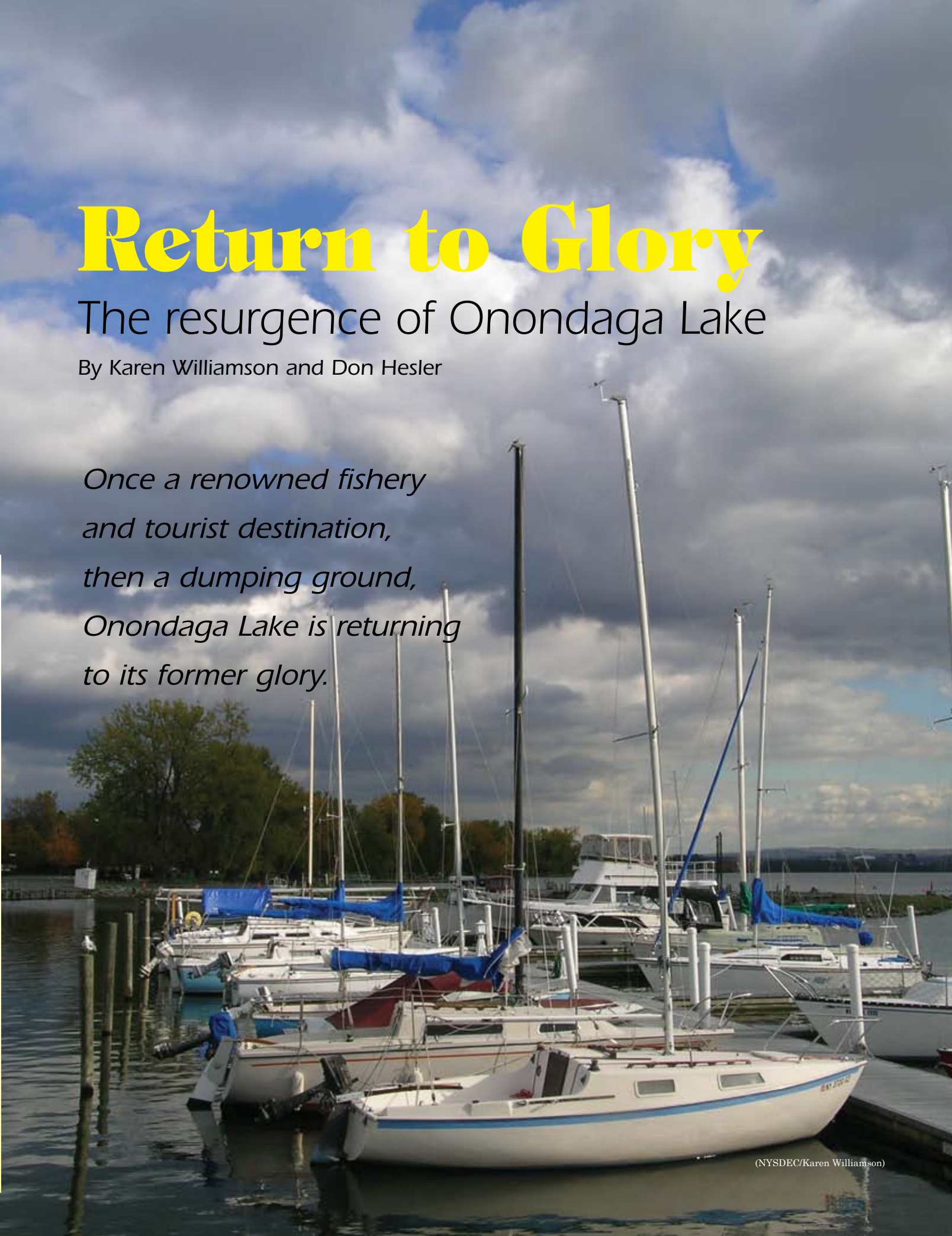
Return to Glory

The resurgence of Onondaga Lake

By Karen Williamson and Don Hesler

Once a renowned fishery and tourist destination, then a dumping ground, Onondaga Lake is returning to its former glory.



