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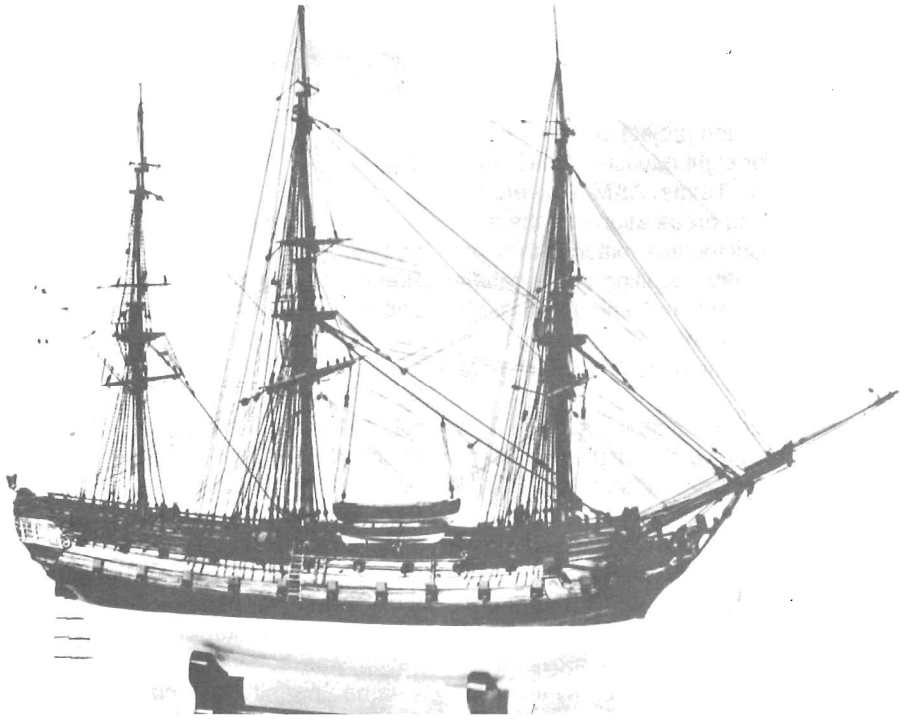
A FIFTH-RATE SHIPWRECK NAMED CHARON



Model of Charon *in the Science Museum, London, England.*

Lord Earl Cornwallis, commanding general of the southern British army, moved his troops northward in 1781 to winter in tidewater Virginia. He paused first at Hampton Roads, but soon moved up the York River to Yorktown under the assumption that the York would be easier to defend. A fleet of naval vessels was soon dispatched from British headquarters in New York to prevent French naval infiltration of the lower Chesapeake Bay. The British had moved too slowly, however, and found a superior force under Admiral de Grasse awaiting them. They were engaged and soundly defeated by the French, who then sealed off the entrance to the Chesapeake and prevented shipping from reaching Cornwallis. Meanwhile, Lafayette moved his forces to Williamsburg to prevent British escape to North Carolina while Washington marched his army southward to join forces with Lafayette. The allied armies then marched toward Yorktown. Earl Cornwallis found himself besieged.

In addition to his formidable army, Cornwallis commanded a fleet of approximately 70 vessels, mostly transports, victuallers, and other support craft. Some of these ships were later scuttled in a line along the beach at Yorktown to prevent an amphibious assault from the sea. One of these ships, which we called the Cornwallis Cave Wreck, was excavated by an AINA team in 1976 under the direction of Dr. George F. Bass (see AINA Newsletter Vol. 2, No. 4).

The largest warship, and flagship of the naval vessels protecting this support fleet, was the *Charon*, commanded by Captain Thomas Symonds. HMS *Charon*, a 44-gun battleship of the fifth rate, was built at Harwich, England in 1778. According to her builder's drafts, which still exist in the Public Records Office in London, she was rated at 880 tons and was 140 feet long on the gundeck. Her complement was recorded at 300 men, and her battery consisted of 20 eighteen-pounders, 22 nine-pounders, and two six-pounders. She was a beautiful ship-rigged vessel, sporting a lavish figurehead of the Boatman of Hades and a well-decorated stern. *Charon*'s hull was a typical frigate hull of the period, full in the beam and the bow, with considerable tumblehome at her main deck. Her breadth was nearly 38 feet and her draft exceeded 16 feet.

The *Charon's* construction incorporated the latest scientific naval accoutrements, such as copper hull sheathing and high-speed chain pumps. She was built of English oak and elm and bolted with iron.

Along with the *Guadeloupe*, 28 guns, the *Charon* was moored about a half mile upriver from Yorktown in a position to flank enemy attack in that sector. Her position had been appreciably weakened, however, by the removal of most of her cannon, ammunition, and crew in order to build a battery ashore.

