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U.S. FISH AND WILDLIFE SERVICE, U.S. DEPARTMENT OF THE INTERIOR
BEFORE THE SENATE ENVIRONMENT AND PUBLIC WORKS SUBCOMMITTEE
ON WATER AND WILDLIFE**

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Good morning Chairman Cardin. I am Genevieve LaRouche, Chesapeake Bay Field Office Supervisor, with the U.S. Fish and Wildlife Service (Service). I appreciate the opportunity to testify today on the Conowingo Dam. My testimony provides the Service's views on the importance of the dam and its impact on migratory fish, as well as the impact of water flow and nutrients on wildlife resources. The Service recognizes a balance is needed between hydropower, fish passage, and improving the health of the Susquehanna River system. We have a unique opportunity to work together to strike this balance and restore this mighty river.

Background

The Susquehanna River, one of America's largest rivers, forms in central New York and flows over 400 miles through central Pennsylvania to Maryland. The largest tributary to Chesapeake Bay, the Susquehanna River provides over 60 percent of the freshwater to the Chesapeake Bay. The Susquehanna River was once home to large numbers of migratory fish including American shad (*Alosa sapidissima*), river herring such as alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*), and American eel (*Anguilla rostrata*). These fish played a vital role in the Chesapeake region's history, supporting one of the most valuable finfish fisheries in the region. Throughout the 19th and 20th centuries, fishermen flocked to fishing communities along the Chesapeake's rivers for the annual spring shad spawning run.

Native Americans relied on shad as an important food source. During the Revolutionary War, American shad were described as the "savior fish" that saved George Washington's troops from starvation after the harsh winter of 1778.

Shad form an important link in the Chesapeake Bay food web. They feed on plankton, and in turn are eaten by species higher in the food chain. Shad adults spawn in fresh rivers and streams where the eggs hatch and the fry live for up to 1 year before they migrate downstream to the ocean. These shad spend 3 to 5 years in the ocean as juveniles before maturing and returning to the Chesapeake Bay's freshwater tributaries, such as the Susquehanna, to spawn. Spring shad spawning runs have historically been a major food source for many migratory birds and fish, including bald eagles, ospreys, catfish, bluefish, and species emblematic of the Chesapeake Bay like striped bass—which also support our watermen and their way of life.

American eels, both juvenile and adult, are commercially important in the Susquehanna watershed; they are exported for food and used as fishing bait. American eels migrate from the Chesapeake Bay into the Susquehanna and other rivers as juveniles where they remain until reaching maturity. At that time, they migrate downstream to the Chesapeake Bay and out to the

Sargasso Sea in the Atlantic Ocean east of Florida where they spawn. The eggs hatch, and the larval eels are transported by ocean currents along the East Coast of the United States and randomly enter embayments. The majority of the eels that migrate upstream to grow and mature are females.

Ecologically, the American eel plays a crucial role as the favorite (but not only)¹ host fish for the freshwater eastern elliptio mussel (*Elliptio complanata*). As the most common freshwater mussel in the Susquehanna River, the eastern elliptio mussel filters gallons of water daily and is a key element to improving water quality in this heavily populated watershed. The youngest mussels are distributed throughout the river when the juvenile mussel stage attaches to the eel's gills as the eels move upstream. At some point, they drop off and fall to the river bottom where they mature.

The mouth of the Susquehanna River is a popular recreational area where anglers fish for various herring species, as well as prized striped bass. This area is a major bald eagle area due to the abundance of fish and roosting habitat along the shore. It also attracts visitors who come to see and photograph the bald eagles and other wildlife. Local economies benefit from fishing and other recreational uses of the river.

Susquehanna River Dams and Fish Passage

Populations of American shad, alewife, blueback herring, and American eel were reduced or essentially eliminated in the Susquehanna River and other Chesapeake Bay tributaries by dams. In the early 1900s, four large hydroelectric dams were constructed across the lower Susquehanna. The 95-foot-high Conowingo Dam was built in 1928 between Cecil and Harford counties in Maryland. The other three dams, Holtwood, Safe Harbor, and York Haven are located upstream in Pennsylvania. Together these dams eliminated access to over 1 thousand miles of freshwater spawning and rearing habitat in the Susquehanna River, and these migratory fish runs were lost.

In the 1950s, inspired by improvements in fish passage technology and public interest, resource agencies in Maryland and Pennsylvania began working with dam owners to provide access for migratory fish to spawning habitat upstream of the dams on the Susquehanna River. The focus was on American shad.

In 1972, construction of the west fish lift (fish "elevator") and trap was completed at the Conowingo Dam. The east fish lift was constructed in 1991. Over the next 10 years, fish passage was constructed at the upstream Holtwood, Safe Harbor, and York Haven dams. In addition, the owner of Conowingo worked with Federal and state agencies to capture, transport, and stock fish in quality spawning and nursery habitat in the upper Susquehanna River upstream of the lower river dams.