(NYSDEC/Karen Williamson)

The material on the shore of Onondaga Lake was white, chalky and artificial. Not much grew on it. It was October 1977, and I was an ecology student at Syracuse University on a field trip to one of the industrial waste beds along Onondaga Lake. I remember being surprised by the sheer magnitude of the pollution. Here was a beautiful lake, right on the edge of the City of Syracuse, that was too polluted for people to enjoy. How could this happen?

Some 28 years later, in October 2005, I was once again on the shores of Onondaga Lake, meeting Don Hesler to take photographs for this story. Remedial

Salty Start

The story of man's involvement with the lake begins with the Onondagas, one of the six nations of the Iroquois Confederacy of upstate New York. Onondaga tradition holds that the Confederacy was born on the shores of Onondaga Lake, and the Onondagas consider the lake a sacred site to this day.

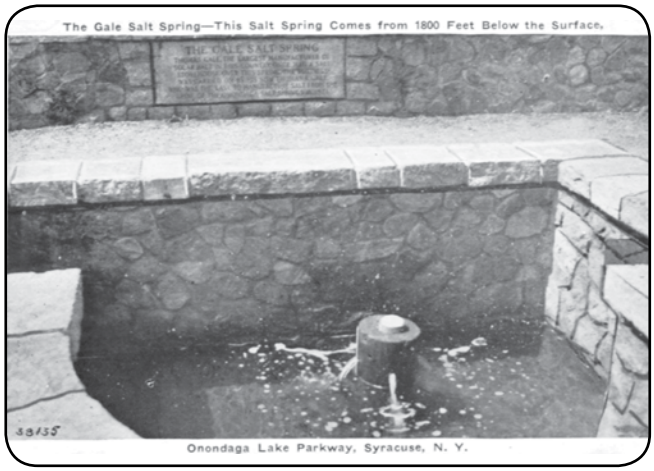
In 1654, the Onondagas revealed the location of natural salt brine springs to a French missionary, Father Simon LeMoyne. By the early 1700s, settlers were making and selling salt from the brine springs.

The fledgling salt industry received a boost from the construction of the Erie Canal in the early 1800s. Dubbed "the ditch that salt built," the canal opened the area to European settlement, and provided easy, inexpensive transportation to a nationwide market. To this day, Syracuse is known as the "Salt City."

Attracted by Onondaga Lake's clean, clear water and the beauty of its shores, entrepreneurs opened a number of lakeside resorts in the mid to late 1800s. People enjoyed swimming, water sports, boating, concerts and amusement park rides and games at various establishments.

Trouble in Paradise

At the turn of the century, near the height of the resorts' popularity, two activities began that would ultimately contribute to the resorts' demise. The first was municipal sewage discharges, and the second was industrial waste disposal.



Top: Salt brine springs, found on the lake's southeastern shore, were the basis for a salt industry in the early-to-mid 1800s. *Bottom:* Resorts like White City drew tourists to Onondaga Lake. By 1938 they were all out of business.

(Images from the Donald H. Thomson Collection, *The Golden Age of Onandaga Lake Resorts*, used by permission.)

work and investigation was in full swing. Construction of a new groundwater treatment plant was nearly complete. Contractors were sampling the lake bottom to prepare for the cleanup project.

Onondaga Lake has been called one of the most polluted lakes in the country, but it wasn't always this way. In the late 1800s the lake was known for exceptional fishing, boating, swimming and the grand resorts on its shores. This is the story of how Onondaga Lake went from public treasure to dumping ground in a scant 100 years, and how today it is showing signs of resurgence to its former glory.

Onondaga Lake Facts

- located in central New York, on the edge of the City of Syracuse
- about 1 mile wide and 4 ½ miles long
- drainage basin (watershed) is about 233 square miles
- average depth 36 feet; maximum depth 65 feet
- flows north to Lake Ontario via the Seneca River

American Aerial Scenes

In the late 1800s, the salt industry began to decline. New industries, drawn by a ready work force, inexpensive transportation, and available natural resources, replaced it. Some of these industries disposed of their wastes directly in or near Onondaga Lake.

