CONSERVATION OF CULTURAL AND SCIENTIFIC OBJECTS

In creating the National Park Service in 1916, Congress directed it "to conserve the scenery and the natural and historic objects and the wild life" in the parks.[1] The Service therefore had to address immediately the preservation of objects placed under its care. This chapter traces how it responded to this charge during its first 66 years. Those years encompassed two developmental phases of conservation practice, one largely empirical and the other increasingly scientific. Because these tended to parallel in constraints and opportunities what other agencies found possible in object preservation, a preliminary review of the conservation field may clarify Service accomplishments.

Material objects have inescapably finite existence. All of them deteriorate by the action of pervasive external and internal agents of destruction. Those we wish to keep intact for future generations therefore require special care. They must receive timely and. proper protective, preventive, and often restorative attention. Such chosen objects tend to become museum specimens to ensure them enhanced protection.

Curators, who have traditionally studied and cared for museum collections, have provided the front line for their defense. In 1916 they had three principal sources of information and assistance on ways to preserve objects. From observation, instruction manuals, and formularies, they could borrow the practices that artists and craftsmen had developed through generations of trial and error. They might adopt industrial solutions, which often rested on applied research that sought only a reasonable durability. And they could turn to private restorers who specialized in remedying common ills of damaged antiques or works of art. Although these skilled craftsmen and artists could often mend and refinish with cosmetic success, what they did to improve the appearance or utility of an object frequently impaired its historical integrity and future conservation.[2]

A profound change in the approach to object conservation took root in a few centers before World War II. In 1929 the Fogg Art Museum at Harvard set up what soon became the Department of Conservation and Technical Research. Edward W. Forbes, the museum director, staffed the department with a chemist and an x-ray specialist as well as an art historian. In 1932 it began publishing a scholarly journal, *Technical Studies in the Field of the Fine Arts,* which continued through ten volumes before the war terminated publication. This reported scientific studies of artists' materials and techniques, the causes and products of deterioration in paintings and other works of art, and new materials and methods to prevent or correct damage to these objects. The department's students found

employment as art museum directors, curators, and a new breed of specialists who came to be called conservators. The latter, few in number, were the first scientifically trained practitioners of object conservation in America.

By the end of World War II numerous art museums must have known of the Fogg's pioneering work but few had been able or willing to embrace it. Museums of art, science, and history tended to operate in separate spheres with little intercommunication. Many art museums continued to place their trust in restorers who clung to traditional empirical treatments. Some art experts relying on aesthetic judgment questioned or bitterly opposed the scientific findings. The high costs of equipping and staffing adequate conservation laboratories deterred many museums. The consequent lack of demand for trained conservators tended to dry up the meager sources for training.

Scientific conservation continued to grow nevertheless. In 1950 members of the original Fogg program joined with staffs of similar laboratories and individuals imbued with the same concerns to organize the International Institute for Conservation of Historic and Artistic Works (IIC) headquartered in London. Subsidiary national groups formed under its wing in many countries. IIC proved an effective means to stimulate continued research and training. It set standards for the new profession and multiplied the amount and availability of technical information. The American group initiated a code of ethics in the early 1960s that emphasized the profession's basic tenet: "unswerving respect for the aesthetic, historic and physical integrity of the object."[3]

Training for conservation came to mean several years of rigorous graduate study and internship or the equivalent in apprenticeship under a master conservator. Formal training of this scope became available again in the United States beginning in 1960.[4] The principal centers focused on fine arts conservation, although museums also needed scientifically trained conservators of more mundane cultural objects and even natural history specimens. If one wished to become a qualified conservator of such material the pathway remained less clear until the 1980s, when training programs for work on library materials, anthropological specimens, architecture, and other specialties began to take shape.

