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W.H. Massmann

Virginia Fisheries Laboratory

Robert S. Bailey

Virginia Fisheries Laboratory

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The Shad in Virginia Waters

By

W. H. MASSMANN AND ROBERT S. BAILEY

Staff members, Virginia Fisheries Laboratory

SUDDEN splashing shattered reflections of spring bloom in the still waters of the Chickahominy as large silvery fish streaked wildly near the surface, then stopped and broke the surface. A roe shad accompanied by several bucks was engaged in courtship and spawning. Driven from unknown ocean depths, the shad had arrived at their destination to deposit eggs in the same river in which they had been born.

The shad run in Virginia tidal rivers has persisted for centuries. Even before primitive man inhabited the coastal plains these splendid fish were returning to the fresh waters annually to lay their eggs. And now, though great stretches of the headwaters of these rivers have been blocked by dams and portions of the remaining areas are rendered uninhabitable by pollution, shad still return to favorable locations in great numbers. Though generations of fishermen have harvested vast quantities, the shad still enter Chesapeake Bay by the hundreds of thousands each year.

Angling for shad, an unusual sport in the past, has recently gained popularity. Since shad do not feed while in fresh water, there is little reason to expect angling to be an effective method for catching them. How an angler can succeed in coaxing a shad to strike at a small silver spinner or spoon is a mystery, but it is no mystery that they will bite and put up a terrific struggle after being

hooked. In Virginia angling for shad began in 1944, two years after completion of the dam at Walkers on the Chickahominy River. At first, most fishing was done from the dam itself; now fishermen troll from boats in areas above and below the dam. This new sport fishery has spread to other rivers, and anglers successfully catch shad in the Mattaponi, Appomattox, Nottoway, Pamunkey, and the James Rivers as well as in Occoquan Creek.

The scientific name of this highly-favoured food fish, *Alosa sapidissima*, marks it as the tastiest of all shads. When it moves inshore in late winter and early spring it becomes easily accessible. Small wonder that shad have always been important to Virginia fishermen.

Before the English colonized Virginia, Indians trapped shad in crude weirs made of brush. Those who lived further inland built dams of rocks across the rivers leaving gaps into which they secured woven funnel-shaped baskets which caught the fish as they attempted to swim through the small openings. The earliest colonists were not equipped for fishing and apparently had no skilled fishermen in their midst. Their success in establishing a permanent settlement was in part due to the Indians who taught them how to take shad and other fish from the shallow waters.

Later, fishermen and nets were brought into the colony and long haul-seines became the most important fishing



Virginia Fisheries Laboratory Photo

The VIRGINIA LEE and ANOMIA drag a surface trawl through the rivers in the fall to collect the migrating young shad. This information is used to forecast abundance of adult shad several years later.



Commission Photo by Kesteloo

J. J. Shaman, editor of *Virginia Wildlife*, an enthusiastic shad sport-fisherman, nets a hickory shad caught on a fly rod.



Virginia Fisheries Laboratory Photos

Upper left - Embryonic shad in transparent egg cases. The eye is very prominent and the egg yolk attached to the slender body resembles a bloated belly.

Upper right - Shortly after hatching, young shad have consumed all of the egg yolk. This is a critical period when the larval fish must find food nearby or perish.

Lower left - By early fall, juvenile shad resemble the adult. Now they leave the rivers and bay and spend the next few years in the ocean.

Lower right - Four or five years after migration to the ocean, mature shad will return to fresh water to spawn.

gear. George Washington, one of the most notable shad fishermen of later colonial days, entered in his diary on April 11, 1760, "About 11:00 set the people to hauling the seine and in the night caught and dressed—barrels of herring and 60 white fish."

These white fish of course were shad. Many colonial planters engaged in commercial fishing, seeking primarily the herring and shad. Since colonial days gill-nets have been introduced and following the Civil War an enterprising Yankee came to Virginia with pound-nets. These two gears have now largely replaced the long haul-seines which are more cumbersome to handle and less effective.