One of these was the Solvay Process Company (a predecessor to Honeywell International, Inc.), which began producing soda ash on the west shore of Onondaga Lake in 1884. Soda ash was used in the manufacturing of detergents, chemicals and glass. The manufacturing process required large supplies of salt brine and limestone—both of which were readily available locally. It also generated large quantities of "Solvay waste," a white, chalky material composed of various compounds including calcium carbonate and calcium silicate. Solvay waste was discharged directly into Onondaga Lake and deposited in waste beds on and near its shores.

End of an Era

By the mid twentieth century, the continuing pollution—and the ever-growing lakeside waste beds—doomed the resorts. By 1938, Maurers' Long Branch Resort, the last of the grand resorts, had closed.

During this time, however, public access to the lake that we enjoy today was secured. In 1928, Joseph Griffin, secretary to the Onondaga Park and Regional Planning Board, developed a plan for a park to surround the lake. His dream was partly realized in 1931 with the construction of Onondaga Lake Park on the eastern shore.

Wake-Up Call

Across the lake, industrial waste disposal continued. In the early morning of Thanksgiving Day 1943, a dike, holding back a series of Solvay waste beds, failed. A two-mile area of the State Fairgrounds and State Fair Boulevard was inundated by flowing waste, rousting people from their homes and carrying away parked cars. Rescuers worked through the day to save people and animals, and luckily no one was killed. However, at least twenty rescuers required treatment for chemical burns sustained during their efforts. The magnitude of the spill awakened the public to what was happening to Onondaga Lake.

A dike failure at the Solvay waste beds flooded a two-mile area in 1943.

(From the Margaret Valenno Collection, *The Golden Age of Onandaga Lake Resorts*, by Donald H Thomson,used by permission.)

Most Polluted Lake in America

Early in the twentieth century, Allied Chemical and Dye Corp. (which incorporated various companies including the Solvay Process Company) began producing chlorine and caustic potash, as well as various organic chemicals including benzene and toluene. By 1946, mercury was being used in the manufacture of some of these products. As a result, mercury was released into the lake, its tributaries and the soil. At one point, an estimated 22 pounds of mercury were entering Onondaga Lake every day.

By the 1950s, Onondaga Lake was a mess. Besides mercury and Solvay waste, other substances such as benzene, toluene, PCBs, cadmium and chromium had contaminated the lake's bottom sediments and its tributaries, former manufacturing sites and the Solvay waste beds. The waste beds themselves had grown to 80 feet in height and covered more than three square miles of land.

The lake's water had become cloudy, and was contaminated by bacteria from sewage discharges and sewer overflows. The cloudiness was caused by sediment carried to the lake from its watershed and by algae blooms fed by high levels of phosphorus in the water.

Sewage sludge was also dumped in the lake. Sometimes rafts of sludge would rise to the surface, where the sludge combined with algae to form floating mats of decaying material. As the sludge and algae decomposed, sulfide and methane gases drifted over lakeside communities. Onondaga Lake had become one of the most polluted lakes in America.

The Road Back

The Federal Clean Water Act of 1972 marked a turning point for Onondaga Lake. Among other things, the law established minimum wastewater treatment requirements. Amendments to the act provided grants to help fund municipal sewage treatment plant construction and upgrades. In New York, DEC became responsible for carrying out and enforcing the Clean Water Act under the oversight of the U.S. Environmental Protection Agency (EPA).

In 1979, a new metropolitan sewage treatment plant—known as "Metro"—was built on the south shore of Onondaga Lake. Metro's effluent quickly became a major source of water flowing into the lake, as much as 60 percent of total inflow in summer months. The lake's water quality improved through the 1980s, but still did not meet federal water quality standards by the 1990s, when Metro contributed over half the phosphorus and 90 percent of the ammonia entering Onondaga Lake.

Photos courtesy of Onondaga County

In 1998, as a result of earlier court action, an historic agreement was brokered by Governor Pataki and signed by Onondaga County, DEC, the State Attorney General's office and the Atlantic States Legal Foundation. The agreement required the county to reduce ammonia and phosphorus discharges from Metro on a predetermined schedule. The county was also required to reduce bacteria and floating waste reaching the lake from sewer overflows, and to monitor water quality of the lake and its major tributaries.