On the night of October 10, the French began firing red-hot shot from ashore. The *Guadeloupe* slipped her moorings and withdrew to a position on the Gloucester side of the river, where she was scuttled a week later to prevent capture. But the *Charon*, manned only by a skeleton crew, was virtually helpless and remained to take hot shot in at least three places. She was soon aflame from hold to masthead, and attempts made to scuttle her were unsuccessful. She broke from her moorings and drifted downstream into a transport which she set afire. Both vessels floated aground at Gloucester Point, across the river from Yorktown, and burned to their waterlines.

American surgeon Dr. Thatcher, observing the holocaust, wrote in his journal:

> The ships were enwrapped in a torrent of fire, which spreading with vivid brightness among the combustible rigging, and running with amazing rapidity to the tops of several masts, while all around was thunder and lightening from our numerous cannon and mortars, and in the darkness of night, presented one of the most sublime and magnificent spectacles which can be imagined.

The British comments were understandably less triumphant. A Lieutenant James, who served on board the *Charon*, reported:

> .....we saw with infinite concern one of the finest ships in the navy of her rate totally destroyed on this day.

Thus died the *Charon*, a fiery omen of the great military disaster which was soon to follow. Her archaeological significance needs no explanation.

GL136

A survey of the York River, conducted by the Virginia Historic Landmarks Commission's Research Center for Archaeology, revealed eight shipwrecks in the Yorktown area which were attributed to Cornwallis's fleet. One of these wrecks, designated as GL136, lay a few hundred feet off Gloucester Point at a depth of about fifteen feet. GL136 was by no means a virgin wreck; the French were already conducting salvage operations off the point in 1782. In 1852, and again in 1935, there was further activity in the area, the latter excavation being conducted with a clamshell bucket from a steam dredge. There were undoubtedly additional intrusions by sport divers and oyster tongs, so GL136 must have depreciated considerably since she sank. Nevertheless, the wreck was considered by many people to be that of the *Charon.* Foremost among these claimants was John O. Sands, Assistant Director of Collections at the Mariners' Museum in Newport News, whose meticulous research into the naval aspects of the siege of Yorktown could not be ignored. It was high time to investigate the site, before all surviving timbers and artifacts disappeared.

VHLC Research Center diver Jim Knickerbocker readies for a Charon *research dive.*
Photo: C. F. Amer

THE CREW

The excavation of GL136 served both as a ship identification project and as a training exercise for eight nautical archaeology students from Texas A&M University. Negotiations and preparations for the project were conducted intermittently through the spring of 1980, resulting in the contribution of equipment and personnel by both Virginia and Texas interests. By June 9 the project had become a reality and all hands were on site.

I served as project supervisor and field school instructor. A research grant from the College of Liberal Arts at Texas A&M funded a large portion of my expenses for transportation and research. My workload at Yorktown was considerably lightened by John Broadwater, head of the underwater branch of the Research Center for Archaeology at Yorktown, who provided office and work space and kept my administrative duties to a minimum.

The nature of the project was such that field supervision was best shared by three co-directors. Sam Margolin, a former Texas A&M nautical archaeology student who was on the VHLC staff at Yorktown, was in charge of the documentation and disposition of artifactual material. Dick Swete, another A&M nautical student then on the VHLC Yorktown staff, was in charge of the excavation. Paul Hundley, then a nautical student completing his thesis, served as divemaster and logistical director. Paul has since graduated and taken a position with the Western Australian Museum in Fremantle, where he will assist in the reconstruction of the Dutch East Indiaman *Batavia.*

Because the excavation was primarily designed as a ship identification project, each student was made responsible for properly recording and researching a specific area of the hull. Thus Chris Amer became our expert on the keel, keelson, and supporting structure, while Gianmarco Brenni interpreted the copper sheathing patterns, Jim Duff studied planking inside and outside the hull, and Bill Huber recorded the shot lockers. Denise Lakey had to develop a framing plan from those rotted timbers, Diana Lange was in charge of bow construction, Tom Oertling was expected to identify the pumps, and Michala Perreault was assigned stern construction.

Chris Amer examines iron ballast "pigs," flanked by Sam Margolin and Paul Hundley.
Photo: J. A. Duff