Conservators needed to perform three well-defined functions: examining objects to confirm and record their significance, original composition, and condition; preserving objects by environmental control or treatment to prevent or decelerate continued deterioration; and restoring objects when necessary to make them understandable with minimum loss of integrity.[5] In so doing they had to work in close collaboration with two other kinds of experts. Curators possessing thorough knowledge of the nature, significance, and context of objects needed to define the specific goals for their

conservation. Conservation scientists had to analyze and test materials, environmental influences, and procedures to establish the appropriateness and adequacy of treatment. As conservation scientists continued to refine the materials and methods for treatment, trained conservators inevitably applied ones that were later superseded by others better protecting the integrity of the objects.

The Empirical Phase, 1916-1948

As was true in museums outside the parks, object conservation in the parks during this period tended to apply practical methods based on everyday experience and observation rather than scientific analysis. The Park Service director's first annual report to the secretary of the interior in 1917 noted two urgent conservation situations that illustrate the point.

One involved a collection of deteriorating totem poles at Sitka National Monument. These striking objects, significant as documents of native culture, were the primary visible resource attracting visitors to the park. The Service obtained $1,000 in its 1918 appropriation to appoint a Sitka resident as monument custodian and have him treat the poles. Over several years decayed wood was chiseled out and replaced with new cedar, and new paint was applied. "It is anticipated that when these repairs are completed the poles will be preserved permanently, or at least that heavy repairs will be rendered unnecessary for many years," the director's 1926 report declared. The old poles nevertheless deteriorated beyond repair by 1940, when CCC workers carved reproductions incorporating bits of the old ones.[6]

A Canadian crew, faced with the same basic problem during the 1920s, analyzed the need more scientifically. They developed a procedure for reinforcing original totem poles, using tested wood preservatives, isolating untreated old wood from contact with the soil, sealing it, and finally painting it in close consultation with knowledgeable natives to match original colors. Poles decayed beyond repair were carefully taken down and protected from further weathering. In 1931 the National Museum of Canada published a description of the process that the Park Service reprinted ten years later in its *Field Manual for Museums.*

Response to the second conservation need cited in the director's 1917 report was also empirical but reflected more interest in scientific guidance. At El Morro National Monument both vandalism and weathering threatened the inscriptions carved in a sandstone outcrop by passing travelers of preceding centuries. As common-sense preventive conservation, the Service installed fencing and protective plantings to deter modern visitors from adding to the incised record. These and other measures did not protect the inscriptions from the weather, and in 1920 the Service sent a block of the

sandstone to the National Bureau of Standards for experimental treatment. Scientists there tried to impregnate the stone with some binding agent, but the binders penetrated only a short distance. Because the artificially consolidated outer layer expanded and contracted with temperature changes at rates different from the underlying rock, it tended to spall off in chunks.

Concern with object conservation necessarily increased with the rapid growth of the national park system and its museum program in the 1930s. Early in 1935 the Field Division of Education at Berkeley issued Museum Preparation Memorandum No. 1, which pointed out the importance of counteracting rapid deterioration in specimens and getting them stabilized. It offered no hands-on assistance from the division but recommended two recent, inexpensive publications containing sound, scientific guidance in object conservation. *The Preservation of Antiquities* by Harold J. Plenderleith of the British Museum Laboratory provided clear descriptions of materials commonly found in the composition of ancient artifacts, the nature of their deterioration, and practical methods of cleaning and preservative treatment the laboratory had developed and tested. The 1929 annual report of the National Museum of Canada contained a paper by Douglas Leechman giving comparable information for anthropological museum specimens of North American origin.[7] Carl Russell probably had copies of both sent to all parks, which could not have found better instructions at the time.