Progress at Metro has been swift. Ammonia reduction goals were met in 2004, eight years ahead of schedule. Phosphorus discharges have already been reduced by 80 percent—and further reductions are expected as the new treatment system comes fully online. Metro is now one of the most advanced wastewater treatment plants in the country. When all systems are fully operational, it will be one of the most advanced in the world.

The county has begun projects that will ultimately reduce sewer overflows by 90 percent. Until work is completed, however, skimmers are being used in some creeks to catch floating waste. By the time all work is complete in 2012, sewer overflows will no longer contribute bacteria and floating waste to the lake when it rains.

Improvements at Onandaga County's Metro Sewage Treatment Plant are resulting in water quality improvement in Onondaga Lake.

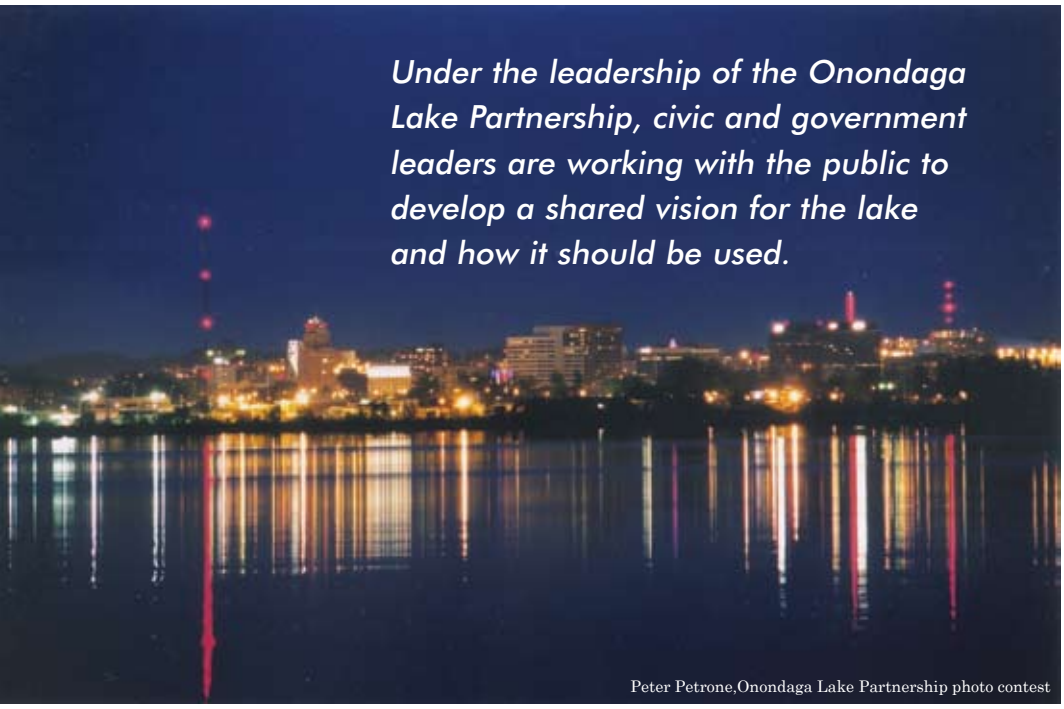
Onondaga Lake is already showing signs of recovery. Water quality standards for ammonia have been reached, and the ecological balance of plant and animal microorganisms in the water has improved. Less floating waste is reaching the lake, and bacteria counts are falling.

As Metro upgrades are brought online, phosphorus levels in the lake are falling, but still do not meet standards. The problem is that

The Onondaga Lake Partnership consists of federal, state, local government and other public and private interests that work together to improve Onondaga Lake and its watershed. Members include the U. S. Army Corps of Engineers, the U.S. EPA, New York State, Onondaga County and the City of Syracuse.

ONONDAGA LAKE PARTNERSHIP

A clean lake reflects well on all of us.



