

# AMERICAN CANALS

BULLETIN OF  
THE AMERICAN CANAL SOCIETY

Vol. XXX, No. 4

Dedicated to Historic Canal Research, Preservation, and Parks

Autumn 2001

## PRESIDENT'S LETTER

Greetings! I'm writing this while it is still the month of September and the terrorists' attacks on our country are still fresh in our minds. Nearly two months will have passed before you read this, but I believe I would be remiss if I did not extend my sincere sympathy to any ACS members throughout the world who may have been intimately affected by the attacks and subsequent events.

It is too early now to tell if the results of the attacks will impact the turnout at the combined PCS/ACS event that will have been held by the time this reaches you, or if the changed priorities of government expenditures will affect any canal restoration or preservation projects. We should all keep the priorities of our nation foremost in our minds and get back to our canal hobbies when we can.

I was fortunate enough to hear David McCullough, Pulitzer Prize-winning narrative historian, speak at our local college this past week. I was quite impressed with his object lesson that throughout the history of our nation, including now, Americans have, and will, overcome all adversities.

I'd like to again remind all ACS members that our website is a source of information for all ACS members and non-members alike. Mark Newell is doing a fine job, but he can't list society and canal-related information that he doesn't know about. Please contact Mark with anything you'd like to see on our site, and offer your help to him if you've a bit of time. I'd personally appreciate it.

One of my goals for my recent retirement was to go back to college and see if I couldn't place my love of history in general, and canal history in particular, on a more formal academic foundation. As a "dumb engineer," I took only one history course during all my many years of formal schooling, and that was a "present U.S. History" course. Of course, as my kids and grand kids love to tell me, there wasn't that much "present history" then to learn about. I had originally thought I would try to get a master's degree in canal history/engineering, or something

## THE LOUISVILLE AND PORTLAND CANAL



The three 1830 locks, photographed during construction of the 1871-73 enlargement. Photo by Edward Klauber, published by permission of The Filson Club, Louisville, Kentucky.

From the *Pittsburgh Gazette*, 8 February 1833. "The Cincinnati Daily Advertiser says that some villain or villains, on Wednesday night last week, put a cask of powder to each of the three locks of the Louisville and Portland Canal, one of which only took fire and blew up the lock to which it was attached, throwing down a hundred tons or more of stonework, which has probably put an end to the use of the canal for some months to come. A reward of \$1,000 is offered for the detection of the perpetrator of this high handed villainy."

**Contributed by William Dzombak**

similar, but found the local colleges are pretty stereotyped as to what is to be offered in a specific curriculum. So, I am taking advantage of the Senior Guest program whereby a senior citizen (old fellow like me) can take any open undergraduate course for free, and am attempting to design my own historical technology curriculum. I am enrolled now in U.S. History—the Formative Years, and Introduction to Archeology, at the Stark County, Ohio campus of Kent State University. I find the going interesting and my fellow students (many 45 years my junior) ex-

tremely bright. I find myself studying harder than I ever did in my student days, just to keep even with the younger students.

All-in-all, I'm finding my re-education to be stimulating, interesting, and a lot of damn hard work. I'd be interested in learning if any of you people are familiar with courses being offered at academic institutions that might be termed technical history. I'd also like to talk with educators around the nation to see if it might be feasible, and extremely useful, to add

(continued on page 2)

# American Canals

BULLETIN OF THE AMERICAN CANAL SOCIETY

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The objectives of the American Canal Society are to encourage the preservation, restoration, interpretation, and use of the historical navigational canals of the Americas; to save threatened canals; and to provide an exchange of canal information. Manuscripts and other correspondence consistent with these objectives are welcome.

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## President's Letter (con't.)

more technology history to some of our curriculums. I'm looking forward to hearing from many of you people out there concerning this subject.

This is the last issue of *American Canals* for the year 2001. I'd like to take this opportunity to ask for input to our society's efforts in any area where you think we might be able to improve for the year 2002. It's also like to hear from our committee chairmen and committee members about what they might like to accomplish for the year 2002. We specifically need volunteers to help out with such established committees as our Parks Committee, Canal Boat Committee, Publications Committee, etc. We'd also like to hear from you concerning your ideas for new committees and efforts you believe the American Canal Society should be sponsoring. Get in touch with me, please, and see what we can do to make the year 2002 a banner one for the American Canal Society.

Well, I guess that is about all for this issue. I'd like to hear from you all. I can be contacted via our website at [www.americancanalsociety.org](http://www.americancanalsociety.org) or by e-mail at [woodscanalone@aol.com](mailto:woodscanalone@aol.com).

Till next time, HEADWAY TO YA!



## CANAL CALENDAR

**November 13, 2001.** 7:00 p.m. Annual meeting and covered dish supper, Jerico Valley Community Center, New Hope, PA. Friends of the Delaware Canal. Call 215-862-2021 or visit [fodc@erols.com](mailto:fodc@erols.com)

**November 17, 2001.** 12:30 p.m. Canoe the Canal. Old Santee Canal. Moncks Corner, South Carolina. Call 843-899-5200.

**November 17, 2001; January 27, 2002.** Continuing Hike Series. Various sites. C&O Canal Association. Call Pat White at 301-977-5628.

**December 1, 2001.** 10:30 a.m. Annual Frostbite Hike. C&O Canal Association. Meet at Great Falls, VA, Visitors' Center. Call Ken Rollins at 804-448-2934.

**December 31, 2001.** 2:00 p.m. Seneca Aqueduct. New Year's Eve Hike. C&O Canal Association. Call Pat White at 301-977-5628.

**January 9; February 13; March 13; April 10, 2002.** Lecture series sponsored by the Susquehanna Museum of Havre de Grace, Inc. in Maryland. All events take place at 7:00 p.m. at the Havre de Grace Middle School Media Center. Check <http://users.erols.com/susqmuseum/Index.html>, or call 410-939-5780.

**May 4-5, 2002.** Reenactment of the attack on Havre de Grace during the War of 1812. Lock house grounds of the Susquehanna Museum of Havre de Grace. See above for contact information.

**NOTE:** The calendar is short this time because I have not received organizational calendars for next year.

**DEADLINE:** Material for our next issue must be on Associate Editor Linda Barth's desk no later than January 1, 2002.

**Material submitted to AMERICAN  
CANALS for publication should  
be double-spaced and on one  
side of the paper only.**

## MARTIAN CANALS ON VIEW

A science site on the internet, [www.badastronomy.com](http://www.badastronomy.com), reports that a TV shopping channel (QVC) advertised a special remote-controlled telescope focuser useful for looking at "craters on the moon . . . the rings of Saturn, the spot on Jupiter, or the canals on Mars."

Wow! That is really something! Thanks to modern technology, you can see something that isn't there! Or could the advertiser have been a little mixed up? Has anyone tried this amazing focuser?

- Bill Trout

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# WORLD CANALS CONFERENCE AND TOUR OF IRELAND BY CANAL BOAT

by Nancy R. Dunnivant



A Royal Canal lock under a stone bridge in Dublin.