This infusion of scientifically based technical information contributed directly to specimen treatment in some parks. When Jean (Pinky) Harrington took charge of the nascent historical archeology projects at Colonial National Historical Park in 1936, he set up a laboratory to clean and treat the vast number of artifacts being recovered (Chapter One). Perhaps the most sophisticated procedure employed there involved the iron objects. Supervised CCC enrollees hand-cleaned these heavily rusted specimens, wrapped them in strips cut from sheet zinc or covered them with the more expensive granulated zinc, and immersed them in dilute sodium hydroxide for hours or possibly days. An electrochemical reaction generated hydrogen, reducing the rust to iron. The specimens then required thorough washing, perhaps brushing, and oven drying before being coated with melted paraffin. A published account of the Jamestown laboratory's procedures cited the Plenderleith and Leechman instructions as the principal sources.[8]

Another example of their influence occurred nearby. In 1937 Paul Hudson, the park curator at George Washington Birthplace National Monument, prepared excavated brass artifacts for exhibition by cleaning them with 10% acetic acid to remove surface corrosion and coating them with celluloid dissolved in acetone. These methods came directly from Leechman's paper. Because Hudson and other park staff who applied the

newly available information were untrained in scientific conservation, their use of the techniques remained empirical.

The same scientific publications also influenced thinking at higher levels in the organization. In a December 1936 report Ned Burns restated Service responsibility to preserve objects of scientific or historic value related to the parks. "These specimens require professional attention for their repair, cleaning and preservation in accordance with the most modern methods . . . ," he wrote. "Unless constant protection is provided by skillful and experienced technicians serious loss and irreparable damage will result through their deterioration." Such technicians scarcely existed at that stage, however, forcing Burns to rely on exhibit preparators in the museum laboratory whose manual skills he trusted. In 1937 he had an exhibit artist from the laboratory restore murals at Arlington House probably originally executed by George Washington Parke Custis. The paintings restorer then working at Morristown National Historical Park was doubtless equally ignorant of the new standards for such work developed at the Fogg Museum. In 1938 Burns detailed one of his preparators to instruct and supervise CCC enrollees at Cacapon State Park, West Virginia, in cleaning and restoring 175 antique specimens of various kinds.[9]

Scientific procedures, on the other hand, characterized Burns' response to another conservation challenge. In June 1935 two Mammoth Cave National Park guides discovered the mummified body of a pre-Columbian Indian some two miles within the cave. The park exhibited the body near the discovery site in an available showcase. In about two months mold was apparent on the mummy's skin. Burns reasoned that the immediate cause involved the old showcase. Turning on its lights warmed the enclosed air, accelerating mold growth. The air cooled and contracted when the lights were off, sucking in more damp cave air, which also favored mold. But why had the body not decayed in the cave's moist atmosphere? The cave's history had demonstrated the presence of saltpeter in the sediments that had washed into the underground passages. Chemical analysis revealed the nitrate in the sand on which the mummy had lain and in body tissues as well. Burns theorized how the infusion might have occurred and devised a corrective treatment.

First he cleaned away the surface mold using a soft brush, selected solvents, and the assistance of one of his exhibit preparators. Then he had the mummy placed in a tight wooden box. Within the box it rested on a wire mesh shelf above ten pounds of dehydrated calcium chloride. By blowing warm, dry air through the box he dried out the body enough to inhibit continued growth of the mold without attendant damage. Then he impregnated it with a fungicide, thymol dissolved in alcohol. Meanwhile he ordered a new table case manufactured to exact specifications. Its unique feature was a shallow drawer beneath the case floor to hold calcium

chloride for dehumidifying the air in the case and thymol to kill any mold that recurred. The drawer automatically opened or closed a tight-fitting trap door in the floor of the case as it slid in or out. Burns carefully positioned the mummy in the case, charged the drawer with its chemicals, and instructed the park staff to keep them replenished.[10]

When Mammoth Cave National Park a few years later became concerned about the condition of the historic saltpeter vats in the cave, it turned again to the Museum Division for advice. Burns arranged to have selected samples of the old wood analyzed by the Agriculture Department's Bureau of Chemistry and Soils as the first step in planning proper treatment.[11] A second Museums Association booklet by Harold Plenderleith, *The Conservation of Prints, Drawings, and Manuscripts,* had alerted him to scientific developments in paper conservation. To inform those park museums having manuscripts on display he quoted at length from this publication in the Museum Division's monthly report for January 1940. The March 1940 report showed him also well aware of progress being made in document care by the National Archives. From this report parks learned that the Archives would, upon specific request from the director, laminate in cellulose acetate significant historic documents from park collections. Lamination represented a line of conservation research largely distinct from what came out of the scientific laboratories of the Fogg and a few other art museums. As host to the Park Service engineering laboratory for a few years just before World War II, the Museum Division also kept in touch with its research on conservation of building materials.

