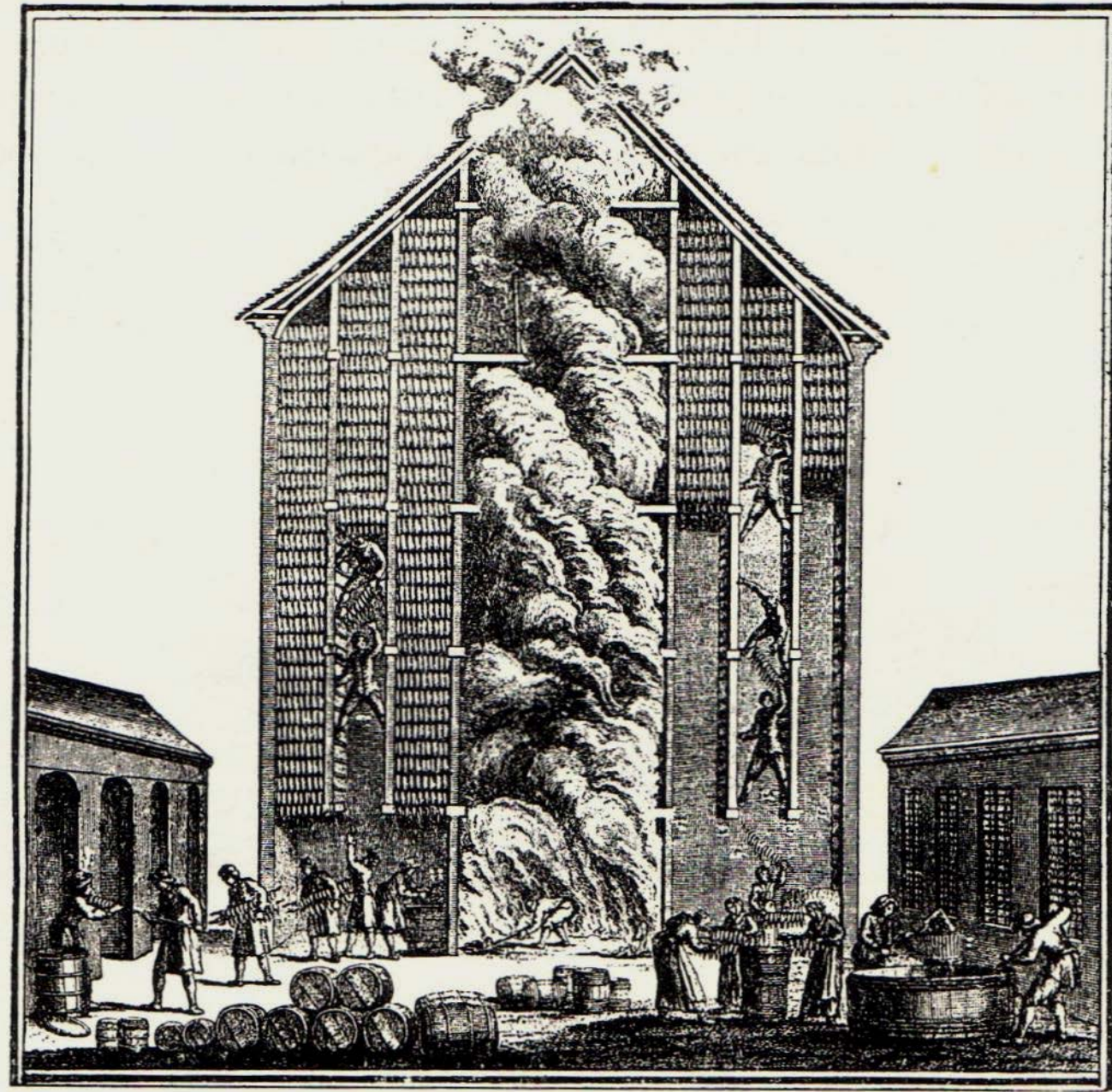
How many fish in the smoker? Approximately 1500 fish could be in the visible layer alone.

There is no way to tell the length of the building. If it was 30' long, with 1 layer/foot, it could hold 45,000 shad.

That's a smoker!

Image is from Singer, Charles, 1958.  
A History of Technology, 1750-1850.

Volume IV, p. 49.





**Shad planking is a cooking technique where shad are slowly baked on wooden blanks before a bonfire. Shad plankings were big events along the Potomac as early as 120 years ago.**

Right: Marshall Hall, MD 1893 (Lib. Of Congress)

Below Top: Annual Shad Plank, DC Bar 1916. Bottom: Marshall Hall, MD 1924 .





**“Largest seine  
in the world”**

**At Stoney Point,  
Mason Neck, VA  
Potomac River,  
c 1890s.**

**The seine net was  
6 miles long!  
(32,000 feet)**

**They caught 5,000  
shad in one haul.**

**Not surprisingly, shad  
started to disappear.**

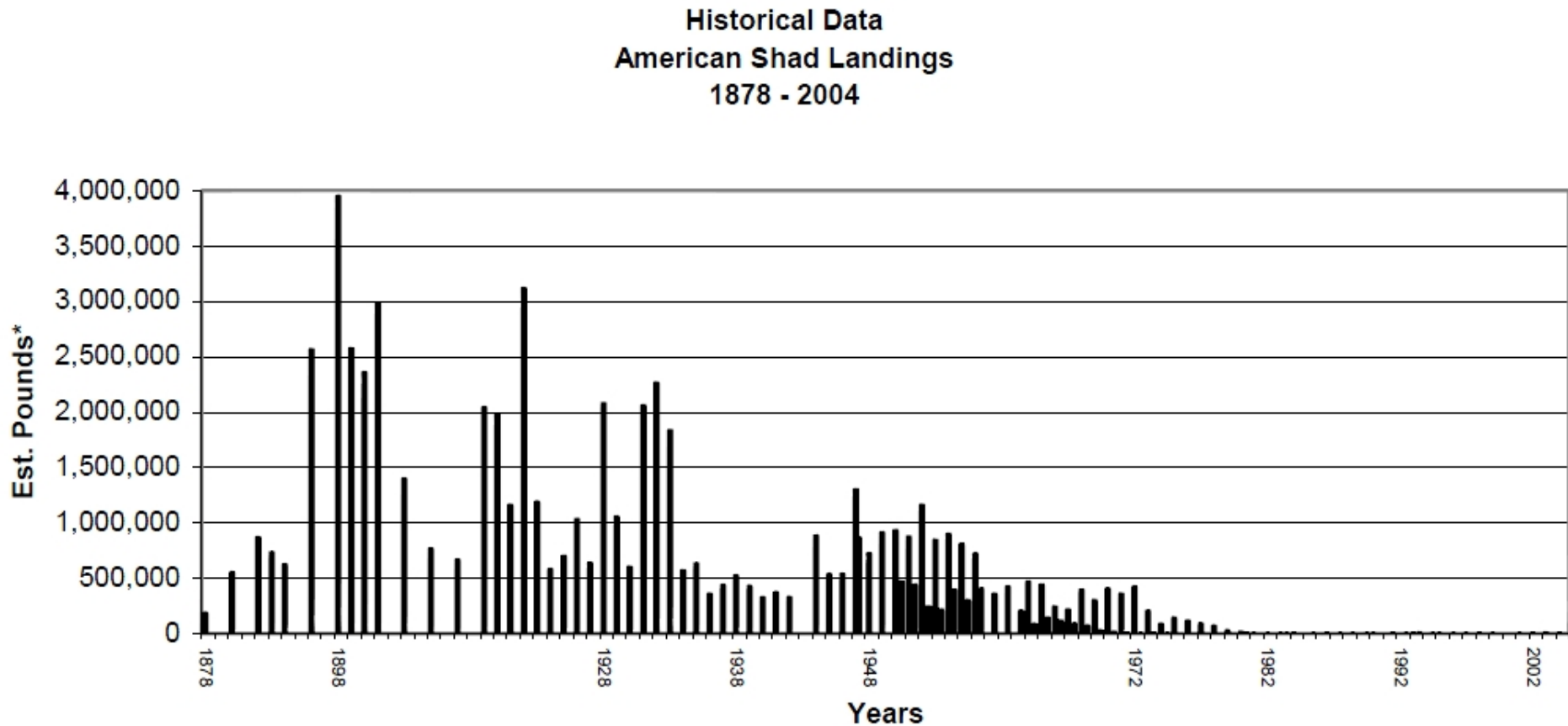


**Largest seine in the world.** This seine, operated for shad and alewives at Stoney Point, Virginia, on the Potomac River, was the longest net of the kind. The net proper was 9,600 feet in length, and the hauling ropes at the ends were 22,400 feet long, giving 32,000 feet as the total sweep of the seine, only one end of which shows in the illustration. The seine was hauled by steam power and the labor of 80 men, and was drawn twice daily, at ebb tide, throughout the season. As many as 3,600 shad were taken at one haul, and 126,000 in one season, and 350,000 alewives were caught at one time. Recently the season's yield of shad fell to 3,000, and the fishery was consequently discontinued in 1905 after having been carried on for a century. This seine was a source of eggs for the Bureau's shad hatchery on this river. (See p. 1399.)