Having planned to attend the World Canals Conference (WCC) in Ireland, we also had the opportunity to join the Canal Society of New Jersey for a trip around the countryside by canal boat. Bill McKelvey, tour coordinator, planned a very interesting trip for all of us. The group included members of the Ohio Canal Society, New York Canal Society, Virginia Canals and Navigations Society, and of course a majority from New Jersey.

Upon arrival we boarded a tour bus and did some sight-seeing in Dublin. Many of us also hired an amphibian vehicle that was called the Viking Splaush. We rode on it to the canal basin where, after a few adjustments, our bus became a boat. After entering the basin we toured the area and the Liffey River for a short distance. It was great fun when everyone donned Viking helmets and shouted the Viking battle cry.

Dublin has many interesting sculptures depicting important people and events from the past. They have been placed in the small parks around the city. One entire building is ornamented with busts of famous natives of Ireland.

St. Patrick's Cathedral was beautiful to behold. Unfortunately the church is no longer able to maintain it, but contributions from private sources and from tourists have helped with the upkeep.

The gardens are lovely with a backdrop of memorial plaques along a wall honoring great artists and humanitarians. A special marker has been placed at St. Patrick's Stone in the courtyard.

The next day we boarded our tour bus and headed for Killucan Harbor to pick up our rented canal boats. After proper instruction from Leisureways Holidays, we began our journey east to Dublin, stopping along the way at Longwood Rd.



Bill Trout piloting a canal boat through the narrow "high cut" on the Royal Canal. The banks are 10 feet high.

Aqueduct. The next day we boated to Maynooth Harbor. On May 14th we traversed 16 miles, leaving the Royal Canal at the tide lock, crossing the Liffey River, and entering the Grand Canal Basin. Going through the last locks to join the boat rally was a nighttime adventure, but Captain Bill Trout got us through safely. The amenities group helped us along the way. We were anchored on the Grand Canal in Dublin along Mespil Rd. We tied up with our other boats and remained there while attending the WCC.

The meetings were held in Dublin Castle. We were welcomed at a reception held in the Town Hall of Dublin by the Lord Mayor and other dignitaries. The banquet was held in the staterooms of St. Patrick's Hall. The speakers addressed the theme of the conference, "Living History". The Royal Canal and many other canals of Ireland have just recently opened to boaters. On the Royal Canal, you can travel west from the sea lock in Dublin for almost 100 miles.

Other canals of the world display the same interest—to portray the canal-side historical structures in a manner that will convey the impression of "Living History". Many questions were brought up; some about the role that modern technology can play and how it can be used to enhance displays. What part should riparian landowners play in the devel-

opment of areas along the canal? Also discussed was to what extent restoration should be used as it applies to "Living Heritage".

One of the more interesting presentations was on the Cayuga Lake Steamers, Ithaca, NY, by Tom Grasso, president of the Canal Society of New York State. Unskilled labor was used to build the bullhead boats, square-ended deck scows used as bulk carriers. There are 28 known sites of sunken boats. They soon began using steel hulls that last longer. In 1843 packet boats that carried passengers and freight were put into use. By 1880 they had to contend with traffic jams on the Erie Canal. Steam tugs and diesel tugs were frequent haulers on the Erie. Hoodledashers, tugs, and freighters were 150-250 feet long. There was a problem with explosives and fires. Now there are luxury cruise boats that ply the same route for the carefree pleasure of a waterway vacation.

During the WCC we were served delicious meals in an historic setting. We ate in Dublin Castle, the staterooms of Dublin City Hall, Lagan Side waterside in Belfast, Waterfront Hall, and Lisburn Civic Center on the Lagan River.

A chartered train took us to Belfast and Northern Ireland. We were amazed at the wonderful restoration that is going on there: the waterfront center, and the beautiful park that was developed

at the site of the old gas works. The meeting place was equipped with the latest technology. The people of Ireland, whether Northern or the Irish Republic, were hospitable and kind to all of us. Traveling by bus, we arrived at Lisburn in time to take rides on the local amenity group's private boats. We all took time out to shop for linens, of course you know that Lisburn is the linen center of the world. After our day in Belfast and Lisburn, we returned to Dublin to our boats. The following evening we were invited aboard boats of members of the Dublin Boat Rally that were docked with us on the Grand Canal at Mespil Road. Dinner under the tent nearby was our closing reception for the WCC.

We left the next day retracing our canal voyage. We passed through the Grand Canal Basin, in Dublin, entered the Grand Canal tidal locks, went east onto the Liffey River, crossed over and entered the Sea Lock. We were back on the Royal Canal and traveling northwest and later west. Two nights later we reached Maynooth Harbor and tied up for the night.

At Maynooth we toured St. Patrick's College and St. Mary's Chapel—the most magnificent chapel I have ever seen. It has inspiring stained glass windows and beautiful carving on the pews and walls. The rose window depicts Christ the King surrounded by the Blessed Virgin Mary, the evangelists, the



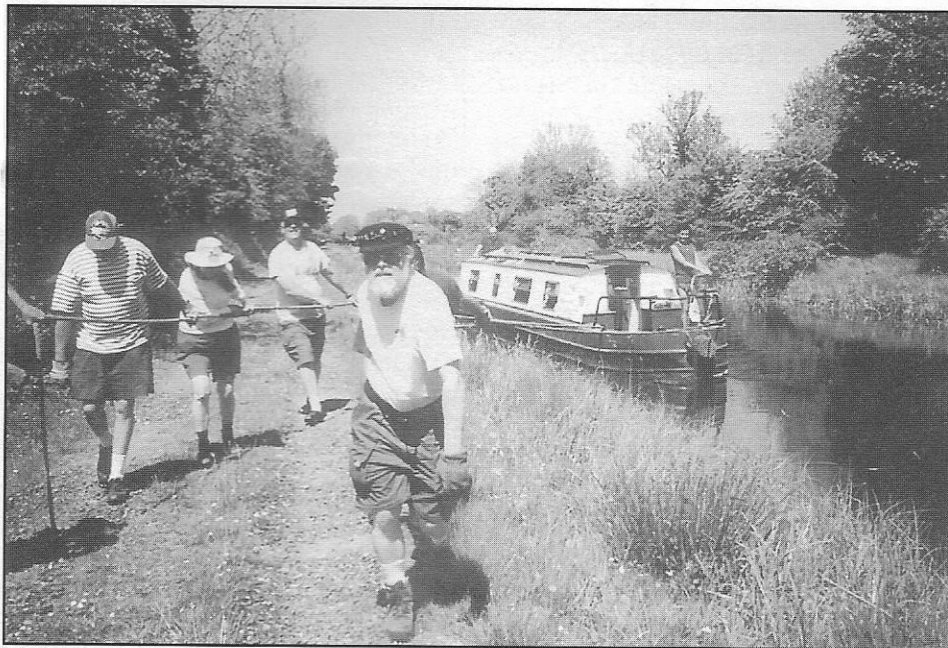
Nancy Dunnavant presents an A.C.S. burgee to Derek Whelan of the Inland Waterways Association of Ireland.

apostles, and the prophets. The chapel was begun in 1795 and completed in 1890.