Empirical treatment of museum objects nevertheless remained the norm. The Service in 1940 received for the Lincoln Museum the objects used as evidence at the 1865 trial of the assassination conspirators, including Booth's murder weapon, his telltale diary, the leather boot Dr. Samuel Mudd had cut from his broken leg, and the various guns and knives carried by his accomplices. Exhibit preparators in the Museum Division laboratory cleaned the items, which had lain secure in a Treasury Department vault since the trial, and applied any preservative treatment that seemed necessary to ready them for exhibition. Six months later Salem Maritime National Historic Site sent to the Museum Division a parchment stencil and other items that Nathaniel Hawthorne had used as an official in the Salem Custom House. Again the preparators cleaned and repaired the specimens for display.[12]

Often curators applied preservative techniques, likewise empirically rather than scientifically. Late one afternoon in 1941 Ralph Lewis checked on some matter in the Lincoln Museum vault and found the uniform of Major Henry R. Rathbone, a guest of the Lincolns at Ford's Theatre, heavily infested with clothes moths. Seeing the infestation as a conservation emergency, he promptly carried the uniform upstairs to the empty

laboratory, soaked it thoroughly with carbon tetrachloride, and hung it to dry overnight. His choice of treatment typified empirical conservation. The chemical was at hand, not yet outlawed because of its toxicity. Lewis knew it was used for insecticidal fumigation in combination with another chemical. Dry cleaners also used it, so it should not damage the textile. In this instance the treatment eliminated the infestation without apparent side effects in spite of inadequate analysis.[13]

Clearly understanding the need curators and preparators untrained in conservation had for better empirical guidance, Ned Burns devoted more than a quarter of the *Field Manual for Museums* to a Technical Methods chapter. The introductory paragraph on cleaning and preservation stated the importance of approaching these tasks scientifically: "It is essential to know, first, the physical and chemical properties of the objects to be cleaned . . . . The chemical nature of the material to be preserved as well. as the composition of foreign substances to be removed should be determined by tests to avoid mistakes in treatment."[14] The chapter said little more about how to make or obtain such analyses, for which few museums in or out of the parks had proper means. What it did supply were brief, clear instructions and precautions curators or preparators should follow in treating the principal kinds of specimens. It concluded with a useful glossary of the materials museums used in preparing and preserving objects. About as soon as the *Field Manual* made these empirical data readily available, Burns started drafting a handbook for the Committee on the Conservation of Cultural Resources as it prepared American museums to protect their collections under wartime emergencies (Chapter Three).

The Service museum program had not yet really crossed the threshold from empirical to scientific conservation, as revealed by its efforts to cope with the Gettysburg cyclorama. This huge painting depicting the battle of Gettysburg had been on view in Gettysburg for many years before the Service acquired it in 1942. The simple building that housed it lacked the means for proper climate control and was penetrated by driving rains. The artist's canvas, heavy with paint and hanging from its upper edge, had weakened with age. Grime dimmed the painted surface. Burns inspected the acquisition and advised the park to do what stabilizing it could with its own employees, but he suggested no specific measures.

After the war the Service's 1948 appropriation included $10,000 for conservation of the cyclorama, and Burns took prompt action. The critical changes in painting conservation techniques emanating from the Fogg Museum had evidently not captured his attention. Instead he worked out contract specifications with Carlo Ciampaglia, a New York muralist. Ciampaglia and a few assistants washed the painted surface of the cyclorama with soap and water and glued a horizontal strip of new canvas to the back as an attachment for added support.[15] This treatment involved

risks to the painting that scientific conservators would have avoided. About this time Yosemite National Park engaged a San Francisco restorer to work on some of its fine paintings. Also of the old school, he practiced reforming varnish coatings and other methods outdated by the research at Harvard and elsewhere.