# Shad Landings in the Potomac River

Figure 2. The 1878- 1956 Potomac landings are from *Chesapeake Fisheries*. The 1964-2004 landings are from PRFC data. (PRFC)





However, the decline in shad was not due solely to over-fishing. Like other east-coast rivers, there are three main reasons for their decline in the Potomac, each had significant impacts:

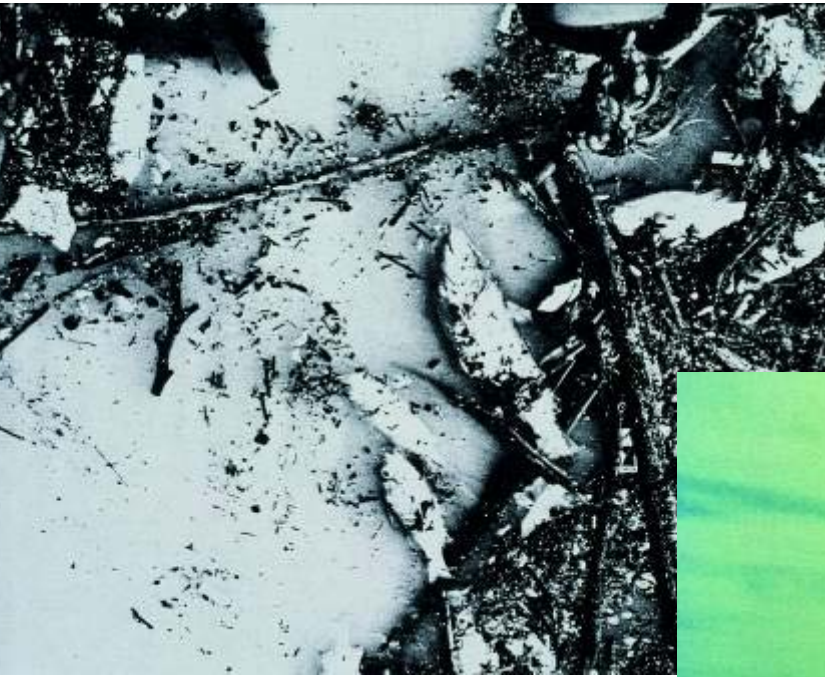
- 1) Over-fishing (as shown and discussed),
- 2) Pollution, and
- 3) Loss of Spawning Habitat  
(primarily due to dams).



1960's era slide of a  
acidic mine drainage  
affected tributary to  
Georges Creek, North  
Branch, Potomac  
River.







**Pollution:** The Potomac River was once synonymous with water pollution. Huge fish kills which occurred during the 1960s, especially during Spring spawning runs, led President Johnson to declare the Potomac River “a disgrace.”



↑ Dock at Mount Vernon, 1972.

**Our nation’s founders would have been shocked about the state of the beloved Potomac.**



The past is prologue - Where have all our forest gone, long time ago?  
At left are American Chestnut, on the right are maples.





Large tree (cedar? oak?) cut in the coastal floodplain (Surry County) of Virginia.  
Circa early 1900s, from "The Company," by H. Temple Crittenden.  
If you use the diameter of the railway car as roughly 3', the tree is about 10' in diameter.

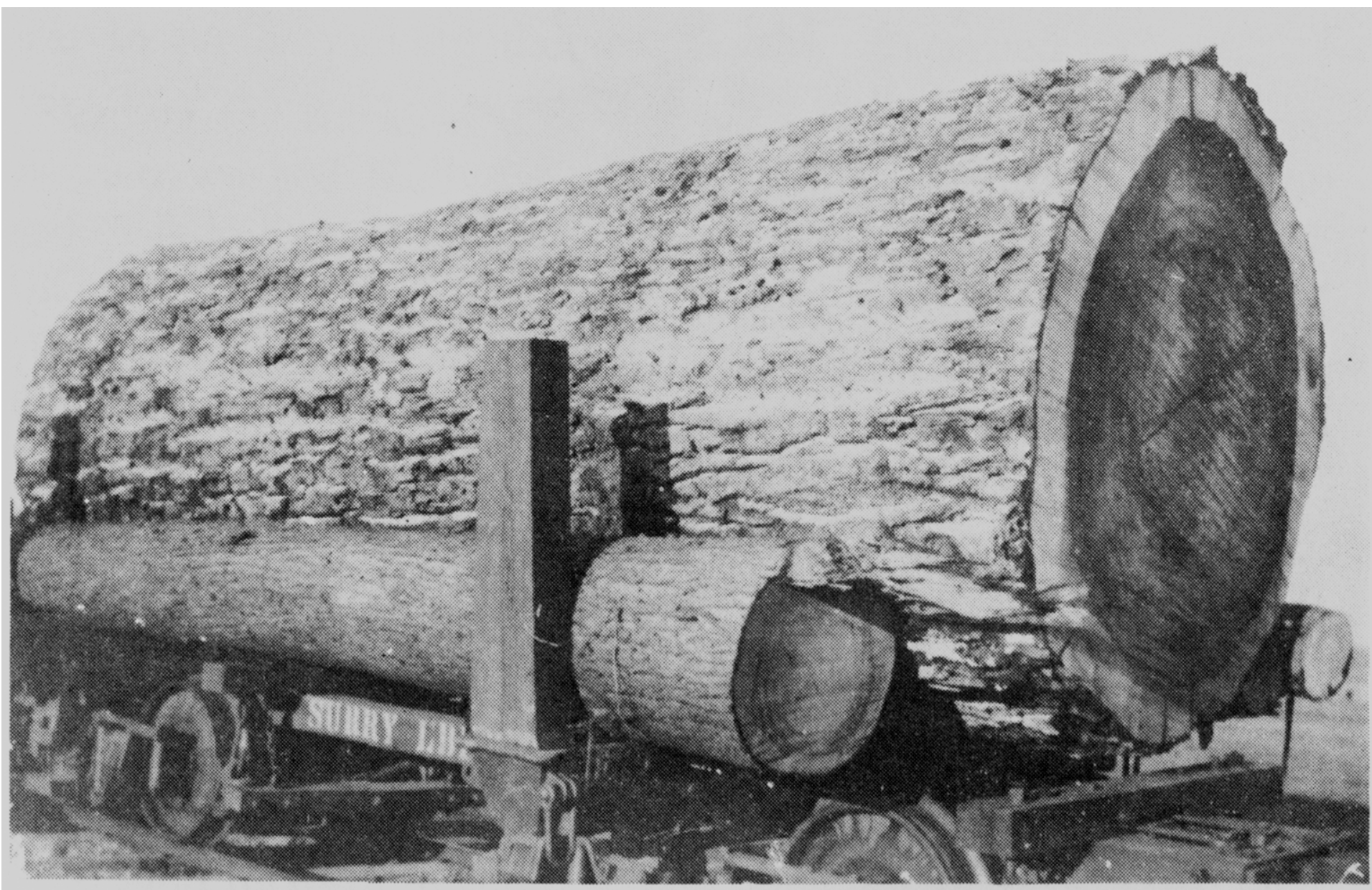
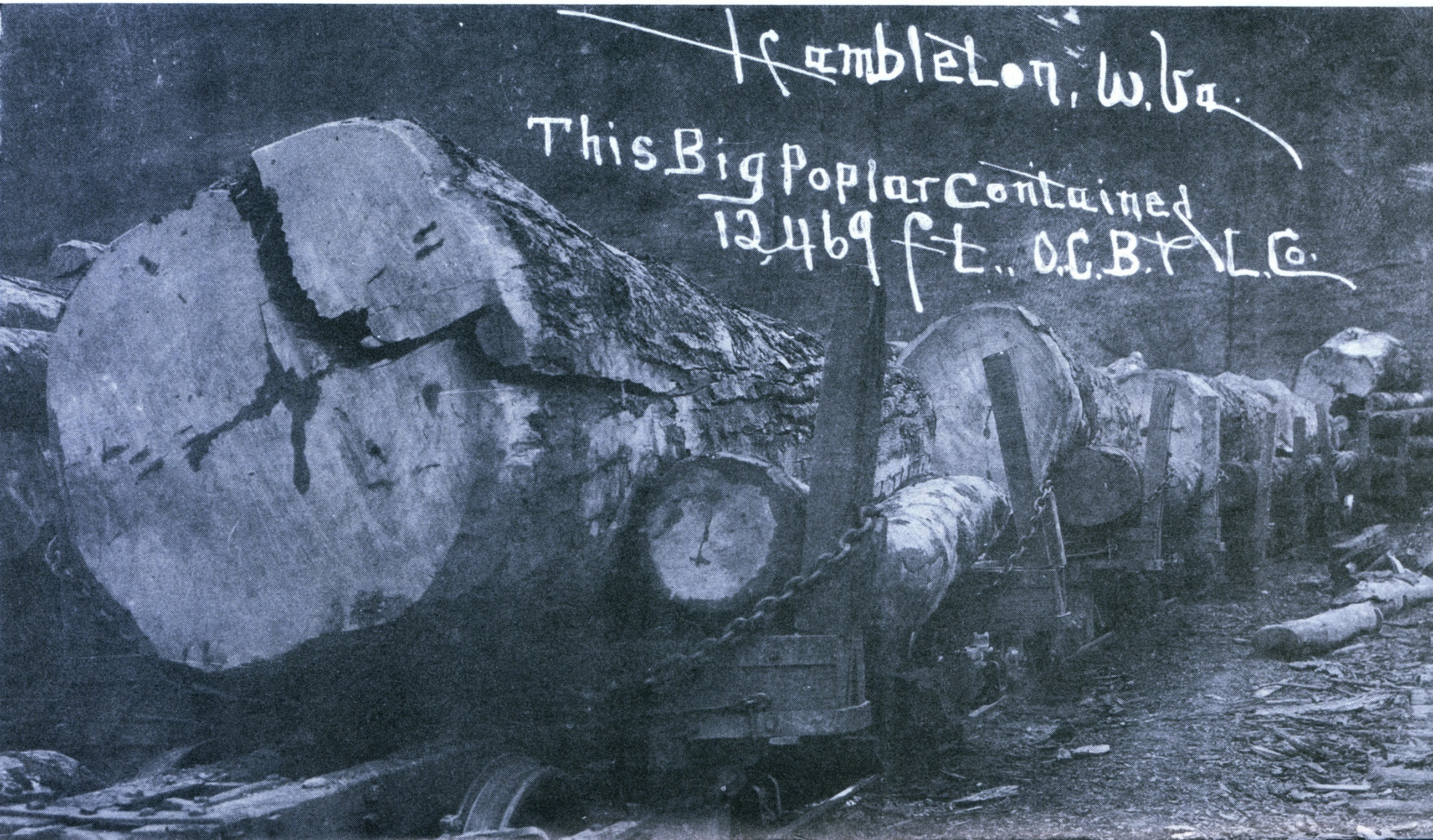