Wherever we boated on the canal the citizens greeted us warmly and helped with the lock gates. They were very excited to see boats again on the Royal Canal. Moving along the canal we reached Killucan Harbor, where we were able to replenish our water, petrol, and cooking gas. When we reached Mullingar, we tied up and decided to stay there for two nights. It is a train stop and some members decided to take the train to the Shannon River, others rode the train to Dublin because it runs along the canal and they could get a better view of the canal. That evening we met some members of the Royal Canal Amenity Group (RCAG), a volunteer group. They had been removing trash from the canal in the form of grocery carts. They invited our group to join them the next evening. To our surprise, they came for us in cars and took us out to the countryside. We were shown a bog where peat is harvested. It is cut by machine and formed into sections, the sections are auctioned off and the owners cut the sections into bricks. This is their energy source for heating their homes and for firing the generators that produce electricity. It is a natural resource like coal in the states. We were also taken to see a farm where there still remain forts from



Members of the Royal Canal Amenity Group with shopping carts and other rubbish they have fished from the canal.



A.C.S. director Bob Barth leads the team of draft animals towing a disabled boat to Coolnahay Harbor.

the early Irish settlements. They were built to protect them from their enemies. The castle was in the center and small mounds built around the castle housed the workers, with tunnels that joined the hovels. The livestock were kept between the castle and the hovels. If an attack from the Normans was imminent, people ran through the tunnels to warn everyone and give them time to escape.

We left Mullingar to head down the canal. We had one boat that had already

gone ahead hoping to have time to get closer to the Shannon River. We rode a short distance and tied up at Coolnahay Harbor. We decided to walk along the path and get a closer look at the canal structures. Soon we saw our missing boat being hauled by its crew. The motor was no longer functioning. Everyone grabbed the rope and pulled hard to help tow the boat. Now we know how hard the horses had to work. We took a while figuring out how to pull it, one rope or two? We were able to get it through several locks and tie it up at Coolnahay Harbor. There it could be tied up to one of the boats and towed back to Mullingar. The next day we all headed for Killucan to turn our boats in and to enjoy a wonderful smorgasbord feast on the lawn. The next morning we boarded a bus that took us back to Dublin.

We were too early to get our rooms and had a wonderful time on the electric train. We purchased "on and off" tickets and hopped on the train for a trip to Howth. We wanted to visit the transportation museum and stroll around the waterfront. The end of the carline was the access to Dublin Bay. Many families were spending the day at the beach. Riding back to Dublin we continued on by the Irish Sea to Bray where the ferry comes across from England. It was a lovely ride by the sea which I will always remember. We returned to Dublin and gathered our belonging, anticipating an

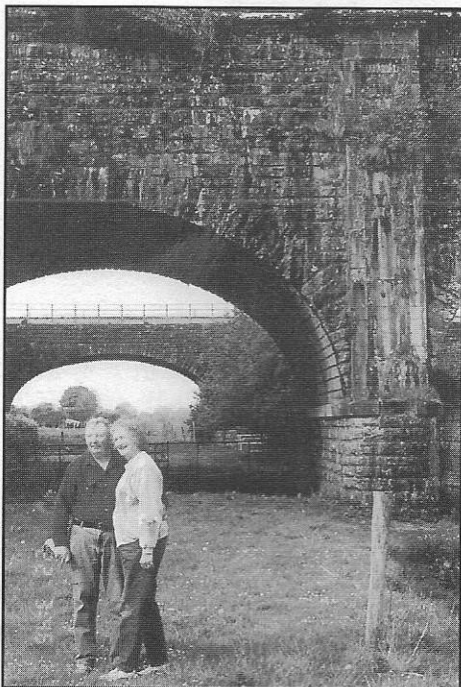
early breakfast and trip to the airport for our return to the states.

Ireland was beautiful and interesting as we toured by bus, train, and canal boat. Also it was great fun, and everyone agreed that Ireland is truly the Emerald Isle. Although some historic structures have disappeared, many are still in use. The office of Waterways Ireland, a public amenity group, has done a great job maintaining and preserving aqueducts, stone bridges, and culverts, building new gates and restoring the locks, opening up the dry dock at Mullingar and the feeder canal from Lough Owel, replacing bollards, and making a well-landscaped harbor. At Killucan they also built new lock gates.

Thanks to all the boaters amenity groups for their hospitality, and to Des Leyden, president of Inland Waterways International, and Bridgid Johnston, with Waterways Ireland, for planning a wonderful World Canals Conference.

A special thanks to Derek Whelan, Chairman of the Inland Waterways Association of Ireland, Dublin Branch. Derek and Una Whelan are also directors of Leisureways Holidays. If you would like to hire some of their barges you may contact them by e-mail [info@leisureways.com](mailto:info@leisureways.com); web page [www.leisureways.com](http://www.leisureways.com). The Whelans were most kind and helpful during our holiday in Ireland.

For on-line maps of the canals see the Inland Waterways Association of Ireland web site: <http://www.iwai.ie/>



The Schafers pose for an anniversary photo under the Boyne Aqueduct.

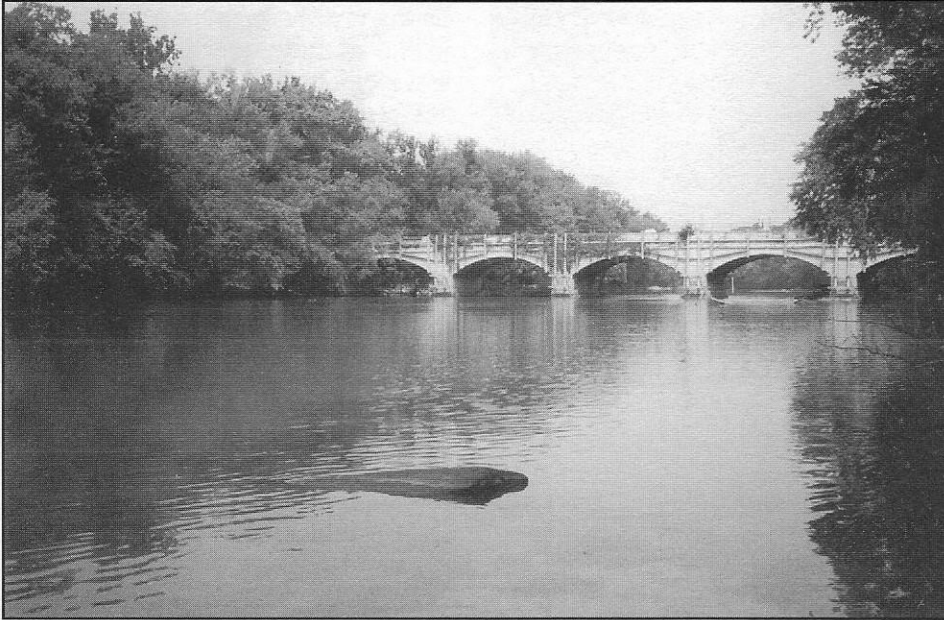
### CROSSING SWEDEN BY CANAL

"330 miles of idyllic Scandinavian countryside" is just one of the attractions of the Göta Canal, according to Robin Lloyd, who recently used it to get from Göteborg on the North Sea to Stockholm on the Baltic. His experience, along with a good deal of information about the canal, is described in an illustrated article in the April 2000 issue of the magazine *Cruising World*.