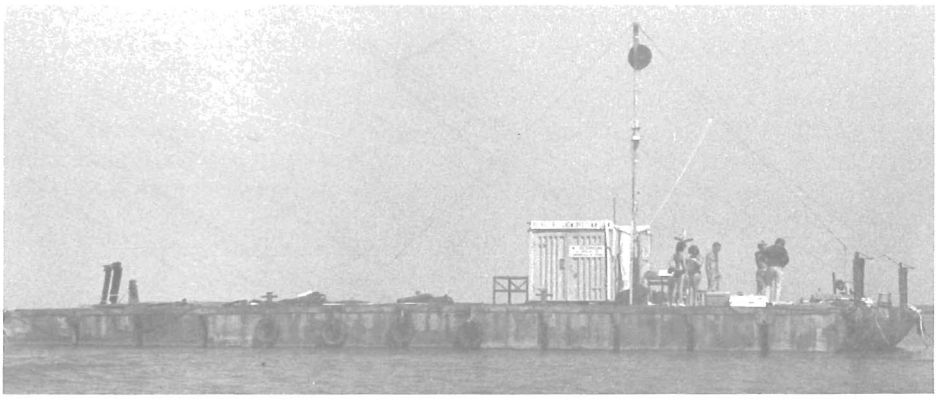
The students paid fees, our major source of funding, to cover living and certain operational expenses, and provided their own transportation to the site. Excavation was conducted six days a week, weather permitting, and formal classes were held after supper three evenings per week in classrooms provided by the Virginia Institute of Marine Sciences. Students were housed aboard the *Tern,* an oceanographic survey vessel owned by VIMS.

THE EXCAVATION

We worked from a barge which the U.S. Army had graciously moored over the wreck site. Two teams of two divers each worked simultaneously. Four teams were normally scheduled to dive each day, but extra projects were frequently undertaken by directors, VHLC staff, and students on special diving assignments. Student divers worked almost exclusively on "hookah," a system which provides air by a hose connected from the compressor on the barge directly to the mouthpiece. A hookah air supply system is used for many reasons, but is especially good for tethering divers

and thereby preventing novices from drifting into oblivion with the tide.

I usually try to forget the early days of a new excavation, when equipment flaws surface and inexperienced divers seem intent on inventing new problems. This particular project had additional concerns: jellyfish were present in the greatest numbers witnessed in the York for many years, our meager budget seemed to threaten us with bankruptcy from the beginning, and underwater visibility varied from a few feet to zero. The first few dives brought discouraging news. There was very little ship left and few associated artifacts were in evidence.



Army barge moored over Charon *site.* *Photo: J. J. Simmons*

At the end of the second day of excavation, I was convinced that the length of the wreck was about right for the remains of a 44-gun ship. If so, less than five percent of the hull would have survived, and the possibility of any interesting artifacts being found would be practically nil. It was disappointing news for everyone. That night in the classroom, I lectured the crew on my favorite subject: that the results of any shipwreck investigation, no matter how poorly preserved the wreck, are limited only by the intelligence and ingenuity of its investigators. We then discussed our options and formed a plan of action.

Things went better after that night. Students quickly made peace with the river and became dependable excavators. The weather was beautiful and little time was lost to storms. Somehow, Dick and Paul kept the equipment in operation and stretched our scarce dollars farther than I would have believed possible. But it was our students who raised my spirits the most. It is one thing to study ship structure in the classroom, but quite another to discern that structure from among jumbled piles of rotted timbers in near-zero visibility. Yet their diving slates continuously surfaced with new hull information. We were going to do a good job on this project after all.

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PROFILE

Catherine Meyer. *Photo: D. L. Hamilton*

Although she is not directly involved in the on-site aspects of the Institute's archaeological investigations, INA Administrative Assistant Catherine Meyer plays a significant, although largely unseen, role in keeping the Institute's projects on an even keel.

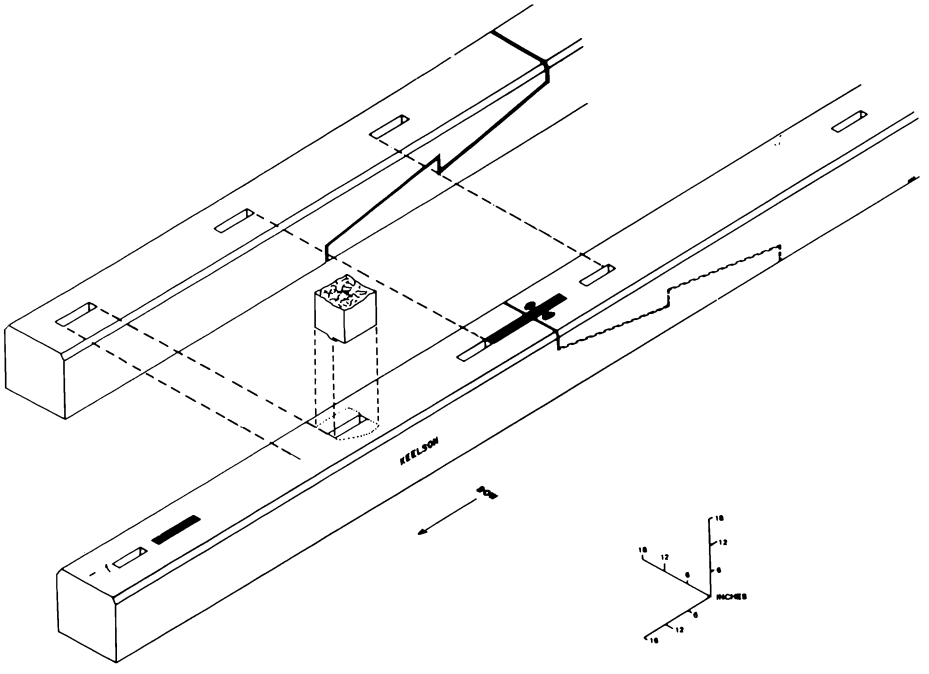
Catherine was born Catarina Pestalozzi in Zurich, Switzerland. Following schooling in Zurich she attended Cambridge University, where she passed an English Proficiency Examination. She then spent three months in London as an interpreter at the International Cancer Congress before returning to Switzerland for a year in the Management Course at the International Hotel School in Lausanne. From Lausanne Catherine moved to Paris, where she was employed by a hotel while taking a comprehensive French culture course at Sorbonne University. The lure of a major music festival then took her to Salzburg, Austria, where she worked before taking a job with Swissair.