Under the leadership of the Onondaga Lake Partnership, civic and government leaders are working with the public to develop a shared vision for the lake and how it should be used.

Peter Petrone,Onondaga Lake Partnership photo contest

more than half the phosphorus that enters the lake comes from runoff. The Onondaga Lake Partnership and other community programs are working to prevent these land-based sources of phosphorus, such as runoff from lawns, farm fields and stormwater, from entering the lake.

The Road Back: Industrial Wastes

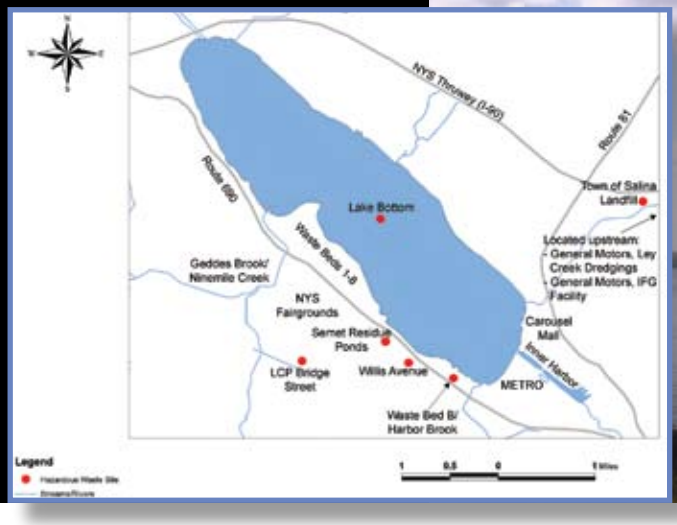
At the same time that government agencies were addressing metropolitan sewage discharges and runoff, industrial waste discharges were addressed on a parallel track.

Allied Corporation's discharges to the lake continued until 1986, when a combination of economic and environmental factors led the company to end production of soda ash, and thus Solvay waste. In 1988, chlorine production was terminated, as well as the use of mercury in manufacturing operations.

In 1989, New York State took legal action against Allied, seeking cleanup and damages for the pollution of Onondaga Lake, its tributaries and related manufacturing sites. That same year, Onondaga Lake was added to the State Registry of Inactive Hazardous Waste Sites as a Class 2 site, meaning that contamination at the site posed a significant threat to human health or the environment. In 1994, Onondaga Lake and nearby contaminated areas were added to EPA's "Superfund" list of hazardous waste sites most in need of cleanup.

Before cleanup could begin, however, investigation was needed to determine exactly what pollutants were in and near the lake and how they moved and acted within the lake's ecosystem. Between 1992 and 2002, engineers and biologists analyzed more than 6,000 samples of sediment, water, groundwater and fish.

Although much cleaner, pollution continues to enter the lake through other sources such as old manufacturing and waste disposal sites.



HISTORIC FISHERY

Cisco (*Coregonus artedi*)

Onondaga Lake has a rich history as a productive fishing lake. According to historical accounts, the lake's waters were originally clear and cold and supported an abundant fish population, including cisco (commonly known as lake herring) and Atlantic salmon. In the mid to late 1800s, the cisco was considered a delicacy and a fisherman's prize, and was billed as the "Onondaga Lake whitefish" in restaurants around the state.

By the 1880s, increasing pollution and overfishing began to take their toll. In 1885, the United States Fishing Commission reported that (commercial) "fishing in Onondaga Lake dropped from 20,000 pounds to 1,000 pounds in just one year. In 1898, the tasty Onondaga Lake whitefish...disappeared entirely."

Industrial discharges of mercury to Onondaga Lake had begun by 1946. Mercury was absorbed into the food chain, and eventually became concentrated in fish at levels unsafe for human consumption. Fishing in Onondaga Lake was banned completely in 1970.

Municipal sewage discharges also affected Onondaga Lake fish. Sewage discharges contained high levels of phosphorus, which served as a fertilizer for algae blooms. As algae and other organic solids decomposed in summer, so much oxygen was consumed that deeper lake water became anoxic and fish could not survive. The sewage discharges also contained high levels of ammonia, which is toxic to fish. Only species that could tolerate polluted waters survived. By 1974, DEC fisheries records showed that just 12 fish species were found in the lake.