Interested readers should be able to find the report at, or with the aid of, their local libraries. We are indebted to A.C.S. V.P. Bill Gerber for bringing this to our attention.

## SAVING THE MONOCACY RIVER AQUEDUCT

By Bruce J. Russell, Contributing Editor



The Monocacy River and its aqueduct, looking north from the Potomac River.

America's towpath canal era was a brief one, lasting from the late 1820s until the early years of the 20th century, when most remaining waterways were either completely abandoned or closed to commercial navigation. Following the Revolutionary War, the new nation's leaders including George Washington looked upon man-made channels as the most efficient means of providing low-cost transportation for people and goods. Use of existing rivers was fraught with problems including swift currents, hidden rocks, and periods of low water. Although rafts were constructed for the purpose of conveying commodities such as lumber and coal down the Hudson, Delaware, Susquehanna, Potomac, James, and other rivers, these were only capable of moving in one direction. Hauling them against the current back to their original points of origin was too difficult and labor intensive. Hence they were broken apart and their wood sold once their cargos had been unloaded. The raftsmen then had to make their way overland back to the places where coal and lumber were obtained. New rafts were then fashioned from crudely cut timbers, and the entire process repeated.

By the 1790s, many American leaders had gone to Europe and observed its network of artificial canals, especially in England and France. For much of their

distance, these ran parallel to existing rivers and streams. Unlike the latter, their depth remained constant at between 5 and 7 feet. Likewise they had a current which traveled at a minuscule rate of speed. Thus barges loaded with various commodities, and clearing the bottom by just a few inches, could proceed without worry about hidden rocks or raging whirlpools. Furthermore, a team of horses or mules had scant difficulty moving a heavily-laden vessel, since water offered very little friction. In spite of the fact that wooden vessels traveled at the rate of 3 to 5 m.p.h., they always kept moving, and there was complete assurance that they would arrive at their destination. The aforementioned rafts, on the other hand, sometimes struck submerged stones or tree trunks which caused them to overturn, resulting in total loss of the cargo as well as, in some cases, the raftsmen.

In Maryland, the Potomac River had been used for rafting since the mid-1700s. At that time the frontier began at Cumberland, situated about 185 miles from what is now Washington, D.C. West of Cumberland was still virgin territory, inhabited by often-hostile Native Americans. A series of forts was erected by the British to provide protection for the farmers occupying the land east of Cumberland. After the War of Independence was won, Americans

almost immediately began migrating west of Cumberland, their eventual destination being the Ohio River Valley, where unlimited farmland was situated. Cumberland became a gateway point to the new territories, and the small settlement grew rapidly. In addition to being a place for the building of rafts to be floated down the Potomac River, loaded with fresh-cut lumber, it also was close to areas where a new fuel known as coal had been discovered. By 1800 it was obvious that coal was more efficient than wood, and it began to be loaded onto rafts for transport to the young nation's new capital, named after its first president. Unfortunately, while many coal-laden rafts did make it into Washington, some didn't. Upon overturning, they unloaded their cargoes of coal into the Potomac.

Another problem facing the rafts was the Great Falls of the Potomac River, situated approximately 14 miles west of Washington. Many were unloaded slightly west of the cascade and their lumber or coal transported via wagons for the final few miles. Smaller rafts made use of a bypass canal which skirted the falls on the Virginia side. In some cases, the rafts were dismantled and then reassembled on the eastern end of the Great Falls to complete their journey to the Georgetown section of Washington. Regardless of which means was used as a bypass, it was labor intensive and impractical.

By the early 1820s, it was determined that a navigable canal independent of the Potomac River was needed to furnish inexpensive, dependable water transportation between the nation's capital and the Ohio Valley. New York State had embarked upon the construction of the Erie Canal, and elsewhere in the country artificial waterways were being mapped out. In 1828 the Chesapeake and Ohio Canal Company was chartered by the states of Maryland, Virginia, and Pennsylvania. Work commenced the same year under the direction of chief engineer Benjamin Wright, who had previously worked on New York State's Erie Canal. Wright knew his business, and within about a year excavation was taking place at several locations west of Washington. The labor force was composed of local farmers seeking additional income, and immigrants recruited mainly from Ireland. Friction between these two groups of

ten caused work stoppages, and sometimes deaths resulted from the brawling. Liquor frequently played a role in the violence.

The Chesapeake and Ohio Canal was originally supposed to furnish a water route from Chesapeake Bay to the Ohio River, a distance of several hundred miles. However it only got as far west as Cumberland, Maryland where it stopped. Instead of taking the predicted 7 or 8 years to complete, the work dragged on for 22. Sections of the canal were opened as they were done. Harpers Ferry was reached in 1834, Hancock in 1839, and Cumberland in 1850. By this time, the Baltimore & Ohio Railroad was finished, and its route paralleled the canal for its entire distance. From 1830 onward the railroad and the canal company waged legal battles for rights of way, with the latter usually winning. Hence it was the railroad which was obliged to cut into the side of the mountains to create an alignment. Nevertheless, after the C&O Canal got to Cumberland, it never went further west. In addition, a projected branch which would have diverged from the main channel at Point of Rocks, Maryland and terminated in Baltimore, was never built. By 1850 the railroad era had begun, and both private and government support for canals had evaporated. What had been built would be permitted to continue, partly as a means of recouping investment monies and also to provide jobs for boatmen and boat builders.

From the time it opened in 1850 until its closure in 1924, the C&O Canal carried mainly coal mined in the area around Cumberland, Maryland, its western terminus. Small amounts of other commodities such as lumber and sand or gravel were also handled. In addition, a number of quarries along its 186 mile route furnished building stone for many of the buildings in Washington, D.C. including the U.S. Capitol, the Smithsonian Institution, and the Treasury. The blocks were taken by boat directly into the city where they were transferred to horsedrawn wagons for transport to the construction sites.

For its entire distance, the C&O Canal runs parallel to the Potomac River. This is why it's sometimes referred to as the Potomac Canal. An archival film made in 1917, which depicts a mule-drawn boat traveling along the waterway, is titled "Down the Old Potomac

Canal," rather than "Down the C&O". Nevertheless in more recent times, the name C&O Canal has prevailed.