Fig. 8—This large yellow poplar cut on Green Mountain, Tucker County, by the Otter Creek Boom and Lumber Co. at Hambleton, Tucker County, filled an entire log train and furnished 12,469 board feet of lumber, 1913. *Courtesy Homer Floyd Fansler.*





“We Dined In A Hollow Cottonwood Tree” by Robert Griffing  
Jesuit Father Joseph-Pierre de Bonnacamps recorded in his 1749 dairy, “which 29 men could be ranged side by side” (near present day Pittsburg)





Settlers cleared the land at an average rate of 13.3 sq. miles per day.

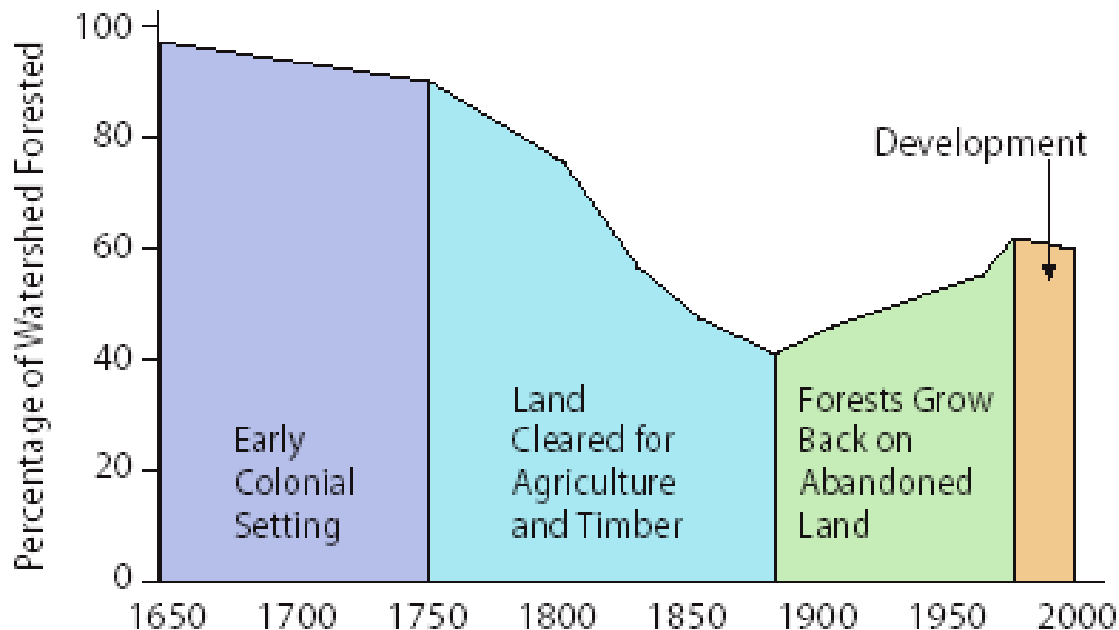
That equals 8512 acres/day!

From: *The Forests of the Potomac*

**Albert H. Todd**, USDA Forest Service  
Watershed Program Leader

**Eric Sprague**, The Conservation Fund  
State of the Chesapeake Forests Project Leader

From the early 1900s to the 1980s we experienced an era of expanding forests.



Since the '80s we have been losing forest.

The current conversion (loss) rate is approximately 32 acres/day.





Fig. 3—Virgin spruce forest near the head of North Fork of Cherry River, Pocahontas County, 1908. Photo by W. E. Rumsey. Courtesy W. Va. Geological and Economic Survey. From "Forestry and Wood Industries" by A. B. Brooks.

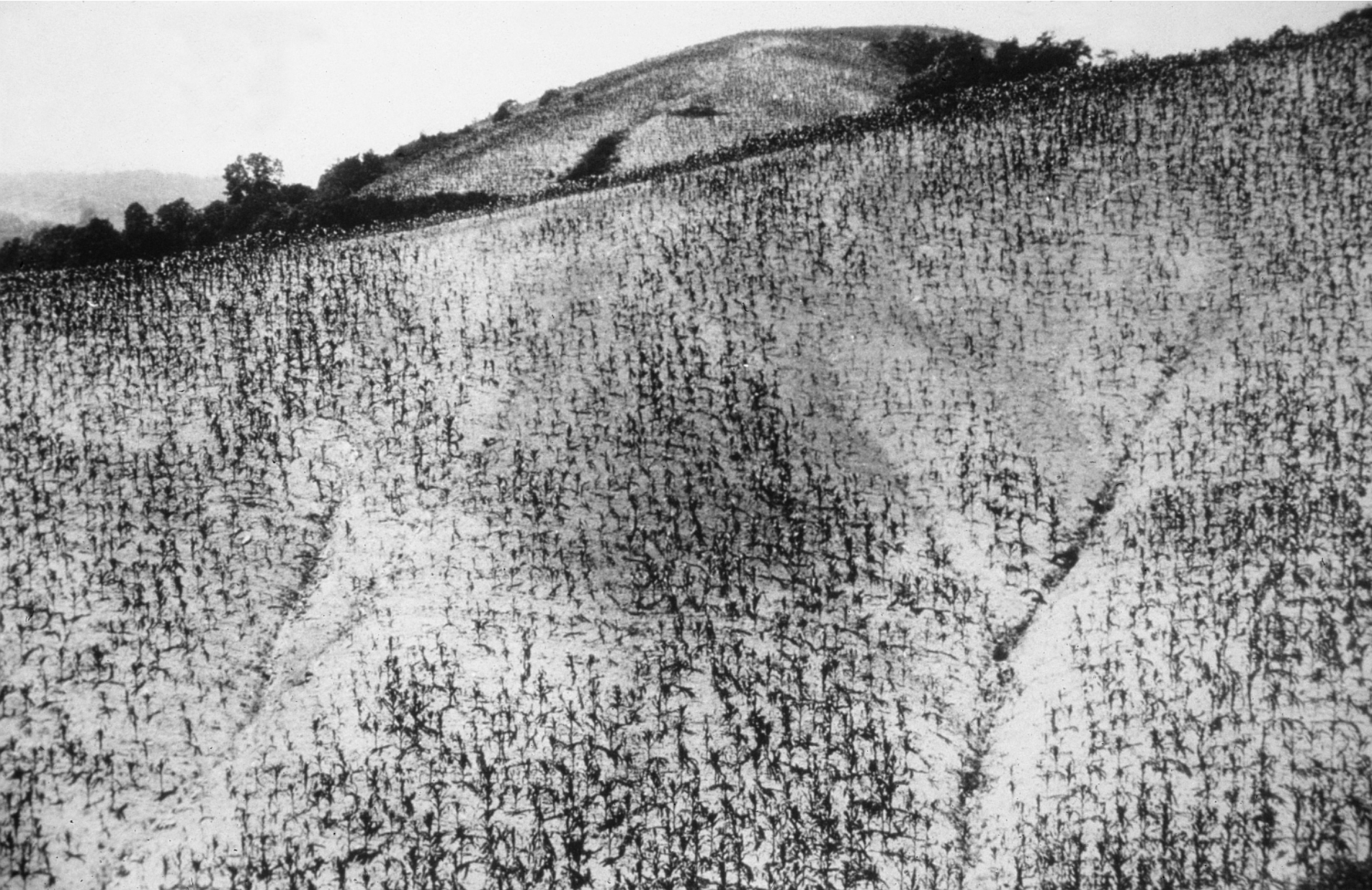


Fig. 76—The barren aspect of the land following the lumbering operations and fires is starkly shown here. Crest of Cabin Mountain, near Dobbins Slashings, Grant County. *Courtesy H. A. Allard.*





Great ideas circa 1920s: Lets turn the denuded, burnt Appalachian mountains into farm land.