¹ Other fish species that elliptio mussels successfully use in the Mid-Atlantic region include the brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), mottled sculpin (*C. bairdii*), and slimy sculpin (*C. cognatus*). They are most successful with the American eel, however.

The 1991 Conowingo east lift facility was designed to pass American shad and other river herring. Trapping and upstream transport by truck of adult fish continued until 1997 and stocking of hatchery raised American shad fry has occurred since 1976. Due to the transport and stocking program, the American shad population in the Susquehanna River improved slowly. By 2001, nearly 200,000 adult shad were counted at the Conowingo Dam fish lifts. Due to an agreement that resulted in fishways being installed at all four lower Susquehanna River dams, the shad trap and transport program was discontinued at Conowingo.

While American shad numbers returning to the Susquehanna River showed a modest increase until 2001, they have since declined. While a combination of factors is likely responsible, the inefficiency of the fishways at passing shad without delay is a key reason for the decline. We believe cessation of the program for trapping and transporting shad upstream of York Haven Dam also affected the decline. Consequently, few adult American shad were able to reach the important spawning and rearing habitat in the Susquehanna River. Restarting trap and transport operations, reducing fish passage delays, and improving fish passage efficiency will be paramount for migratory fish restoration in the Susquehanna River.

The day-to-day operation of the Conowingo Dam affects wildlife and habitat downstream. Rapid cycling of rising water during power generation, followed by falling water levels after generation, creates unnatural river conditions and degrades the aquatic habitat downstream. The flow in the river below Conowingo can change as much as 40,000 cubic feet per second per hour or close to 1 foot of river elevation per hour.

Currently at the Conowingo Dam, flow releases are lowest during the winter and spring months and highest in July and August. Daily maximum releases are equivalent to seasonal flood flows. There is no limit to the rate of rise or fall of water between minimum and maximum releases. These unnaturally rapid changes in water levels impact migratory fish by interrupting migratory cues, lengthening migration times, stranding fish, and reducing suitable habitat.

Due to sediment accumulation behind the dams the larger grained sediments do not suspend in the water column and are trapped behind the dam. Unlike the fine sediment, this larger material is critically important for creating high quality instream habitat for bottom dwelling organisms such as oysters, but due to the dam, this sediment is unable to make it downstream and replenish downstream habitats.

Current State of the Fisheries

Historic declines in abundance of American shad on the Atlantic Coast have been attributed to overfishing and degradation of riverine habitat quality. Dam construction and pollution have also been factors contributing to the decline and almost complete disappearance of shad in many watersheds. On the Susquehanna River, the American shad population upstream of the

Conowingo Dam is at historically low levels, and population estimates downstream below the dam have shown a decrease since 2001. Despite this decrease, population estimates suggest American shad are present downstream of the dam and more fish would be passing upstream, if more suitable conditions were available to the fish.

The spawning migration of coastal migratory fish in rivers is a time sensitive event. If fish migration is blocked or delayed, adverse biological impacts can result including re-absorption of eggs, spawning in unsuitable areas, depletion of energy reserves, and fish mortality. All of this results in poor recruitment of juvenile fish to the population, which in turn impacts the sustainability of the fishery. Ideally, fish should be able to pass the Conowingo Dam site within hours. However, recent studies found that 69 percent of shad attempting to pass were blocked at the Conowingo Dam and unable to reach their spawning grounds and the remaining 31 percent of shad took an average of 2 weeks to pass over the Conowingo Dam. While the American shad population below the Conowingo Dam is currently estimated at about 100,000 fish, only 12,733 American shad passed the Conowingo Dam in 2013.

After taking into account the dams upstream of the Conowingo Dam—Holtwood, Safe Harbor, and York Haven—only 2 percent of the American shad attempting to migrate up the Susquehanna actually made it to their spawning grounds. That translates into only 200 fish passing all the lower Susquehanna River dams in 2013. The fish passage goal for adult American shad passing into that spawning habitat is 2 million fish.

The Service has the opportunity to resolve fish passage issues at the end of every 30-50 year FERC license at hydroelectric facilities. Currently, both Conowingo Dam and the York Haven Dams are being relicensed with fish passage improvements. The next two upstream dams will be relicensed in 2030. Fish passage at all dams on the river is measured against the Susquehanna Rivers Fish Management Plan criteria. Currently, only Safe Harbor Dam is close to meeting the fish passage criteria. Conowingo dam is the first dam on the river and this is our opportunity to bring Conowingo's 1972 and 1991 fish lifts in to compliance. Safe, timely and effective fish passage at Conowingo is essential to the American shad restoration on the Susquehanna River.

Two migratory Susquehanna River fish have been considered for special protection. The Service received a petition in 2010 seeking Federal protection under the Endangered Species Act (ESA) for American eel. The Service is currently undertaking a status review for American eel which is scheduled to be completed in 2015. In addition, a determination was made in 2013 not to list river herring under the ESA, however the two species, alewife and blueback herring, are still considered "Species of Concern." Most coastal states, including Maryland, have a moratorium on commercial fishing for river herring and shad.