When Benjamin Wright and his team of engineers and surveyors were mapping the route of the canal during the late 1820s, it was realized that a number of natural streams would have to be crossed. All of these originate in the Maryland hills, and gradually work their way south to the Potomac, which flows along an east-west axis. It is these streams which cause the Potomac to become wider and wider as it nears Washington. Between Georgetown and Cumberland it would be necessary for 11 separate crossings to be made. Thus aqueducts were called for.

Having traveled to France and Britain, Wright was familiar with canal aqueducts. Essentially they were bridges which carried the waterway across streams and rivers. An essential requirement was that they be constructed in such a way that little if any water leaked from them. Retaining sufficient water was always a challenge for the canals, especially during periods of drought. A badly leaking aqueduct could cause the water level in the canal bed or prism to drop several inches, resulting in loaded boats scraping bottom.

Two methods of building canal aqueducts existed. One was to construct stone piers which would support an enormous wooden trough. Most of the aqueducts on New York State's Erie Canal, such as those at Montezuma,

Schoharie, Rexford, Crescent, and Rochester followed this pattern. The advantage was a relatively low initial cost. The disadvantage was that the wooden troughs had to be periodically repaired and often replaced entirely as the wood rotted. Today, only the stone piers remain of these imposing structures. All of their wooden troughs have disappeared. Once regular use of the Erie Canal ceased in 1917-1918, they simply rotted away.

On the C&O Canal the aqueducts were built differently. Instead of stone piers supporting a wooden trough, the entire aqueduct was built of stone. Consequently, in building these structures, stone cutting and stone laying had to be precise. Each block had to fit perfectly so that leakage would be kept to an absolute minimum. This meant a much higher construction cost of the aqueducts on the C&O Canal than on the Erie, but a much lower maintenance cost. On a long-term basis, this would result in considerable savings.

Another factor which probably influenced the design of the C&O Canal's 11 aqueducts was the availability of good quality stone. For a century prior to the start of work on the C&O, stone was being quarried from a number of locations along the Potomac River between Great Falls and Cumberland. This enabled Chief Engineer Wright to avoid compromising his standards by incorporating wood in his aqueducts. Since it followed the Potomac River watercourse



Hikers now use the former towpath.  
The steel will be removed when restoration is complete.

for its entire distance, the C&O Canal did not have to cross wide, steep valleys the way many European and British canals did. Instead, its aqueducts were required only to carry the waterway across major tributary streams emptying into the Potomac River just above their mouths.

The largest such stream feeding the Potomac which the canal would have to cross was the Monocacy River, which originates about 50 miles north in the Maryland hills. At the point where it empties into the Potomac, the Monocacy is approximately 450 feet wide. It's also navigable for many miles. During the 19th century it was used for general transportation purposes, and today pleasure boaters diverge from the Potomac and work their way up it for a considerable distance.

Chief Engineer Wright knew that the most practical means of getting the canal across the mouth of the Monocacy River was to construct an aqueduct. The alternative would have been locks to lower boats to the level of the river, and raise them again on the opposite side. This method would also have necessitated the construction of a dam across the mouth of the Monocacy to create a slack water pool through which the boats could pass. This would be fine at times of normal water levels, but if a flood occurred, causing water to pass rapidly over the dam, passage by boats would involve the risk of their being swept over the dam into the Potomac. The far better choice was to erect an aqueduct which would be the longest on the entire canal. It would also be the most imposing and the most beautiful.

There are no surviving engineering drawings or plans for the Monocacy Aqueduct. Instead all that exists are a few rudimentary sketches of what it was supposed to look like when finished. Benjamin Wright, the chief engineer, wasn't even an engineer by training but instead had prepared to practice law. He then took up surveying, and later on went into engineering where he taught himself the basic principles using trial and error combined with common sense. Of course, there is no doubt whatsoever that he was a brilliant man, and that what he learned from his work on the Erie Canal he applied to the Chesapeake and Ohio. During the 19th century many engineers were autodidactic.



Temporary supports have held the aqueduct together since the assault of the 1972 hurricane.

The structure he designed was 516 feet long, about 25 feet wide, and consisted of seven arches each 54 feet high. Work began in 1829, and four years later in 1833 it was finished. Since the C&O Canal was constructed in sections, one contract probably covered the building of the Monocacy Aqueduct and perhaps a quarter of a mile of waterway at either end of it. Along with the PawPaw Tunnel situated much further west near the Cumberland terminus, it is one of the most imposing remains of the entire canal. Wright's term ended in 1831, and the aqueduct was completed under the direction of Alfred Cruger.

Since so few records exist, it's difficult to know exactly how the construction crews went about erecting the seven-arch aqueduct. It would appear that coffer dams were installed around the points where the bases of the arches were located. Once these were in place and made secure, water was pumped from the inside until a completely dry area was created. Workmen then dug into the riverbed, perhaps as far as bed rock, and began placing stone into position. Once the bases of the arches had been completed, the coffer dams were removed. The technology of creating such barriers had existed for centuries and had been used for bridge building throughout Europe since Roman times. Once the arches were finished, the remainder of the structure was completed. Four years were required to finish this job. Today

such a project would consume a matter of months.

Stone for the Monocacy Aqueduct was obtained from a local quarry situated about 4 miles away. This was known as Nelson's Quarry, and it produced white and pink quartz sandstone which was hacked from the base of Sugarloaf Mountain. Two methods were utilized to get the stone to the construction site. One involved the use of huge timber rafts which were floated down the Monocacy River to the point where it flows into the Potomac. The other was a primitive railway consisting of wooden rails topped with iron strips. Pieces of stone were placed atop two-axle railcars and then hauled by horses the 4-mile distance. From Monocacy Aqueduct it's possible to see Sugarloaf Mountain, the source of the stone.

Before the stone was installed, it had to be cut and fashioned into blocks which fitted snugly together. Fortunately, sandstone is soft enough to be cut using saws powered by waterwheels. At various places along the route of the C&O Canal stone-cutting mills existed, and these were utilized to shape the blocks used not only for the Monocacy Aqueduct but for the 10 others along the waterway, as well as the many lock chambers. For those interested in industrial archeology, there are published accounts of how these stone-cutting mills operated. Their finished products were neat-looking blocks which could be fitted tightly together. Only a minuscule amount of ce-



ment needed to be applied to achieve 100% water tightness.

Approximately 250 men toiled for four years erecting the Monocacy Aqueduct. In addition to the crew working at the quarry, there were the men employed in transporting the stone, first to the stone mill for final cutting into blocks, and then to the construction location. Carpenters erected the wood framework which supported the stones as they were assembled into arches. The aristocrats of the labor force were the masons who were responsible for final shaping of the stones and for putting them into the correct position. Many of these skilled artisans were recruited from Europe and the British Isles where they had done similar work on both canal and railway structures.

Lime and cement were also required, and factories were established to produce these items. Many of these continued to turn out their products once the waterway opened in 1850. The type of cement used was known as hydraulic. Its main characteristic was its ability to set and become hard under water. Hence it was ideal for lock chambers and for the inner walls of aqueducts which didn't utilize wooden troughs.