Since the 1980s, water quality in Onondaga Lake has slowly improved, and fish are returning. Today, 56 species of fish are found in the lake—almost five times as many species found in the 1970s. Mercury levels in fish are slowly declining. In 1986, the fishing ban was eliminated, but a health advisory against eating any Onondaga Lake fish remained. In 2000, the health advisory on eating Onondaga Lake fish was relaxed further to "eat no more than one meal per month," with the exception of walleye which remains "eat none." Women of childbearing age, infants and children under the age of 15 are still advised to eat no fish from the lake.

Today, trophy-size walleye and bass are caught in Onondaga Lake, and fishing derbies are popular. Mercury levels in fish are expected to continue falling as cleanup progresses. DEC staff hope that eventually only the general statewide health advisory on eating fish (no more than one meal per week) will apply to the lake. Onondaga Lake is once again on track to become a fisherman's paradise.

In 1999, Allied merged with Honeywell International, which became liable for the pollution Allied and its predecessor companies had caused. In 2004, Honeywell completed a study which evaluated alternatives for cleaning up the lake. Based on a combination of alternatives from this study, DEC issued its proposed cleanup plan for Onondaga Lake in November of 2004. After an extensive public outreach program, DEC and EPA issued a final cleanup plan for the lake in July of 2005. Under the cleanup plan, approximately 2.65 million cubic yards—twice the volume of the Empire State Building—of

contaminated material will be dredged from the lake bottom and safely disposed in sediment consolidation areas on the Solvay waste beds. The most highly contaminated materials will be treated off-site.

Furthermore, 579 acres of lake bottom will be "capped" by sand. In many areas of the lake, fish habitat will be re-established under DEC oversight.

Pollution continues to enter the lake from tributary sediments, runoff from old manufacturing and waste disposal sites, and groundwater that flows through contaminated soil on its way to the lake (see diagram pg. 12). However, work has already begun to "shut off" these sources of pollution to the lake, so it will not become polluted again. Cleanup is nearly complete at a former Honeywell plant that was one of the largest sources of mercury entering Onondaga Lake. A barrier wall will be installed below ground level along the lake's west shore to keep contaminated groundwater out of the lake. A treatment plant was recently completed to remove contaminants from groundwater collected behind this wall. DEC continues to work with various parties, including Honeywell, to determine the best ways to clean up these sites and others, and keep the contaminants they contain out of Onondaga Lake.

Bright Future

While the cleanup progresses, both public and private interests are looking toward the future of a clean Onondaga Lake. Under the leadership of the Onondaga Lake Partnership, civic and government leaders are working with the public to develop a shared vision for the lake and how it should be used. Most of the lake's shoreline is publicly owned, and plans call for expanding existing recreational uses such as hiking, biking, fishing and boating. The City of Syracuse and the New York State Canal Authority are revitalizing the Onondaga Creek Inner Harbor, which leads to the lake. To date, an amphitheater and boat docking facilities are complete.

Take a moment and imagine the future...cyclists circle Onondaga Lake's clear blue waters on a warm summer day, while picnickers enjoy the scenery. Fisherman pull trophy fish from its waters, as swimmers enjoy nearby beaches. Syracuse's Inner Harbor attracts tourists and locals alike.

Once again, Onondaga Lake is a jewel of central New York.

Syracuse University graduate **Karen Williamson** is a writer and photographer for DEC's Division of Water. Geologist **Don Hesler** oversees several staff in DEC's Division of Environmental Remediation dedicated to the cleanup of Onondaga Lake.

For further reading, see *The Golden Age of Onondaga Lake Resorts* by Donald H. Thomson, and DEC's web site at www.dec.state.ny.us
You can also monitor water quality in the lake in real time at www.ourlake.org

Paul Garvey, inset: Tess Freedman

top: Tess Fredman; bottom: Paul Garvey, Onondaga Lake Partnership photo contest