# Erosion after the great forest harvests (1880-1920)

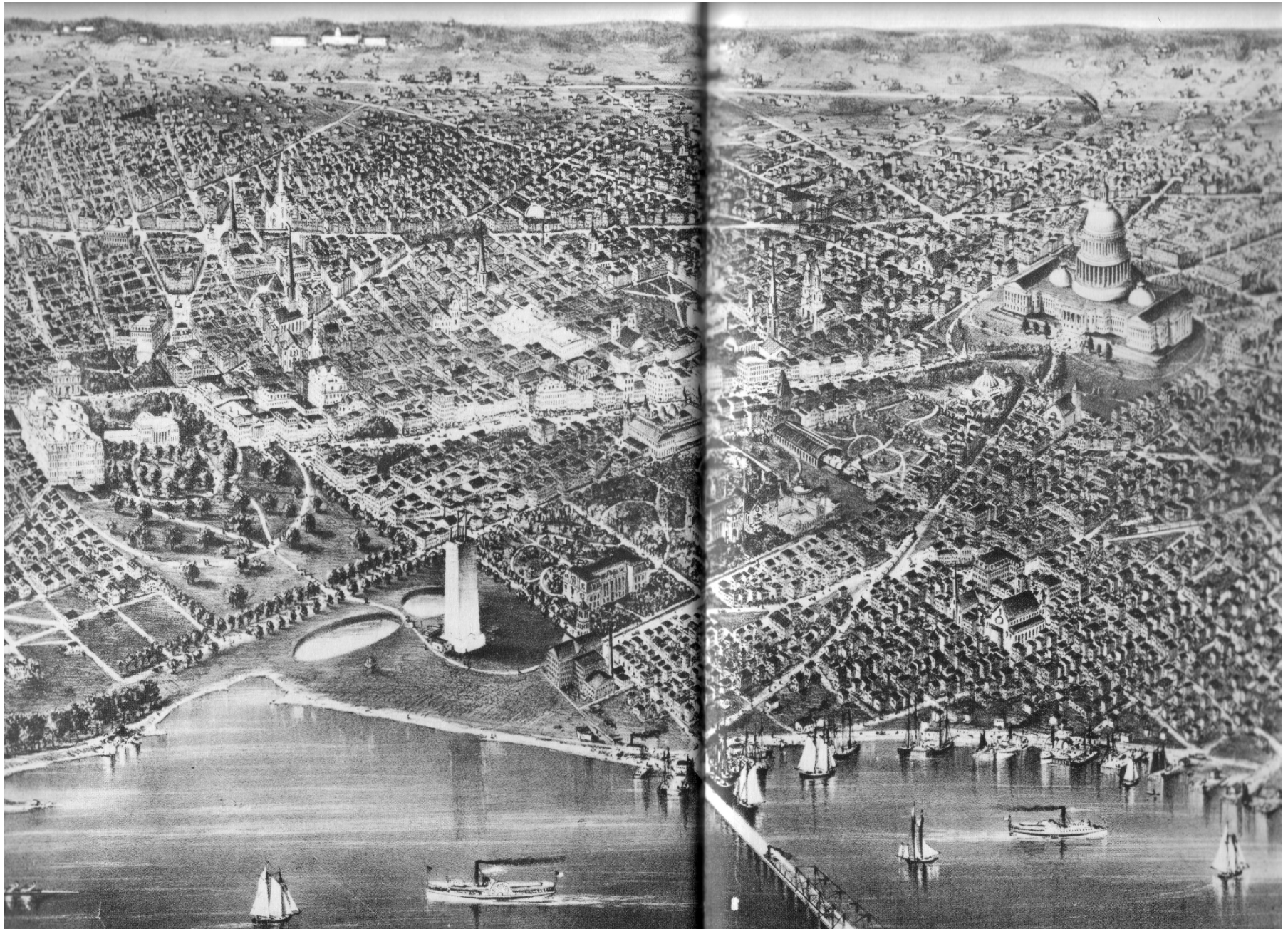


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1870's US Balloon Corps Drawing of DC.

Notice the Washington monument being built right next to the Potomac's shoreline.



The shoreline of Washington, D.C., has filled in tremendously over the last couple of centuries.

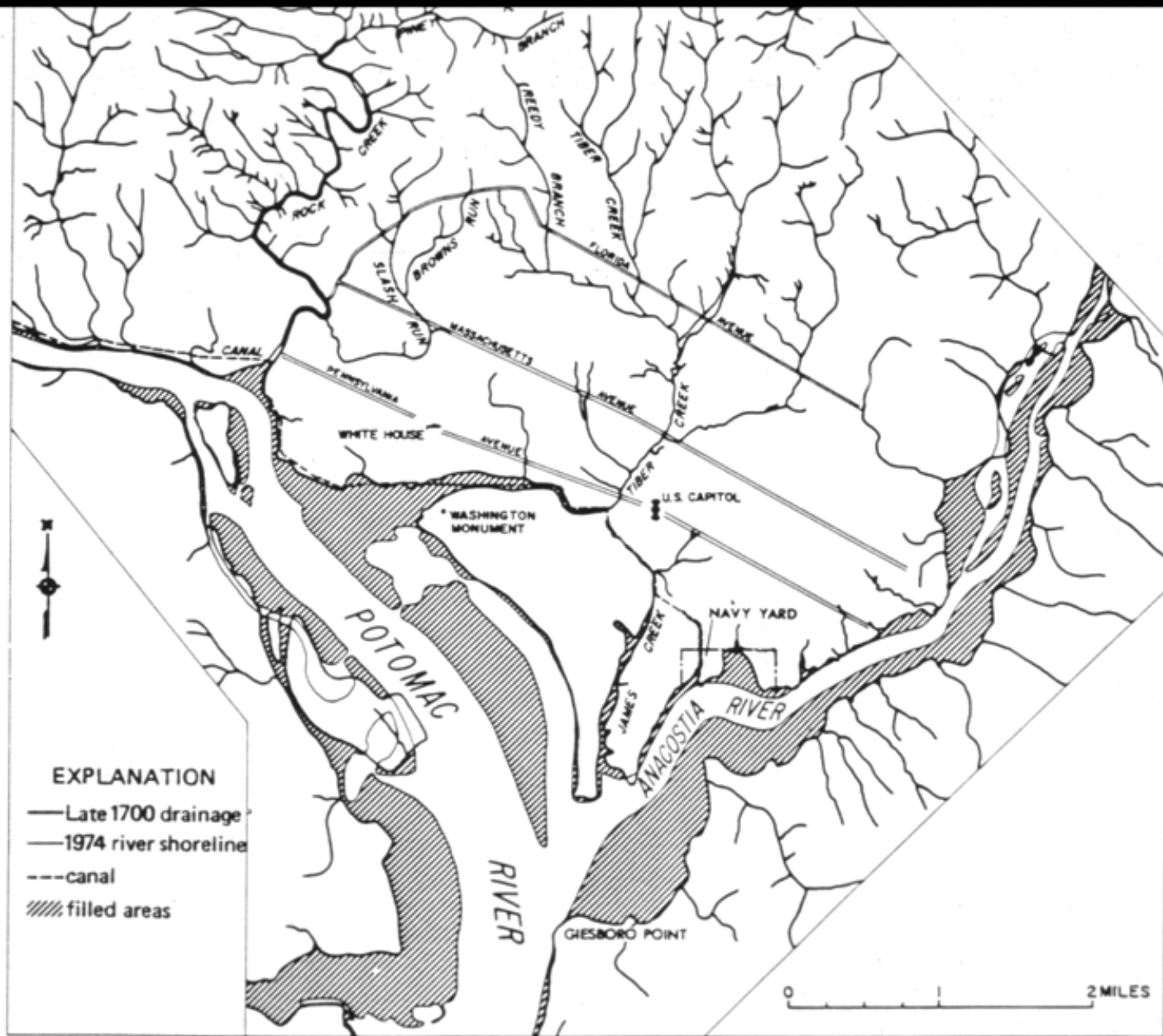


FIGURE 1. — Stream network and river shorelines of the central Washington, D.C., area in the late 1700's, compared to 1974 river boundaries. Selected reference streets and points and the 19th-century canals are also shown.



←Virginia (Private lands)

## Dams: there are two at Little Falls

Maryland (& C&O Canal NP) →

They blocked fish migrations until a fishway was constructed near the Virginia shore in 2000.  
Inset at lower left shows the natural channel visible on the Virginia side during low flow (1999).





Little Falls Fishway Completed:  
January 6, 2000

Remains of coffer dam

Three labyrinth weirs  
to reduce water velocity

Expected fish movement





## Providing fish passage alone is not enough.

A program to stock American shad fry upstream of Little Falls was initiated in 1995 with the purposes of imprinting them to the historic waters and to help rebuild the shad population.