The trough of the Monocacy Aqueduct was designed to contain 6 feet of water, the standard depth of the C&O Canal. It was about 20 feet wide and 516 feet long. Thin wooden rubbing rails were fixed to each wall to prevent the boats from scraping against the stone. The

towpath was situated on the south side of the aqueduct, adjacent to the mouth of the river where it flows into the Potomac.

During the four years that it took to build the Monocacy Aqueduct, it was sometimes difficult to retain a sufficient work force. Many of the unskilled laborers had come to America after having been recruited by the company. They had agreed to pay back the cost of their passage from the wages on the canal. However, they often became frustrated with this arrangement and simply walked away. Some disgruntled workers secured work on the Baltimore & Ohio Railroad, which was constructing its route parallel to the waterway, and probably paid higher wages. Thomas Viaduct, located on the Baltimore & Ohio RR (now CSX) between Washington, D.C. and Baltimore, was completed during the 1830s. It's very possible that many of those who built it were indentured toilers who walked off the Chesapeake and Ohio Canal.

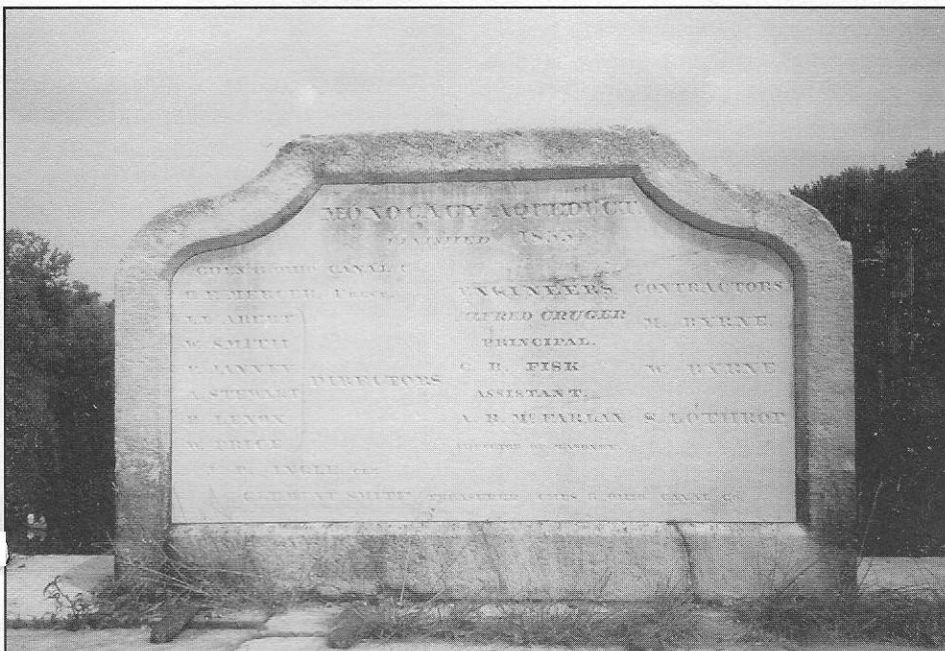
When the Monocacy Aqueduct was finished in 1833, a dedication plaque was erected on its north side which still survives, although its lettering is weathered. Amazingly, it's not graffiti covered. Upon completion of the aqueduct, water was let into the segment of the canal surrounding it and regular usage commenced. During the next 17 years additional portions were finished and boats began moving through them. Although no photographic evidence exists,

there was certainly an inaugural boat which passed over the aqueduct filled with dignitaries and government officials. In 1850, when the waterway reached Cumberland, it was the country's sixth longest man-made towpath canal. One newspaper reporter who rode its entire distance from Washington to Cumberland, and was impressed with both the Monocacy Aqueduct and the PawPaw Tunnel, called it one of the eight wonders of the world, in a league with the Pyramids of Egypt and the Hanging Gardens of Babylon.

Limited passenger service was offered for a few years between Georgetown, a section of Washington, and Cumberland. However, since the Baltimore and Ohio Railroad covered the same route, most people preferred the faster train. Therefore, except for excursion vessels which ran from Georgetown to Great Falls, and through the PawPaw Tunnel, the C&O Canal became purely a freight hauler.

During the 1840s when it was decided to erect an enormous monument in the shape of an obelisk to George Washington, a quarry was located adjacent to the canal. Until the outbreak of the Civil War in 1861, boatload after boatload of stone was transported down the waterway to the nation's capital. Likewise during the 1850s when the original Smithsonian Institution buildings were being constructed, the red sandstone for them was quarried from a mountainside at Seneca and sent via C&O boats. This gorgeous red material was also used to build the aqueduct at Seneca where the stream of that name enters the Potomac. Sadly several years ago one of its arches collapsed following a flood. It has still not been reerected.

Because the C&O Canal straddled the line separating the North from the South, it, along with the B&O Railroad, was a target of Confederate forces seeking to disrupt communications with Washington, D.C. from the west. On at least one occasion, troops from Virginia tried to blow up the Monocacy Aqueduct. Unfortunately for them, the black powder they used wasn't powerful enough to damage the thick masonry. Had dynamite or TNT been available, it would have been a different story. What the Confederates did succeed in doing several times was blasting away sections of canal bank, causing water to flow out and barges to run aground in the mud.



The plaque is still legible after 168 years.



The Seneca Creek Aqueduct suffered more severe flood damage.

However such breaks were easily repaired and the canal rewatered.

The peak year for the canal was 1877 when several hundred boats were in operation. Almost all were built in Cumberland, the waterway's western terminus. They were between 90 and 95 feet long. When loaded they drew 4.5 feet of water. Since the main customers were located in and around Washington, most of them passed over the Monocacy Aqueduct. Since the aqueduct was wide enough for only one vessel at a time, those going in the opposite direction had to wait.

Maintenance of a routine nature was done mainly during the winter, when the canal was shut down. One of the tasks was to look for cracks in the stones where water could enter, then freeze into ice, and cause bigger fissures to appear. Filling such cracks was a priority of the maintenance force. Hydraulic cement was normally used for this purpose.

After 1890 the C&O Canal began to decline sharply as the coal business went increasingly to the railroad and the mines feeding it at Cumberland began to give out. By 1910 only about 30 vessels were still in use, and by 1920 this figure was halved. A severe flood in 1923 resulted in considerable damage to the waterway. It was decided that costly repairs could not be justified, and it was permanently shut down. All of its structures including locks and aqueducts were left in place, but they would no longer be maintained.

During the next 30 years the Monocacy Aqueduct survived as a reminder of Maryland's towpath canal era. Occasionally hikers would walk over it on the towpath where the mules and mule drivers formerly passed. Since there were still many people alive who remembered when barges loaded with coal ran over the C&O Canal, few wondered what its purpose had been. Old timers, who often lived close to the abandoned waterway, were always willing to answer questions.