Catherine's three years as a secretary with Swissair in Zurich and Madrid provided ample travel opportunities, and those years found her in various locations in Europe, Scandinavia, the Middle East, Mexico, and the United States. Having thus at least temporarily satisfied her wanderlust, Catherine took a position in Zurich with the Institute of International Affairs.

In 1965 Catherine married Edgar F. Meyer and moved to Cambridge, Massachusetts, where she worked at Lesley College while Ed conducted post-doctoral research in biochemistry at M.I.T. Ed accepted a teaching post at Texas A&M in 1967, and the Meyers took up residence in College Station, their current home.

When their youngest son started grade school in 1976 Catherine decided to look for part time employment as a translator. The Institute of Nautical Archaeology had just moved to College Station, and George Bass hired her to translate Italian manuscripts. Her secretarial and administrative skills soon became apparent, and Catherine was retained as INA's "home base" secretary. In the fall of 1976 she became an elected officer of the Institute, suceeding Cynthia Eiseman as Corporate Secretary. Catherine's efficient handling of a wide variety of administrative responsibilities (including business correspondence in five languages) has been a major factor in the Institute's success, as she handles INA's financial books and serves as a link between the College Station headquarters and field projects, directors and membership.

When not working Catherine pursues varied interests, including cooking (her desserts are superb), literature, outdoor sports, and the piano, which she practices daily, accompanied by her children. Her love of travel is obvious; one of her more recent trips abroad was on the 1979 INA Aegean nautical archaeology tour. The summer cruise provided Catherine with her first opportunity to visit Bodrum and Serçe Liman, places already familiar through frequent correspondence.



Comparative views of keelson section: above, from Charon*'s builder's draft; below, from measurements obtained on GL136. Variations in stanchion mortise locations and scarf direction are evident, and representative stanchion stub is seen in lower view.* Drawing: C. F. Amer

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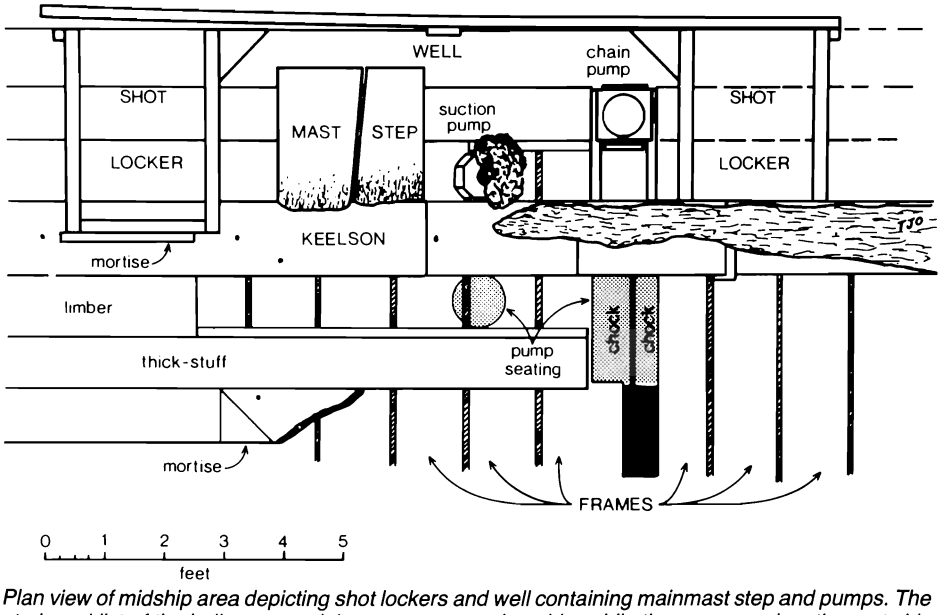
IDENTIFICATION