However, with the population so low, where do you go and how would you capture spawning adults for brood stock?

It is best to use experience, but the fishery closed in 1982.

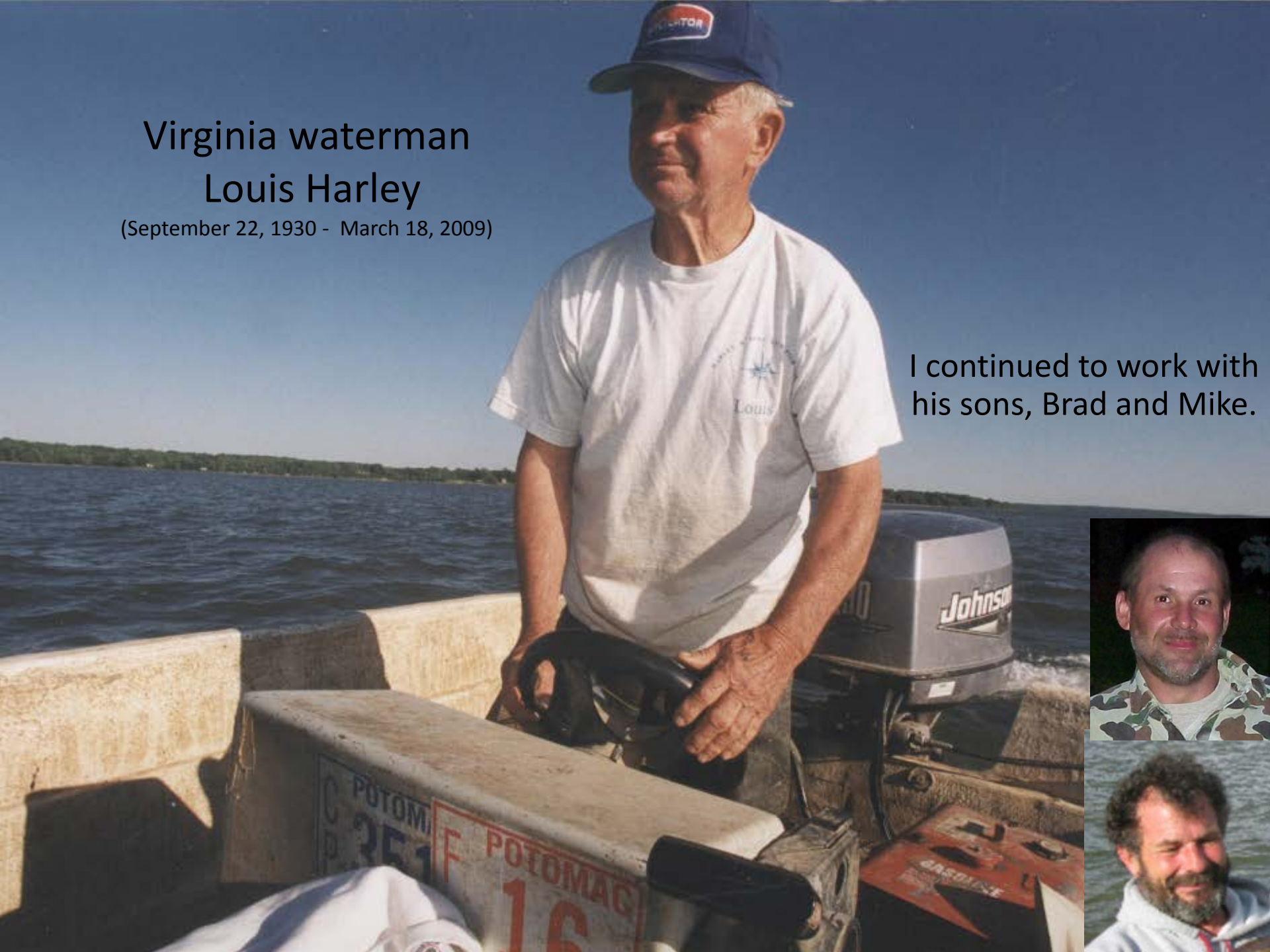
Where could we find experience?

Right: Drift Gill-netting for American Shad in the Potomac River, near the mouth of Dogue Creek, off of Fort Belvoir and Mount Vernon, VA



# Virginia waterman Louis Harley

(September 22, 1930 - March 18, 2009)



I continued to work with  
his sons, Brad and Mike.





Hundreds of volunteers have helped over the years - on many damp and chilly nights.





The fertilized eggs are transported to the USFWS's Harrison Lake National Fish Hatchery. Dave Petersen\* loads a new batch into a hatching jar. The eggs hatch in about 4-5 days and then swim into the larger blue holding tank.

\*Dave was instrumental in developing a scaled-down egg chamber used by the schools.





After hatching and OTC marking, the fry were stocked back in the Potomac River at Mather Gorge near Great Falls, the natural upstream boundary to shad migration, which is approximately 10 river miles upstream from Little Falls.

Over 17 million shad fry were stocked from 1995 to the conclusion of restoration stocking in 2002.

From 2002 until 2014 we supplied Potomac origin shad eggs to the Virginia Department of Game and Inland Fisheries for their Rappahannock River shad restoration. 48 million shad fry were stocked into the Rappahannock River and an additional 5 million into the Potomac River, the latter as “replacement stocking” (versus restoration stocking).





A by-product - Since 1996, tens of thousands of Washington area students have released almost 800,000 shad fry hatched in their classrooms.





**So what's happening to the  
Potomac's shad population?**





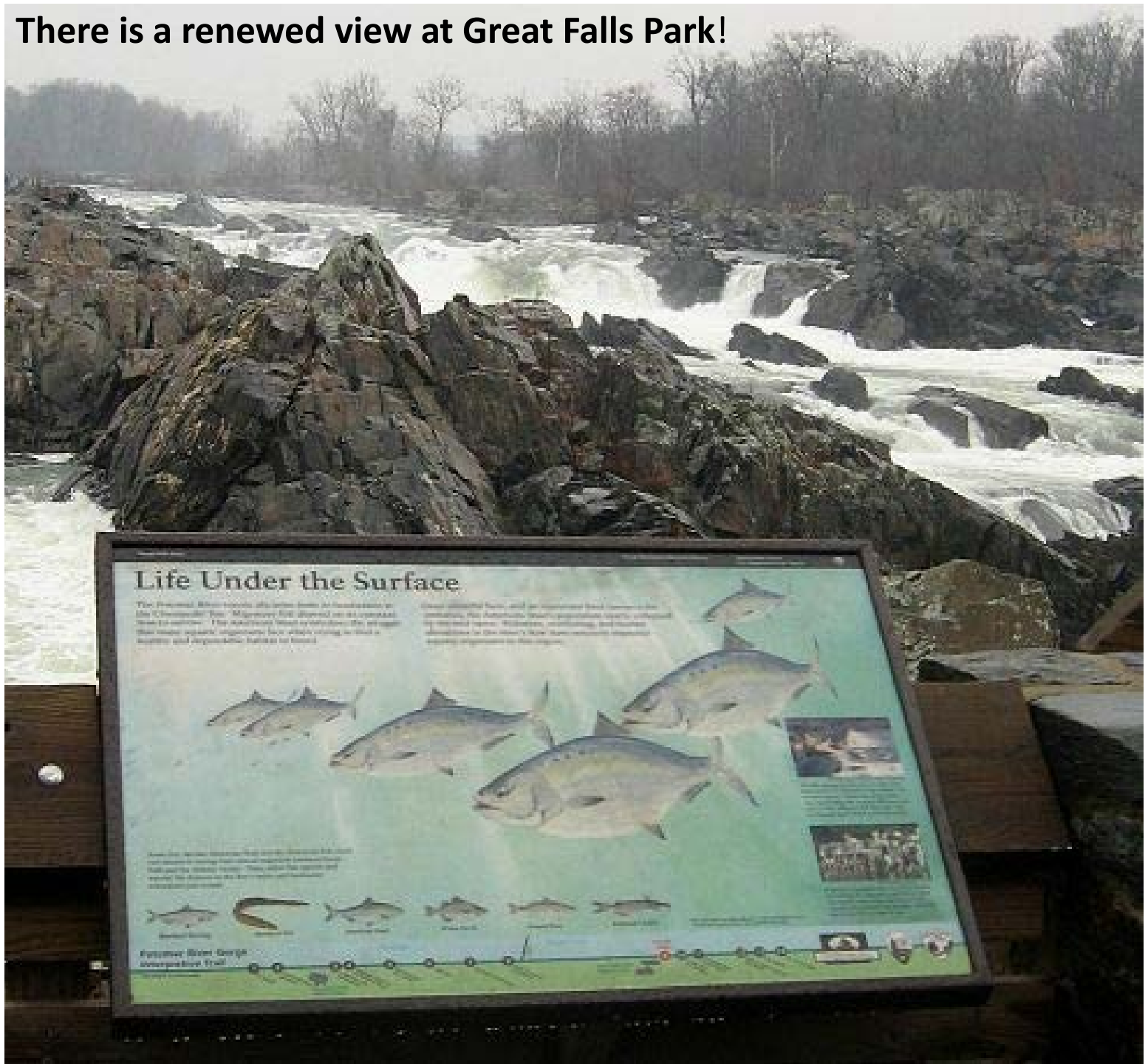
## The fishway at Little Falls is working.