In 1938 the federal government took title to the closed C&O, making it the owner of the Monocacy Aqueduct and its ten smaller cousins, many of which were beginning to fall apart due to lack of upkeep. In 1953 a proposal was made to convert the right-of-way of the old waterway into a road for automobiles. It would be built atop the prism of the canal, which had been waterless for 30 years. Had this road been built as originally planned, the Monocacy Aqueduct would have been demolished. Luckily this scheme never came to fruition, thanks to a public relations campaign waged by Supreme Court Justice William O. Douglas. He and others fought to preserve the entire 186 miles of the C&O Canal for recreational purposes, as well as for its historic value. Ultimately, the National Park Service, on behalf of the federal government, dropped its plan for a road on Maryland's Potomac River shoreline. The seven-arch aqueduct was safe, at least temporarily.

Unfortunately in 1972 Hurricane

Agnes struck the region, and flooding did incalculable harm to what remained of the C&O Canal. The Monocacy River rose to record heights, and raced rapidly around the stone piers. Whirlpools undermined its integrity, and when water levels returned to normal, considerable damage was evident. Some of the other, smaller aqueducts along the C&O weren't as fortunate, and suffered collapse of their arches. The Catoctin Creek and Seneca Creek aqueducts were both partially destroyed and remain in this status today. Unless money is found, their fallen arches will never be restored.

The National Park Service decided to take immediate action to preserve the entire Monocacy Aqueduct so that it would not suffer the breaking of any of its seven magnificent arches. Between 1973 and 1976 a steel supporting structure was installed around the entire 516 foot long aqueduct. Although this affects the aesthetics of the 168-year-old span, it has stabilized it and given it the strength to withstand later floods and stresses. Nevertheless, it's a temporary fix. Much more needs to be done.

The C&O Canal Association is working with the National Park Service to raise money for the complete restoration of the Monocacy Aqueduct. This will preserve it for future generations to see, walk over, and enjoy. A fund-raising drive is now underway which operates under the slogan "Uphold the Monocacy Aqueduct". In addition, the prestigious American Society of Civil Engineers has lent its wholehearted support since it views the structure as historically significant and worthy of restoration.

As matters stand at present, funding may be available within the next couple of years. Engineering design for the actual repair and restoration is now underway. This phase of the project will determine exactly what's required to put the span in perfect condition so it will last into the indefinite future. Once the engineering design task is finished in late 2001, the actual work will commence. It's likely that the National Park Service will put the job out for bids, and either one or several companies will be awarded the contract. The estimated cost for the complete repair and restoration of the Monocacy Aqueduct is between 5 and 6 million dollars. If new stone is needed, it will probably be quarried from Sugarloaf Mountain, where the original white sandstone came from.

The C&O Canal Association has, through its own efforts, raised about \$150,000 toward the repair. The National Park Service is impressed by this level of support from the private sector. It may have influenced the N.P.S. decision to move forward with a top-to-bottom restoration.

Once the work is completed, probably in 2006 or 2007, the Monocacy Aqueduct will be in as good shape as it was when it opened in 1833. In addition, it will stand in sharp contrast to many of the equally long or longer aqueducts on New York State's Erie Canal which, following its closure in 1917, were allowed to decay and crumble. Most of these are partially collapsed and are missing arches and stonework. Had stabilization occurred several decades ago, this would not be the situation.

Those wishing to donate money to the Monocacy Aqueduct project should contact the C&O Canal Association at P.O. Box 366, Glen Echo, Maryland 20812-0366.

*Editor's note. Just as this issue was going to press, word was received that Congress has enacted legislation providing complete funding (in excess of \$6 million) for the restoration of the Monocacy aqueduct. Construction should be under way by summer, 2002.*

### I-95 DRIVING GUIDE NOW AVAILABLE

A Driving guide to Canal Sites Along Interstate 95 is now available to society members. Written by Linda J. Barth, the guide features canal sites from Maine to Florida. Each entry includes a brief history of the waterway, a description of the site as it exists today, and detailed driving directions. In addition, the guide contains many maps, with the sites highlighted.

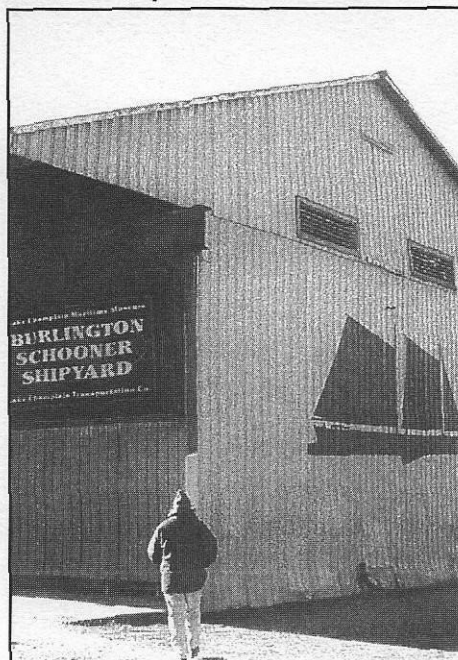
Linda Barth is a director of the Canal Society of New Jersey and a frequent contributor to *American Canals*. She is the author of numerous canal articles and booklets.

To purchase a guide, please send a check for \$12.50 (includes \$2.50 s&h), payable to Linda J. Barth. Mail it to her at 214 North Bridge Street, Somerville, New Jersey 08876.

For further information, contact her at bobandlindabarth@att.net.

## THE BURLINGTON SCHOONER PROJECT

by Art Cohn, Director  
Lake Champlain Maritime Museum



The Burlington Schooner Project is an undertaking of the Lake Champlain Maritime Museum, a nonprofit organization whose principal site is at historic Basin Harbor, Vermont. The Burlington Schooner Project will build a reproduction 1862 class sailing-canal schooner at Burlington Harbor, modeled after the *General Butler* and the *O.J. Walker*, two historic shipwrecks located within a mile of the proposed construction site.

The *General Butler*, built at Essex, New York, was sunk in a violent gale in December of 1876. The *O.J. Walker*, built in Burlington, Vermont, sank in the outer harbor in 1895. Both vessels, built in 1862 on opposite sides of the lake, have been the subjects of intense historical and archaeological study.

The new schooner will be named in honor of Lois McClure, who, along with her husband Mac, has been a major contributor to this and many other community projects. The *Lois McClure* will become a harbor-side educational exhibit illustrating how the lake was utilized for commerce during the 19th century.

The three-year construction of the *Lois McClure* will provide a unique opportunity for students from throughout the Lake Champlain basin to learn the history and archaeology of the Champlain Valley. The launching of the *Lois McClure* in the spring of 2004 will be a special community celebration. Following lake trials, the *Lois McClure* will re-

create the traditional journey down the lake, through the Champlain Canal to the ports of the Hudson River, and on to the South Street Seaport Museum in New York City.

When not traveling, the *Lois McClure* will be a permanent feature of the Burlington waterfront. The ship, with her tall wooden masts, will become a tangible link to the evolution of Burlington. As a boating classroom, the *Lois McClure* will welcome thousands of school children from Vermont and New York, and visitors coming to Burlington by car, boat, bike, foot, ferry, and train.