Whatever ship was down there had been the scene of a horrible inferno. Charred timbers, bits of melted glass and metal, and even heat-fissured ballast stones, were everywhere. As a ship burns, its weight is reduced and its draft becomes increasingly shallow until the remaining hull structure becomes unstable and sinks. The *Charon* had originally towered 44 feet above her baseline at the stern; at its highest extremity, only about five feet of GL136 survived above that point. If this were the *Charon*, we had only the very bottom of the hull, without her bow and stern. But many ships burn and drift ashore, some of them soon to be forgotten. Charred timbers would not positively identify this wreck. We would need much more convincing evidence.

Slowly, information surfaced which would confirm or deny the suspected identity of GL136. By now the crew had documented nearly 130 feet of hull length before timbers ran out at either end. Twisted and melted copper sheathing helped confirm that she was at least as big as a 44, and sank after 1761, the year copper sheathing was first used. Timber sizes began to surface and proved compatible with British scantling of the period. Then we found a deadwood scarf in the bow, a very important timber joint which told us precisely where we were in the hull if this were the *Charon* or a comparably-sized ship. About 30 feet aft of the scarf we struck our first important clue for identification: the stub of a stanchion used to support the main capstan beams above. Then two more appeared. The *Charon*'s builder's draft indicated three stanchions of identical size here, but these seemed slightly misplaced. Eventually Chris Amer's slate recorded what we were looking for, awl marks made by the shipwright at the locations indicated on the draft. Perhaps a change order due to a capstan revision had caused these stanchions to be shifted slightly. Absolute confirmation came a few days later. The *Charon* had a distinctive arrangement of shot lockers and pumps surrounding her mainmast. In rapid succession news came to the surface of their discovery: the remains of an empty shot locker, the wall of the pump well, the mainmast step, the stub of a bored eight-inch-diameter log which represented a suction pump tube, a 13-inch square wooden casing with an eight-inch bore for the chain pumps, another well wall, and finally the after shot locker. No doubt about it, our crew was recording what was left of the *Charon*.

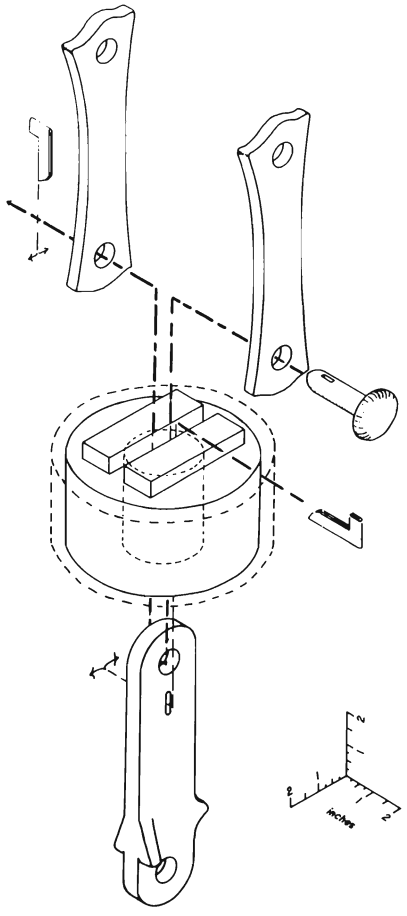
We made a list of specifications to compare known construction features of the *Charon* with those we found on GL136. The list covered nearly three pages and the two columns varied on only a few minor details. Tom Oertling was able to find the necessary links, keys, and discs to permit him to draw a reconstruction of the chain pump, a device which would move a ton of water in 45 seconds. Perhaps more was learned about contemporary chain pumps here than had been provided by any previous excavation. The students figured out the methods of bolting, framing, and scarfing, and interpreted the partitions in the forward shot locker. And they did find a few artifacts, but very few and of very limited value for our purposes. The familiar British broad arrow, sought after as a prize find on all such digs, was not



Plan view of midship area depicting shot lockers and well containing mainmast step and pumps. The starboard list of the hull preserved the structures on that side, while those exposed on the port side were destroyed. Drawing: T. J. Oertling

noticed on an artifact until after the project had ended.

We sat on the bow of the *Tern* on the night of July 4 and watched the fireworks across the river. We were feeling pretty smug about that grundgy old wreck to port, but the students were begging me to abandon team assignments and permit them to dive on their own special interest areas. They were getting that same urge everyone gets near the end of an underwater project; the time was nearly up and there were still so many questions to be answered. We spent the final days of the project that way, with each diver learning a little more about this or that detail. Only close to the end of the project did we lose our first hour of diving to illness of any sort. They were a rugged bunch, logging an average of 50 hours each in five weeks of underwater work and somehow laughing off the bruises and jellyfish stings.