Although the habits and activities of shad during their short stay in Virginia waters are quite well known, their life in the ocean is an enigma. Mature shad leave their winter quarters off the Atlantic coast as the water becomes warmer and migrate into coastal rivers, usually returning, it is believed, to the stream in which they were born—their "parent stream." When water temperatures reach 45°F. shad begin moving upriver in large numbers. During the early part of the season their upstream movement may be no more than two or three miles a day. As the waters in the river warm to the most

favorable temperature for spawning, the fish may advance upriver 12 or 14 miles in 24 hours.

Male or buck shad are more abundant in early runs, but females, or roes, predominate later. Spawning may occur in the fresh waters of any of our larger, tidal rivers but is most concentrated in the James River at Hopewell, the Chickahominy below Lanexa, the Pamunkey at White House, the Mattaponi below Walkerton, and in the Rappahannock River below Port Royal. Little spawning takes place before water temperatures reach 55°F. Shad may spawn three or four times during the season before their 300,000 to 500,000 eggs have been released. The spent fish or "downrunners" that move seaward bear little resemblance to the robust and well-nourished shad that ascended the rivers earlier. It seems hardly possible that these emaciated adults could recover sufficient strength and survive to return another year; indeed in most states south of Virginia, shad, like some Pacific coast salmon, spawn only once and then die. In Virginia they may spawn for as many as four successive years but most of the fish caught in the traps are "virgins," ascending the rivers for the first time. North of Virginia only about half of the shad taken are "virgins,"

the others are "repeaters," which have spawned at least once before.

The fertilized shad eggs drift near the bottom until they hatch. Their incubation period may range from three to ten days depending on the water temperatures. In 1870 it was found that eggs could be stripped from roe shad artificially, fertilized and hatched. Believing that the abundance of fish could be increased by this method many states along the Atlantic coast operated shad hatcheries, but fifty years of hatchery operation has produced no increase in the shad runs. Therefore, hatcheries in most states have been discontinued. Virginia's shad hatcheries, located in the Chickahominy, Pamunkey and Mattaponi Rivers, are operated on a "salvage" basis, utilizing the spawn from shad being sold commercially.

Young shad remain in fresh water and feed on insects and small aquatic animals until fall. Cooling of the water stimulates these young fish, now about four inches long, to begin their journey to the sea. They will not return until they reach maturity.

There is evidence that the fish leaving Chesapeake Bay migrate along the coast for great distances. Shad tagged in Virginia have been caught off the coast in Maine and fish tagged in Maine have been recovered later in Virginia.

Shad usually return to spawn when four or five years old, the bucks generally reaching maturity a year ahead of the roes. A few bucks are quite precocious for they may mature and return to spawn at the age of two. These youngsters—often less than a foot in length—are known as "skips" or "skip shad" and are often confused

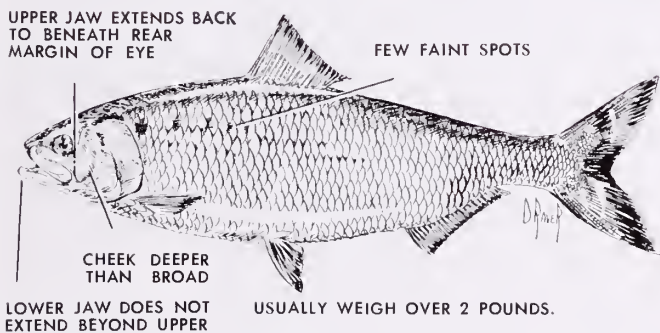
with herring. On the other hand some roes almost become old maids, for they may not return to the rivers until they are six or seven years old.

The history of the shad fishery in the United States has been characterized by a fluctuating decline. There have been many ups and downs in catches, but landings in recent years have never approached the 50 million pounds caught in 1897. Since 1920 catches have fluctuated between 10 and 20 million pounds. Virginia landings have ranged from 11 million pounds in 1897 to two million pounds in 1941. In 1954 over four million pounds were caught and shad were so abundant that markets became glutted, prices dropped and shad fishing was no longer profitable.