Mike Odom, USFWS, with one of the first shad captured at Great Falls after the fishway was opened in 2000. Mike is standing on "Shad Rock."

Year----# shad  
2000 ---- 3  
2001 ---- 12  
2002 -----43



There is a renewed view at Great Falls Park!



## Life Under the Surface

The Pennsylvanian River provides a unique habitat for several species of fish. The river's fast-moving water and rocky banks create a dynamic environment. The diversity of fish species in the river is a result of its unique characteristics, including its fast-moving water and rocky banks. This makes it an important habitat for many species of fish.

Some of the most important species of fish in the river are the Atlantic Salmon and the American Brook Trout. These species are highly dependent on the river's fast-moving water and rocky banks. The river's unique characteristics make it an important habitat for many species of fish.





## "Anacostia Shad"

(1 of 4), in Melrose Skate Park, Rhode Island Ave, Hyattsville, MD; glass mosaic by Valerie Theberge, 2011. I love the Japanese stylized wave, and since the shad spends 9/10ths of its life in the ocean, returning to its natal river to spawn, its depiction amongst waves follows its lifecycle. Valerie's artwork tries to show Hyattsville's global linkage. This is a skate park, so hopefully such linkage expands the youths awareness. A little, but it all helps.



## OUTDOORS

ANGUS PHILLIPS

*Shad News for Local Anglers*

**O**f all the fish that swim in the sea, few are as easy to catch as shad. That's because you don't have to go to sea to catch them. Each spring they come barreling back to the rivers where they were born to scatter eggs by the millions. Dangle a small lure or fly in front of them, and they'll smash at it, then leap and dance at the end of your line.

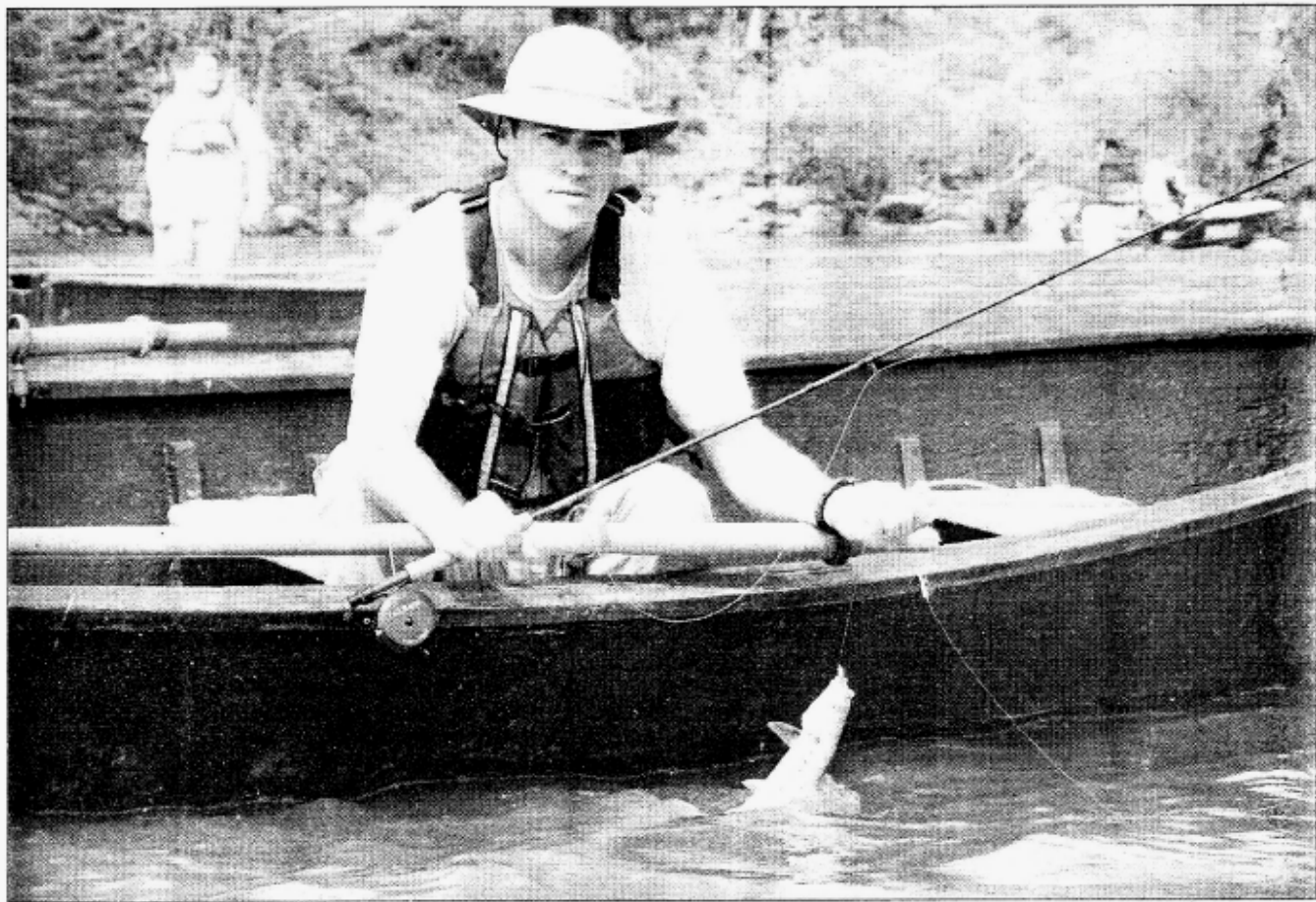
When is best? Right now. Where? Right here.

"They're thicker than fleas," said Mike Bailey, still slightly breathless after landing a six-pound American shad Thursday on the Potomac off Fletcher's Boathouse in the District.

"It ought to be right at the peak here by the end of the month," said Max Skelly of Havre de Grace, Md., just back from a midweek foray on Octoraro Creek off the Susquehanna River, where he caught 20 hickory shad in 40 minutes before reluctantly going to work. "They were all big fish, too," he said. "The Susquehanna is loaded right now."

"Fishermen were shoulder-to-shoulder at all the good holes on the Rappahannock when I crossed the Route 1 Bridge at Falmouth this morning," said Lt. Phil Parrish, a Virginia game warden who works the waters around Fredericksburg. (All eyes are on the Rappahannock this year after the dam above Fredericksburg was demolished in February, opening miles of new spawning waters to shad and other species).

Even George "Shad Pappy" Magaro, president of the Delaware River Shad Fisherman's Association, said he's landed 26 American shad in three trips around



BY ANGUS PHILLIPS FOR THE WASHINGTON POST

**Washingtonian Kevin Barnes shows off a shad he snagged on the Potomac below Chain Bridge. Many shad are now coming up the Potomac to spawn.**

Cummins captured American shad in the Potomac from 1995 to 2002, milked their roe and milt, grew fry in tanks and

fishing with enthusiasm. In my two trips to the Potomac this spring I've seen almost as many anglers waving the long wand as fishing

the boat. Since shad are filter feeders from the herring family, the ones hooked in the gills are unlikely to survive, Cummins said.