Exploded reconstruction of pump chain disc assembly, illustrating (from top) paired links with pin and cotter key, pump disc and key, and single link which would have pierced disc. Dashed area surrounding disc represents gasket. Drawing: T. J. Oertling

Charon became famous during our final week in Virginia. There was national media coverage of the project, and the Gloucester County Historical Society adopted the vessel as its theme for the final bicentennial celebration to be held there in October. Students and field directors recently delivered papers at the 1981 Conference on Underwater Archaeology in New Orleans, presenting the results of their research in their specialized areas.

The *Charon* project was small compared to Yassi Ada or Serçe Liman standards. But it did provide us with a lot of new information about eighteenth-century warships, and we were able to provide a shipwreck with a name. Moreover, the results demonstrate that poorly preserved shipwrecks can be very important, even when most of the associated artifacts have disappeared.

J. Richard Steffy

Wet-suited Jim Duff and cameramen during a television taping session aboard the Charon *Project barge.* Photo: J. J. Simmons.

PISCATAQUA BASIN SURVEY: PHASE I, 1980

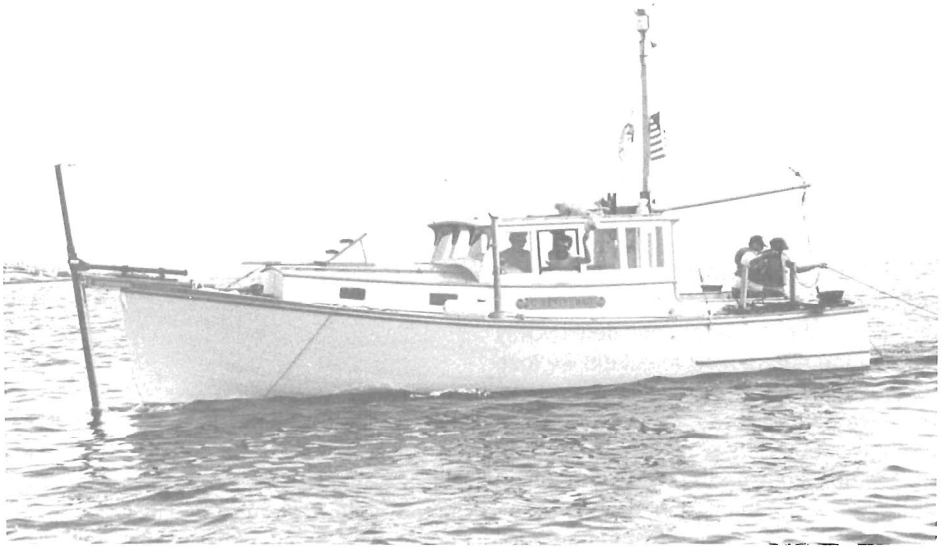
During the month of July, 1980, the INA-affiliated Kittery (Maine) Historical and Naval Museum, in conjunction with Plymouth State College of the University System of New Hampshire and the University of New Hampshire, conducted the initial phase of a remote sensing survey of the Piscataqua River basin. The Piscataqua River area has been the scene of extensive maritime activity since the seventeenth century. Kittery and Portsmouth, New Hampshire, on the opposite side of the river, were busy ports and shipbuilding and fishing centers. Upriver a few miles, the estuary of Great Bay, New Hampshire, was heavily trafficked with river-plying, cargo-carrying sailing gundalows.

Reports of recent discoveries of wreck sites, as well as other marine-related sites, prompted the Museum to initiate a cultural awareness program specifically oriented toward the environs of Kittery and Portsmouth in the seventeenth and eighteenth centuries. One aspect of the program was a preliminary wreck survey carried out in 1978 and 1979 in both coastal and offshore areas.

The 1980 survey was an extension of the preliminary survey, with a considerably expanded scope. Whereas the earlier project had been devoted to the location of wreck sites, the Piscataqua Basin Survey's goal was to locate and evaluate not only wrecks but other submerged or inundated historic or cultural areas as well.

Funded by the University of New Hampshire Sea Grant Office and the State Historic Preservation Offices of Maine and New Hampshire, the 1980 Piscataqua Survey was linked with a terrestrial survey of selected coastal areas. The land survey, directed toward locating prehistoric and historic cultural resources, was a joint undertaking of the Universities of Maine and New Hampshire, and was also Sea Grant funded.

Underwater areas to be surveyed were selected after reviewing previous survey data and the extensive file of information



Sandpiper II *off the Isle of Shoals with all equipment deployed, including bow-mounted sub-bottom profiler.* Photo: D. Switzer

compiled by Museum researcher Jane Hunt-Brackett. From newspapers, historical and customs records, and early maps she had come up with a lengthy list of potential sites, including the general locations of wrecks, shipyards, anchorages, and a bridge.