Recent studies have shown how improved fish passage technology, such as modern fish lifts and fishway entrance attraction systems, can reduce the impacts to migrating fish. Providing a downstream zone of passage by managing flows downstream of the Conowingo Dam will also benefit migrating fish, as well as native mussels and submerged aquatic vegetation.

A New Vision for Susquehanna Fisheries

Conowingo is currently undergoing Federal relicensing, which means we have a rare opportunity to modernize the fish passage provided at Conowingo and advance restoration of American shad and river herring in the Susquehanna River.

In 2010, the Susquehanna River Anadromous Fish Restoration Cooperative's Migratory *Fish Management and Restoration Plan for the Susquehanna River Basin* developed goals for coastal migratory fish restoration. The signatories to this plan included the Service, National Marine Fisheries Service, Susquehanna River Basin Commission, Pennsylvania Fish and Boat Commission, Maryland Department of Natural Resources, and New York State Department of Environmental Conservation. Based on the best available science, the partners agreed to:

- Restore access to historic habitats for juvenile and adult migratory fish.
- Maintain or improve existing migratory fish habitat.
- Enhance migratory fish spawning stocks and maximize juvenile recruitment.
- Evaluate the migratory fish restoration effort and adjust programs or projects as needed.
- Ensure cooperation among all restoration partners while generating support among the general public and potential funding sources.

The plan calls for successful passage of 2 million American shad and 5 million river herring upstream of York Haven Dam. Since American eel have been precluded from the Susquehanna River by the construction of the lower mainstem dams, guidance for their restoration was added via addendum in 2013. It supports a trap and transport program for juveniles so that eels that approach the Conowingo Dam are transported upstream by trucks above the four lower mainstem dams.

Fish passage technology has greatly improved in recent years. The fish passage facilities at the Conowingo Dam can be upgraded to provide multispecies passage. By building and maintaining fully functioning fish lifts on both sides of the river, our data indicate that we can pass the quantity of fish and achieve the fish passage efficiency needed to restore migratory fish populations to the Susquehanna River.

Along with improved fish passage, Conowingo's relicensing offers an opportunity for Exelon to partner with the National Park Service, numerous non-government organizations, and local and state governments to enhance public access for recreation and permanently protect Exelon-owned lands in the Lower Susquehanna River with high ecological, cultural, historic, and scenic values.

The Future

The Service works with license applicants, the Federal Energy Regulatory Commission, other agencies, and the interested public to ensure that hydropower projects operate in an environmentally sound manner and the Nation's natural resources are protected.

We recognize and understand that there is a balance to strike between energy production and fish passage and we are engaged in ongoing conversations with hydro-operators such as Exelon to find that balance.

The relicensing of the Conowingo Hydroelectric Project occurs only once every 30 to 50 years. This is as an opportunity to incorporate the best available science and engineering at the

Conowingo Dam to maintain the energy it provides to our citizens, provide fish passage, and maintain sustainable populations of key ecosystem, recreational, and commercial fisheries. We believe that all of these goals are not only possible, but also realistic.

Migratory fish are barometers of water quality, land, freshwater, ocean connectivity, and ecosystem health. We can ensure fish resiliency and health by maintaining clean, moving water that is free of excess nutrients, sediments, and toxic chemicals. This also promotes human resiliency and health. By reducing inputs from industry and agriculture, restoring streams, and planting streamside buffers, water quality in the Susquehanna River and the Chesapeake Bay improves not just for fish, but also for bay grasses, crabs, and oysters. Actions taken to restore fish populations in the Susquehanna River also provide economic, recreational, ecological and spiritual benefits for residents upstream and downstream. Some of these can also have the added benefit of better protecting communities from seasonal flooding. These actions are vital to sustaining a bountiful Susquehanna River and Chesapeake Bay whose clean waters sustain communities, livelihoods, and a unique way of life.

Collectively, we can affect the future of the Susquehanna River system. With an increasing human population comes economic growth and an increase in demand for energy sources, like hydropower. Generating energy does not have to come at the price of fish for future generations. Anglers could once again fish for shad, herring, and freshwater bass all along the banks of the Susquehanna. Bird watchers can continue to watch bald eagles and other birds dive for fish and other food. We believe energy generation and a robust fishery can be attained while preserving the ecological integrity of the Susquehanna River and the Chesapeake Bay and we are committed to working with our state, Federal, and private partners to see that this is realized.

Conclusion

The Service recognizes and supports that a balance is needed between hydropower, fish passage, and improving the health of the Susquehanna River system. This is a once-in-a-lifetime opportunity to improve fish populations in the Susquehanna River, its tributaries, and the Chesapeake Bay. Applying the best available science and updated engineering techniques at the Conowingo Dam will not only improve fishery populations now but help to ensure their sustainability for future generations.

Thank you for the opportunity to testify today on the importance of the dam and its impact on migratory fish. I am happy to answer any questions and look forward to working with the Subcommittee.