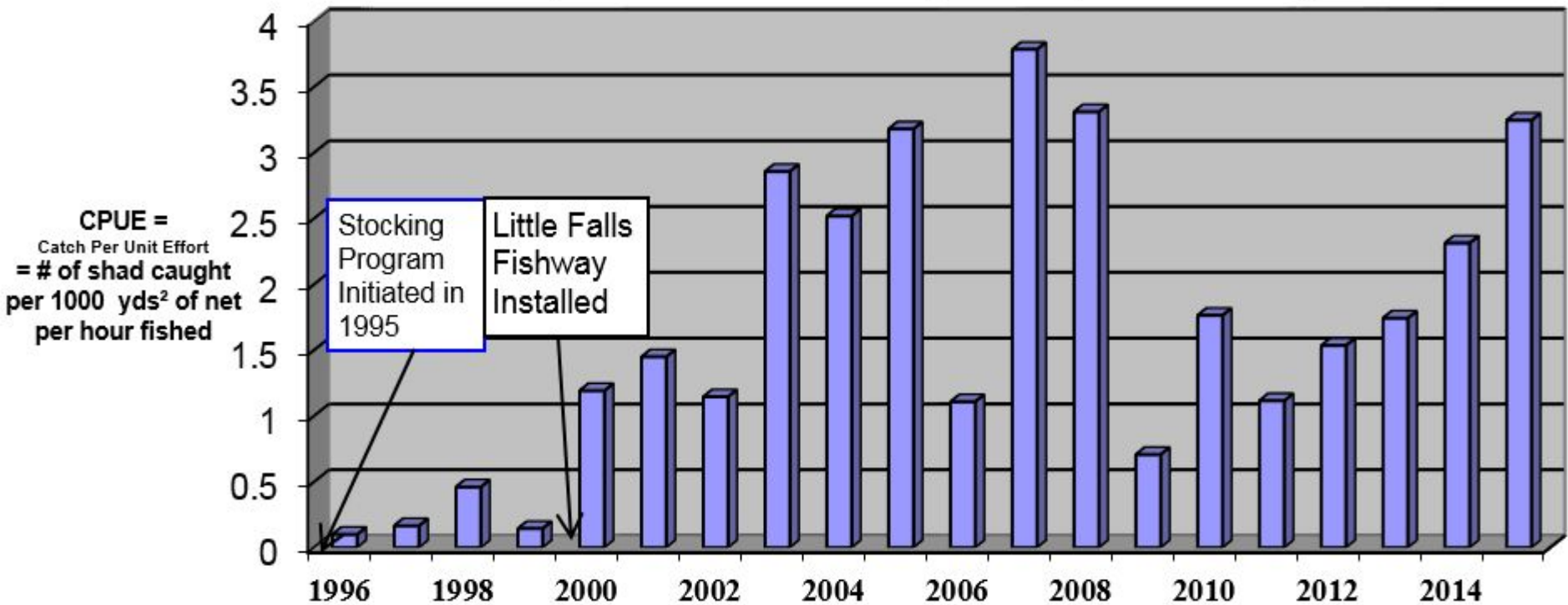


Shad plankings at Fletcher's Cove, 2000-2015



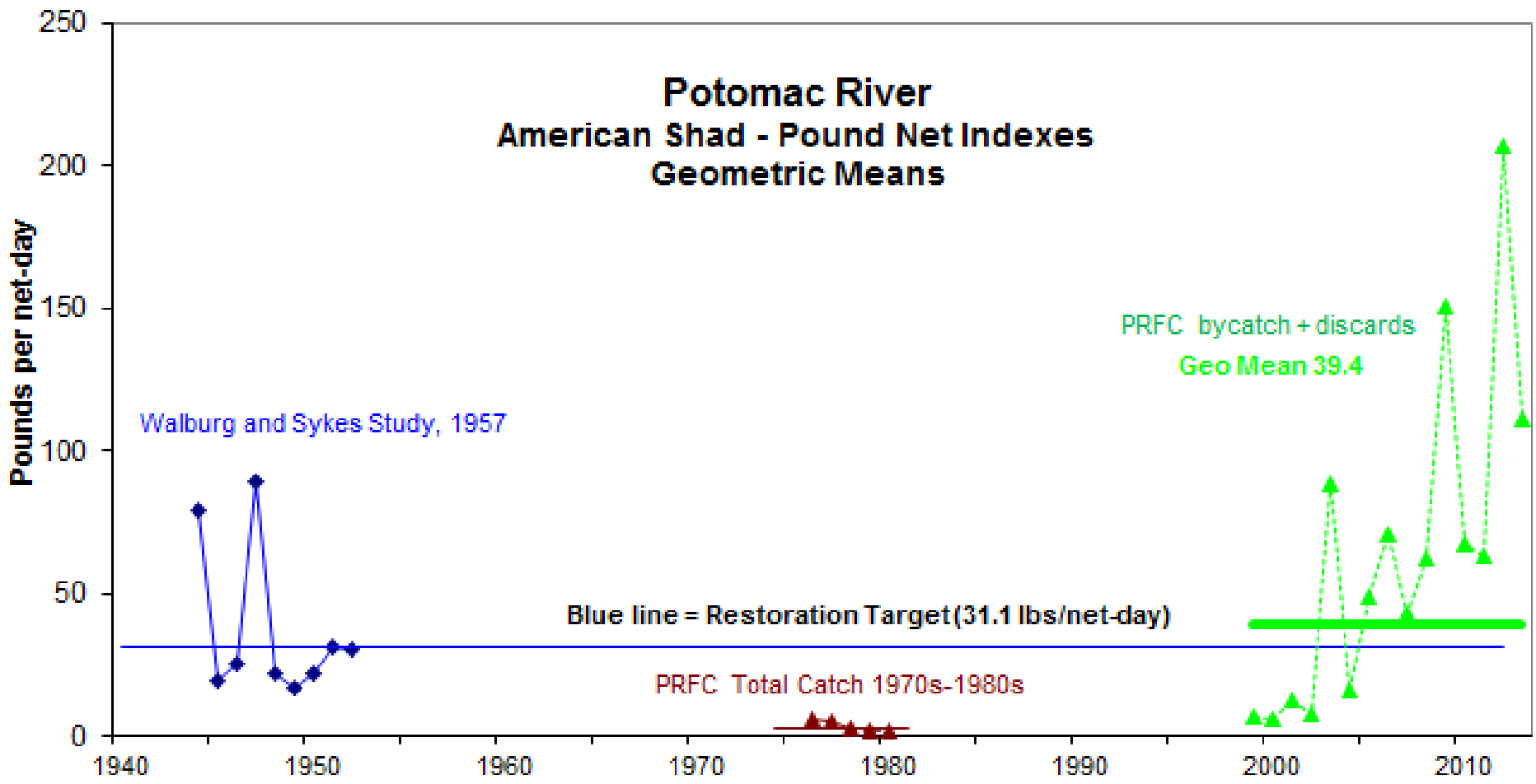
Returning adult numbers have increased significantly.

MD DNR Potomac River American Shad CPUE  
during MD Striped Bass spawning stock survey (1996-2015)  
(DataSource = Eric Durell, MD DNR, Chart = ICPRB)



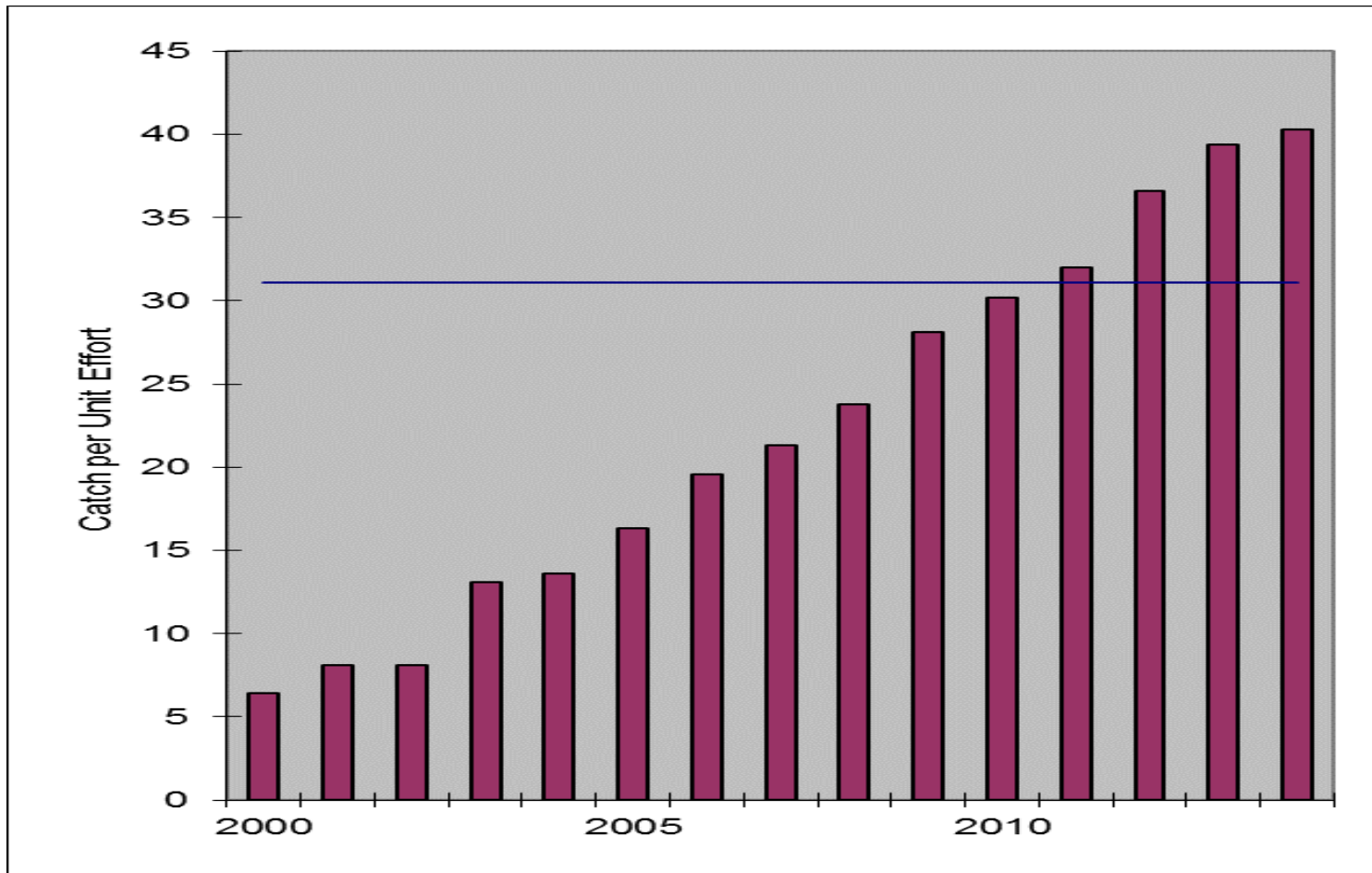


Commercial pound-net fisheries are used to gauge the recovery. In 2007, the Atlantic States Marine Fisheries Commission set the recovery threshold to be a geometric mean of 31.1 lbs/net-day for American shad captured as by-catch (i.e., from non-targeted gear) in the Potomac River. In 2011, that threshold was exceeded. In 2012, the Potomac American shad population was officially declared recovered and sustainable. (from the Potomac River Fisheries Commission (PRFC))



Commercial pound-net fisheries are used to gage the recovery. In 2007, the Atlantic States Marine Fisheries Commission set the recovery threshold to be a geometric mean of 31.1 lbs/net-day for American shad captured as by-catch (i.e., from non-targeted gear) in the Potomac River. That is the blue line. In 2011, that threshold was exceeded.