Even after the list had been pared down to a feasible number of areas, the overall survey area was extensive. It included the perimeters of the offshore Isle of Shoals; selected locations in the harbors of Kittery, Portsmouth, and New Castle, New Hampshire; a section of the Maine coast eastward to York Harbor; and areas within Great Bay.

To obtain the maximum amount of remotely-sensed data from varying seabed conditions, the electronic array included a Klein side scan sonar, a Barrenger magnetometer, and an Ocean Research Engineering sub-bottom profiler provided by the University of New Hampshire Marine Systems Laboratory. The plan was to simultaneously deploy the three systems when conditions permitted; two instruments would be deployed at other times.

A 35-foot closed cabin lobsterman-type boat, *Sand Piper II,* was provided for offshore work by its owner, Lt. Comdr. John Hallett (USN retired), the chairman of the Museum's executive committee. Comdr. Hallet served as skipper when precise local knowledge was required in ticklish areas, and the project's assistant director, Warren Riess, manned the helm throughout the rest of the offshore survey. Since *Sand Piper II* drew too much water to easily navigate in the inshore tidal areas, work in shallow water was carried out in the Museum-owned Boston Whaler, appropriately named *Anomalie.*

The navigational control system for the project was the brainchild of Charles Mazel, who had tested it the previous summer in Maine waters in conjunction with Warren's search for the *Angel Gabriel* at Pemaquid. Charlie's system utilized Universal Transverse Mercator grid coordinates and a programmable Texas Instruments calculator combined with a Hewlett Packard computer. Boat locations were plotten on an X-Y grid related to UTM coordinates. (For details concerning the intricacies of the procedure, see Mazel and Riess, "An inexpensive method for real-time, accurate navigational control of marine surveys," *International Journal of Nautical Archaeology* vol. 8, no. 4, Nov. 1979, pp. 333-338.) Position plots were recorded at one-minute intervals during survey runs. Constant triangulation information was provided by two Cubic Auto Tape "interrogators," each of which received signals transmitted from a shore-based responder. These signals were converted into digitally displayed metric distances. At the sound of a buzzer set to indicate one-minute intervals, the plotter marked the boat position; an "event record" was noted on the sonar, magnetometer, and sub-bottom profiler displays at the same time. This procedure insured close correlation between the position of the boat and a recorded anomaly.

For the initial stage of the survey, equipment was installed on *Sand Piper II* at its mooring at the Jackson Marine Laboratory a few miles from the expedition house in Durham. Meanwhile, contact was made with property owners living adjacent to survey areas to secure permission to establish responder stations.

With equipment mounted and tested, and following a few practice runs to get acquainted with the procedure of position plotting, the survey began on the landward side of the Isle of Shoals, eight miles offshore from Kittery and Portsmouth. Of particular interest here was Gosport Harbor, where a fishing fleet had been devastated by a hurricane in the mid-eighteenth century. Nearby ledges, once unbuoyed,

Position plotting on the X-Y grid system. Photo: D. Switzer

were also surveyed.

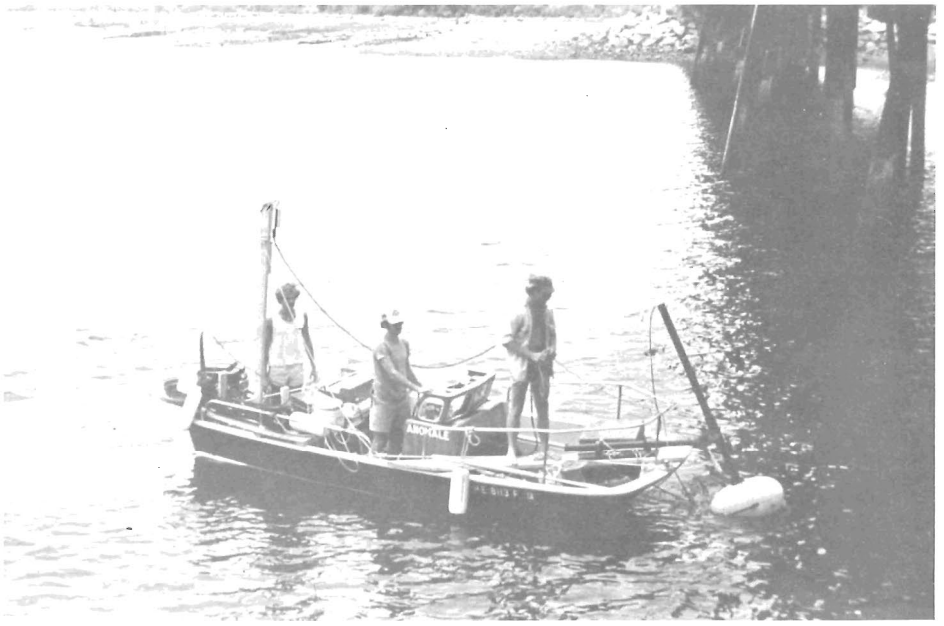
Prior to coverage of the seaward side of the Isle of Shoals, equipment problems and weather conditions forced a shift of focus to inshore areas around Kittery and New Castle. Equipment was transferred to *Anomalie,* which with its shallow draft could easily penetrate the tidal creeks and inlets. Navigational control in these areas required constant shifting of responder stations because the configuration of the coastline caused signals to be "masked." It was not uncommon to have to shift stations as many as four or five times in the course of a single day. While the shift might not be more than a mile "as the crow flies," access to the station site could entail a 10-mile drive. The inshore aspect of the survey thus turned out to be a slow process when compared to the offshore work.