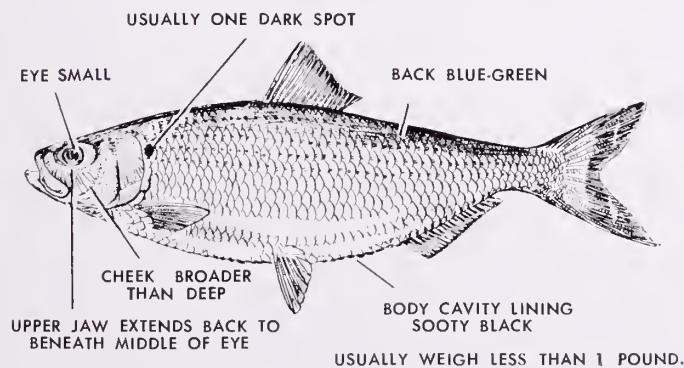
Not all of the reasons for the great changes in abundance are known. Pollution and dams have undoubtedly been important factors. Overfishing has been blamed, but the effect of overfishing is usually greatly overemphasized. Research in progress at the Virginia Fisheries Laboratory suggests that the largest crops of young shad do not necessarily arise from the largest numbers of spawners. It would appear that natural causes are far more important in determining the relative size of the crops of young shad than man-caused factors. However, definite proof of this awaits further research.

Shad were not present anywhere along the Pacific coast prior to 1871. In that year shad fry, brought from the Atlantic, were released in the Sacramento River. From this planting shad increased in numbers and spread until they are now found from San Diego, California to Kodiak Island, Alaska, a distance of about 1500 miles.

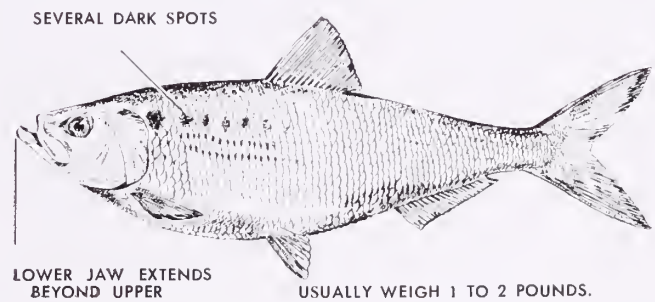
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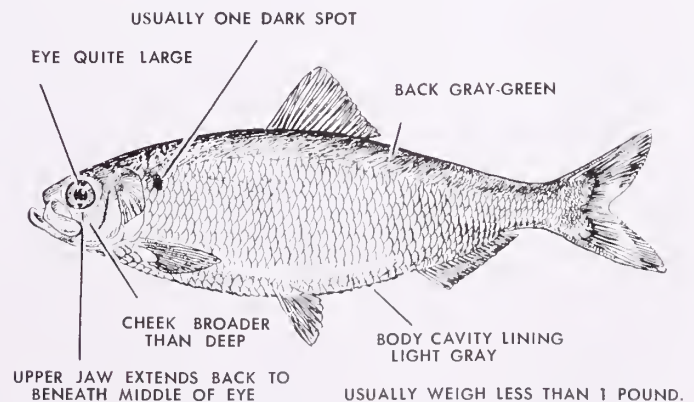
AMERICAN SHAD — *Alosa sapidissima*



GLUT HERRING — *Alosa aestivalis*



HICKORY SHAD — *Alosa mediocris*



ALEWIFE — *Alosa pseudoharengus*

THE SHAD *(Continued from page 7)*

Plantings of shad in the Mississippi River were believed to have been successful, but it was later found that shad from that river were a different species than those planted—a species that was not discovered until after the plantings had been made.

The shad—more properly, American shad, for many other kinds of shad are found in Europe and Asia—might be considered a “king-size” herring since it is one of the larger members of the herring family. This group, one of the largest fish families and economically the most important, includes such valuable fishes as the sea herring, sardine, pilchard, menhaden and river herrings. All herrings are soft-finned fishes having no spines. All have single, short dorsal fins and deeply forked tails. They are deep bodied fishes, flattened sideways. Most of them possess large round scales that come off easily. Their bellies generally have a serrated lower edge.