In 2014 the 15 yr geometric mean of By-Catch Per Unit Effort = 40.3/Lbs/net-day, or 130% of the goal.

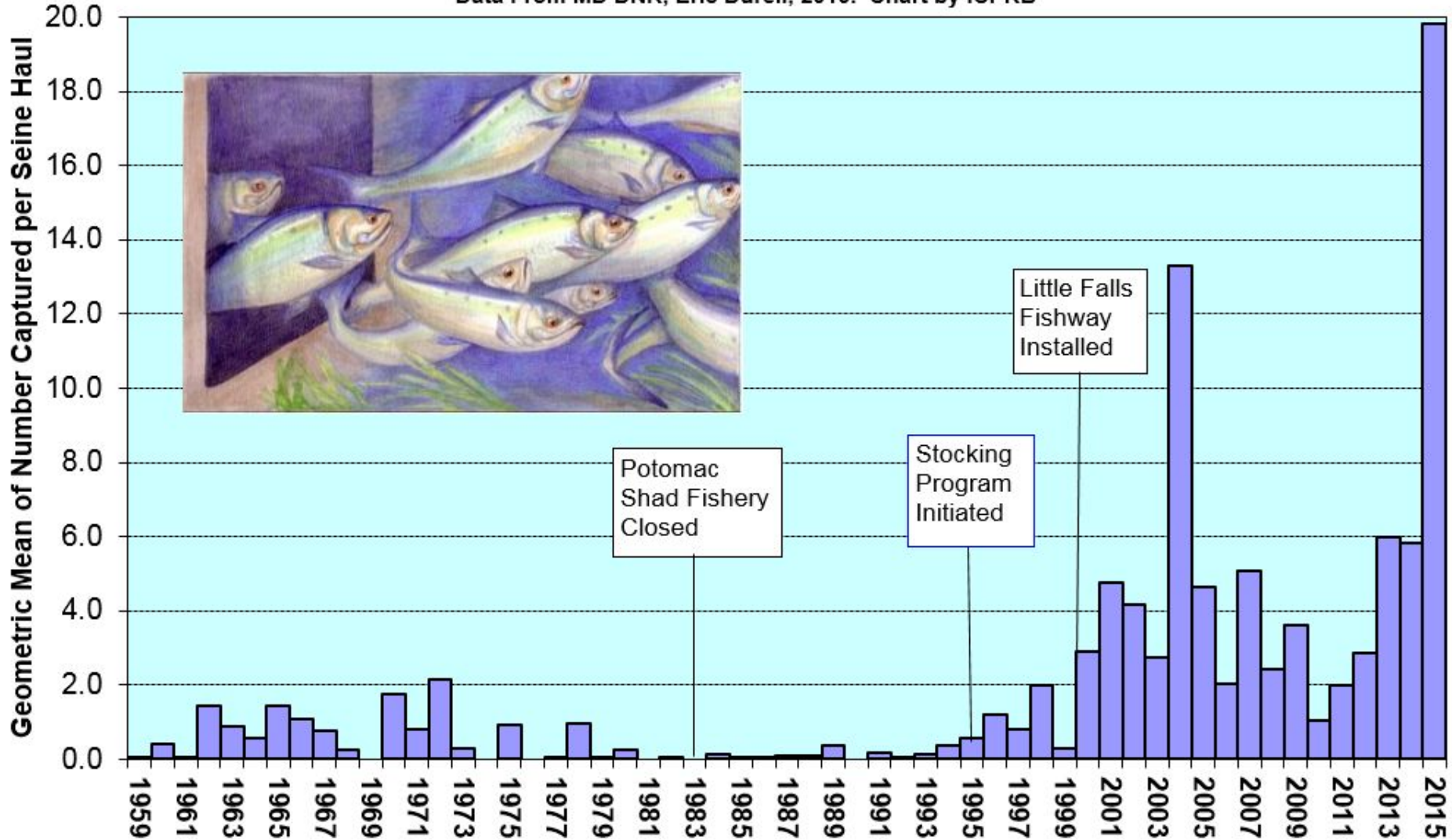


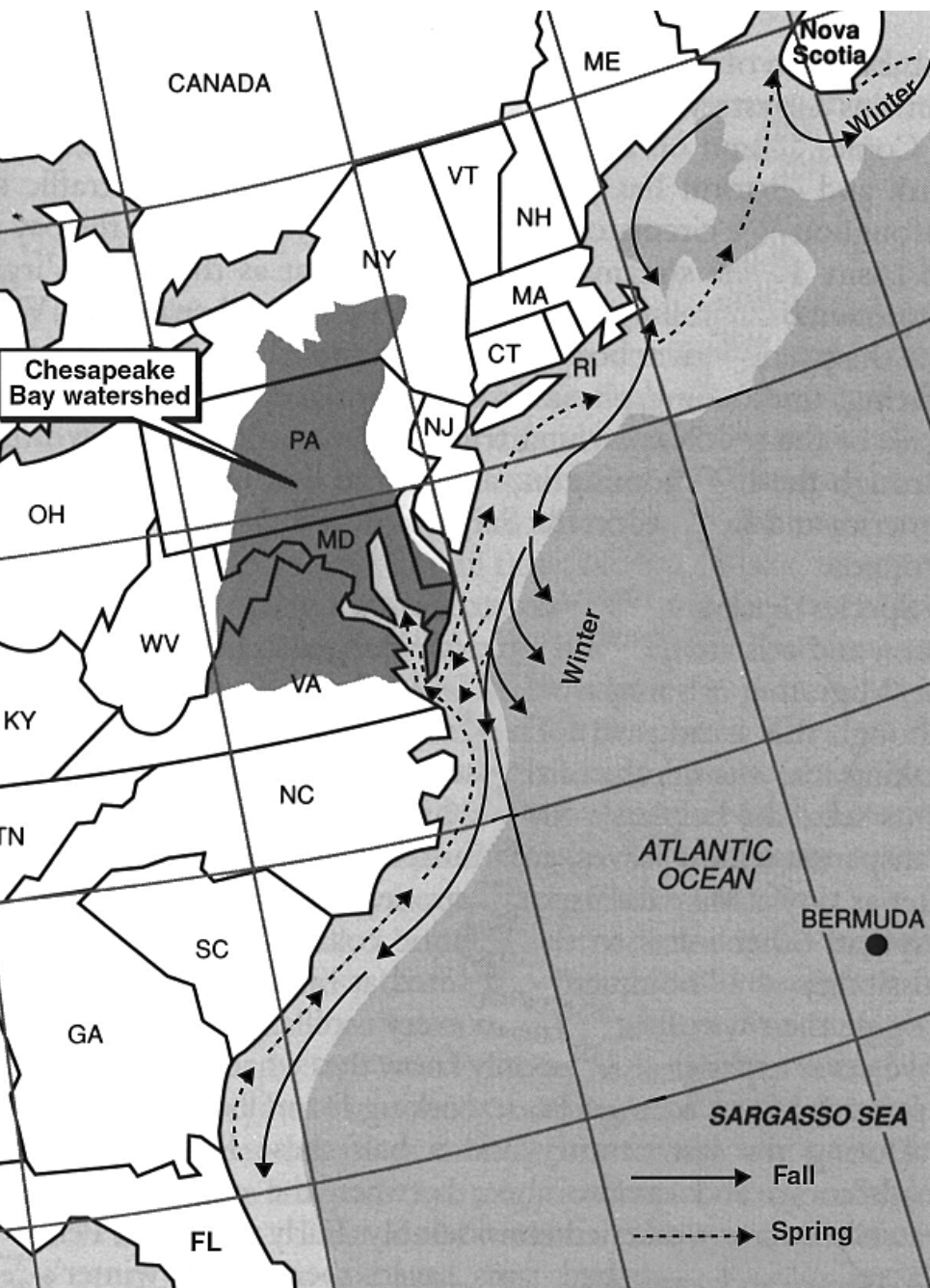


Juvenile abundances have increased dramatically, exceeding pre-moratorium's levels for 13 out of the last 16 years.

### Juvenile American Shad Captured in the Potomac River by the Maryland Shore Haul Seine Survey - 1959-2015

Data From MD DNR, Eric Durell, 2015. Chart by ICPRB





**An end to the story?**  
**No – The journey is long.**  
**The Potomac's shad population will never fully recover until the shad populations of other rivers also recover.**