Following coverage of Kittery's Spruce Creek and the Pool at New Castle, the inshore survey progressed to selected areas in Great Bay. At the request of Archaeological Research Services at UNH, the sub-bottom profiler was deployed at two shallow-water area adjacent to known prehistoric and historic sites. Hopes of obtaining a signature of an inundated terrestrial site, unfortunately, did not materialize.

In inshore areas as well as offshore, the number of anomalies recorded on the magnetometer far exceeded those detected by either sonar or the profiler. Whether the magnetometer hits were on objects of natural or man-made ferrous origin was not determined during the 1980 survey. Anomaly inspection will be carried out during Phase II of the project, also Sea Grant funded, which will be completed in 1981.

There was one exception concerning the inspection of detected anomalies; this occurred in the northern reaches of Great Bay. One of the survey areas chosen on the basis of historical research included the vicinity of where a bridge had once spanned the bay. Here the sonar revealed what appeared to be huge timbers strewn in jackstraw fashion, but in a relatively straight line.

Here in 1794 the renowned constructor of long span bridges, Timothy Palmer, built his masterpiece — the Piscataqua Bridge. It was an engineering marvel of its day, with a length of 2600 feet and an unsupported arch of over 200 feet. Only one picture of it, a pencil sketch, survives. Ice floes carried the bridge away in 1855, and its sole visible reminders today are a roadside historical marker and stone abutments on the shore.



Anomalie *completing a magnetometer run in the Pool, an eighteenth-century anchorage near New Castle, New Hampshire.* Photo: D. Switzer

As the survey continued back to the outer perimeter of the Isle of Shoals and along the coast to York Harbor, it was difficult to forget the intriguing pattern of "timbers" at the bridge site — the most clearly defined sonar picture recorded during the survey.

In November, on a cold, blustery Veterans Day, Warren, survey team member Quentin Blaine and I were given the opportunity to dive and confirm the presence of timbers. Accompanied by members of Al Waterfield's UNH research diving class, we encountered both huge square-sawn timbers exceeding 25 feet in length and the remains of pilings.

A further investigation of the remains of Mr. Palmer's great bridge is high on the list of planned Phase II survey activities. We hope to find remnants of the longest wooden arch ever constructed in the United States. Detailed documentation of the site will be difficult, however, due to poor visibility and strong currents.

Analysis of other data continues in preparation for Phase II. Magnetometer information is being reduced into profile maps, and the locations of possible sonar hits are being correlated with research data. In addition to verifying anomalies recorded during the past summer, Phase II of the Piscataqua Survey will involve terrestrial inventories and the collection of information requisite to the first step in building a regional site classification system based on the model put forth by the late Keith Muckelroy. (See "Historic wreck sites in Britain and their environments," *IJNA* vol. 6, no. 1, Feb. 1977, pp. 47-57.) Finally, information pertaining to site locations and characteristics will be made available to the Historic Preservation Offices of Maine and New Hampshire.

By way of conclusion, acknowledgment must be made of the hard work and long hours put in by survey team members Jane Hunt-Brackett, recorder; Charlie Mazel, engineer; Quentin Blaine, plotter, equipment operator and carpenter; Rick Schulman, plotter and equipment operator; and Jane Muse, provider of epicurean delights at breakfast and dinner — to which we were usually late! And without Warren Riess, who coordinated things so well, we would never have accomplished our goals.

David C. Switzer, Project Director
INA Adjunct Professor
Plymouth State College
of the
University of New Hampshire System

The Institute of Nautical Archaeology is a nonprofit scientific/educational organization whose purpose is to gather knowledge of man's past as left in the physical remains of his maritime activities and to disseminate this knowledge through scientific and popular publications, seminars, and lectures. The INA Newsletter is published periodically by INA and is distributed to its members and Supporting Institutions to inform them of INA's activities. INA is an equal opportunity organization.

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