Hickory shad, alewife and glut herring—frequently referred to collectively as river herrings—also migrate into Virginia rivers in the spring and are sometimes confused with the more highly prized American shad. The shad

reaches a greater size, generally weighing two to four pounds and sometimes as much as eight or ten; the hickory shad seldom exceeds two pounds in weight while the alewife and glut herring rarely weigh over a pound. These four closely-related fishes may be distinguished by the following characters. The lower jaw of the hickory shad extends beyond the upper and the fish has several dark spots on its sides. The American shad has jaws about equal in length, a few faint spots on its sides, a cheek deeper than broad, and an upper jaw that extends back to beneath the rear margin of the eye.

Alewife and glut herring may be separated from the shad by the shape of the cheek, for in the herrings it is broader than deep and the lower jaw reaches to beneath the middle of the eye. Only a single spot is present on the sides. The alewife may be distinguished from the glut herring by its large eye—the diameter of the eye is greater than the distance from the tip of the snout to the forward margin of the eye; the back in gray-green and the body cavity lining is light gray. The eye of the glut herring is smaller, its back is blue-green and its body cavity is lined with sooty black.

THE BEAVER *(Continued from page 19)*

beavers. The beaver is not an aggressive critter, but he will defend himself and his family with vigor. When the dogs attacked, the beavers proceeded to drown them.

The beaver problem in Bath County seems to boil down to this. With no natural enemies, except man, he increases at a goodly rate—each pair having an average litter of four once each year, beginning at two and one half years of age. He prefers the wider stream bottoms and water courses with a gentle flow, which means agricultural land, usually. The little mountain brooks with their steep gradients and rocky bottoms have no attraction for him; put him there and he will soon move downstream or overland to greener pastures.

His practice of building dams will change stream channels and flood valuable fields, sometimes highways. Right now the Jackson River has been dammed in at least six places between the Highland County-Bath County line and Hidden Valley Farm. Of course, when the water level rises — as it generally does with the early spring rains — most, if not all, of these dams will wash out. But the beaver is a persevering animal, not easily discouraged.

He does like corn, especially about the time it reaches the roasting-ear stage, and will eat quantities of soy beans, alfalfa and clover. Mrs. Ruth Cleek remembers their burrowing under the deep snow in the winter of 1945 to feed on the young winter wheat. One tree looks like another to the beaver, so far as dam and lodge-building materials are concerned. In the matter of diet he has certain definite preferences. Willow, aspen and birch, bark and twigs are high on the list, but if he can't get them he will take maple, dogwood, oak and

even pine. He is a trifle wasteful, too, and will sometimes gnaw and chisel on an over-sized white oak until it is well girdled, then goes off and leaves it to die.

But there are favorable things to be said for him, too. He does help to maintain stream and ground-water levels with his engineering practices. The ponds which he creates make favorable habitat for muskrats, ducks and other waterfowl. He will never rob a henhouse or kill a lamb, nor will he (as some folks erroneously believe) eat fish, for he is strictly a vegetarian. The pools he forms in the streams are usually beneficial to fishlife. **And there** will come a day as fashions change and long-haired furs again become popular, when his pelt will be worth good money. These industrious creatures are fascinating to watch and never fail to give the nature lover a thrill.

There is a problem to be faced, no doubt of it. Like plants, an animal can be a “weed” in the wrong location. I believe the program of live-trapping and moving in the more aggravated cases should be continued. Interest in winter trapping for fur should be encouraged and stimulated. If the trapping program gains real impetus I believe the population can be kept under control and Bath County will have another species of wildlife which will be both desirable and furnish some profitable winter-time sport.

While there is some truth to the observation made by Mr. Tom Gathright, long a colorful figure in Bath County conservation circles, that “He was a novelty but he's become a *** nuisance,” I am sanguine enough to say “Let's give him a chance.” After all, Mr. Beaver has only been with us some 20 years, which is a mighty brief span in the life of our universe.