At the heart of the Burlington Schooner Project is the desire to reconnect present-day residents, visitors, and school children to the rich commercial history of Burlington and Lake Champlain's archaeological legacy.

[Note. A picture of the *Lois McClure* was on the first page of our Spring 2001 issue.

—DFR]

### Information please

## HELP! I'M LOOKING FOR CANAL DREDGES

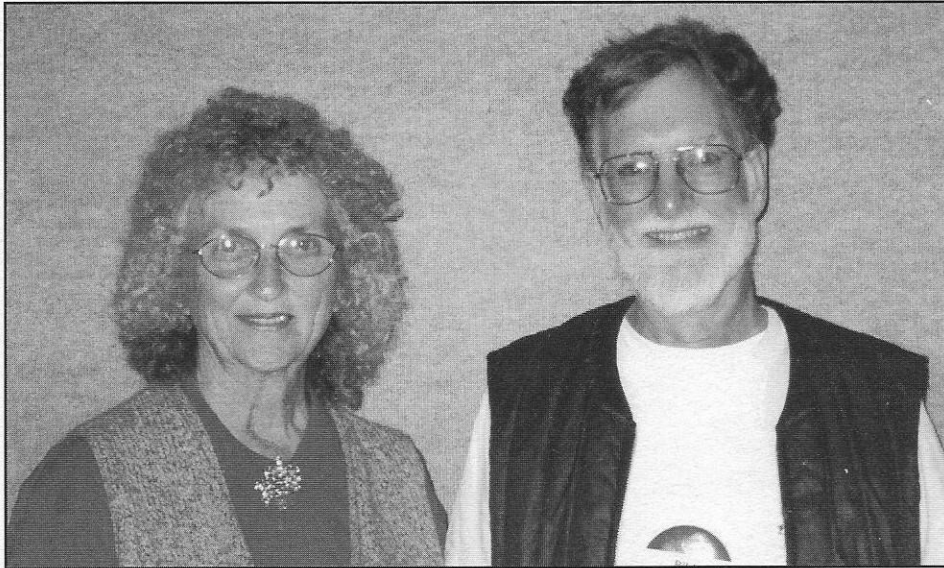
A long-term research interest in steam dredges has yielded a few tantalizing references to use prior to 1880 of the machines in canal development and maintenance. Most of the references are to excavators which dug (like a steam shovel) with a scoop or dipper, sometimes in tandem with a derrick on dry land that swung the waste material aside in a skip. More often, the dredges dumped the scoop in a scow or barge.

Please let me know if you have seen any pre-1880 canal company record of purchase or operation of a dredge, or of a contract to dredge, or a newspaper description of such activity. The machine was referred to as a mud digger, mud boat, steam paddy, or dredge boat. The machinery was apt to be made in south Boston, Troy and Lockport (N.Y.), Trenton, Toledo, and Chicago.

Pictures of any steam dredge would be welcome. The rigs were apt to be kept in service for decades.

Thank you,  
John Thompson  
1733 Westhaven Dr.  
Champaign, IL 61820  
217-356-1910

## CANAL MERGER



Nancy and Bill Trout

*Staff photo*

Nancy Dunnavant, ACS director and recording secretary, and Bill Trout, ACS director, founder, and past president, recently turned off the lonely path of the single state and took up the yoke of marriage. We congratulate them both on their good taste in partners. Please join us in offering them best wishes for a long and happy journey together.

### ***Urgent call for support***

### **NATIONAL CANAL MUSEUM**

In the midst of a campaign to raise capital for a major and much-needed expansion, the National Canal Museum has been awarded a \$100,000 challenge grant by the F. M. Kirby Foundation. In order to receive the grant, the museum must raise \$200,000 from other sources by the 31st of December, 2001. Pledges as well as actual donations will be counted.

If you can help, call the museum at (610) 559-6622 or write:

National Canal Museum, 30 Centre Square, Easton, PA 18042-7743

## **PERSONNEL CHANGES AT AMERICAN CANALS**

Associate Editor Kate Mulligan has asked to be relieved of her duties. Like many other talented and good-natured people, she has assumed obligations beyond the capacity of her allocated hours and days. We have tried to convince her that she should shirk gainful employment and family responsibilities in favor of volunteer work, but the effort has not been successful.

She has done a great job, and will be sorely missed. Attentive readers will have noticed a significant increase in the amount of news, information, and reports from the local, state, and regional canal societies. This is the area of principal responsibility of the associate editor. The progress made has been entirely due to

Kate's skill and diligence during the two years of her tenure.

The good news is that Linda Barth has agreed to take over the job. Linda is already well known to our readers and to canal enthusiasts generally. An announcement concerning her long-awaited latest book (on canal sites along I-95) appears elsewhere in this issue. She is as qualified as anyone except Kate Mulligan herself could be to fill Kate Mulligan's shoes, and we feel extremely fortunate to have acquired her services.

To ensure a smooth transition, Kate has agreed to stay through the winter and spring issues of 2002. During that time, there will be two associate editors. Canal groups which do not already have Linda Barth (or her husband Bob) on their mailing lists should take advantage of that time to effect the necessary change.

## **GOOD NEWS**

Sally Talaga, director of the Wayne County Historical Society, reports that, "much progress has been made on the Towpath-to-Trail project," an effort to create a mile-long trail along the towpath of the D&H Canal. The entire contents of Lock 31 House were sorted; grass mowed; trees cut on the towpath and the house grounds. On the officially designated cleanup day, 53 volunteers spent over 240 hours in cleanup activities.

A beautifully illustrated and annotated map of the Farmington Canal in Connecticut is available from Carl Walter. The oversize map contains vignettes that give a good sense of the canal's history. Send \$10 plus \$4 (s&h) to Carl Walter at 27 Silver Street, North Granby, CT 06060.

In September, the U.S. Senate included \$6.4 million in its budget for the Monocacy Aqueduct. Restoration of the aqueduct has been a long-term project for the C&O Canal Association that has generated support from the National Trust for Historic Preservation. (See above, pp. 6-11.)

The Tuscarawas County Historical Society reports in its newsletter that in August, "The Village of Tuscarawas, along with the Warwick Lions Club, and the Society, dedicated the newest Roadside Marker, the Trenton Lock. Guest speakers included Terry Woods, president of the American Canal Society. The lock is part of the Ohio and Erie Canal."

In September, the village of Point Pleasant, the state of Pennsylvania, and the Delaware Canal State Park jointly sponsored a day-long festival to dedicate the new aqueduct carrying the Delaware Canal over the Tohickon Creek. The wooden aqueduct was completed earlier in the summer and replaces a reinforced concrete structure that was condemned and closed in the early 1990s. The new aqueduct means that there will be water in the Point Pleasant section of the canal for the first time in nearly a decade.

The Canal Society of New Jersey has received \$10,000 operating support from the New Jersey Historical Commission. The money will help facilitate the society's proposed headquarters/archives and master planning process.

**- Kate Mulligan**