The Scientific Conservation Phase, 1949-1982

Within the Park Service archeologists working in the Southwest, perhaps Charlie R. Steen in particular, first realized the importance of conservation based on scientific principles. Concerned about the continued deterioration of wall paintings and plaster in the old mission church at Tumacacori National Monument, Steen contacted the Fogg Museum for advice. R. John Gettens, the museum's chief of technical research, visited Tumacacori in June 1949 to study the materials and conditions involved. Back at his laboratory Gettens formulated a synthetic resin designed especially to spray-coat the friable paint and plaster and detailed a three-step treatment park staff members might safely apply. They were to remove most of the disfiguring dust, adobe drip, and bird droppings by careful brushing, fix the surface with a light spraying of the synthetic resin, then point the broken plaster edges.[16]

Steen's initiative apparently led the Service to seek more information about the work going on at the Fogg. While negotiations were in progress for the Tumacacori consultation, Superintendent Edwin W. Small of Salem Maritime visited the museum and met Gettens. "He is very much interested in the subject of establishing professional standards for people engaged in the conservation of the objects of art and archaeology . . . ," Small wrote Chief Historian Ronald Lee. "I look forward to having him visit Salem and the Adams Mansion and appraise our needs . . . ."[17]

Burns must have wasted little time at that point in beginning the steps necessary to establish a position in the Museum Branch for a Fogg-trained conservator. Harold Peterson, who became a staff curator in the branch in 1947 and who had a particular interest in the preservation of historic weapons and related objects, surely supported this course. Peterson learned all he could by observation, reading, discussion, and experiment, then applied treatments with care while critically appraising the results. He personally cleaned and gave preservative treatment to some specimens for park exhibits under construction, but his informed interest in such matters became more obvious in 1949 during the first Museum Methods Course (Chapter Four). Under his watchful eye trainees and also fellow instructors learned to remove corrosion from gun barrels without scratching the underlying surface. He taught them to pick rust from pits with pointed

wood sticks and never to use such shortcuts as buffing wheels and power brushes.

Peterson's concern for proper conservation of park museum specimens reinforced Burns' sense of how critical the problem had become. A request soon went out from Washington headquarters for specific information on cultural objects in urgent need of preservative action. A response filled with photographs of deteriorating specimens in the eastern parks in August 1949 provided the Museum Branch with good support for a renewed appeal to fund object conservation, and the 1951 fiscal year appropriation included money for the purpose. Meanwhile, Colonial National Historical Park reactivated its archeological laboratory and resumed the electrochemical reduction and paraffin coating of excavated iron during the summer of 1949. To help support the laboratory the regional office urged parks to send specimens of this type to Jamestown for treatment at a cost of fifty cents to two dollars per object.[18]

The Museum Branch demonstrated its growing awareness of higher conservation standards when it installed the exhibits for the new William H. Jackson wing of the Scotts Bluff National Monument museum in the late summer of 1949. Most commercially available matboard had a cheap paper core sealed front and back by thin layers of high-grade paper. Acid content of the core paper could reach and damage the art mounted in the mat through the cut edges of the mat window. Only a few manufacturers supplied matboard composed throughout of 100% rag stock virtually acid-free. The branch specified the use of all-rag mats when it ordered Jackson's sketches matted and framed for the exhibits. When the framed pictures arrived at the park on the verge of the museum opening, however, they had ordinary mats. The branch rush-ordered matboard of the specified quality, and Robert Scherer, a highly competent preparator, rematted the sketches after the opening ceremony.

In the fall of 1950 Burns tried to recruit John Gettens for his conservation position. Gettens accepted another offer from the Freer Gallery of Art but recommended two of his Fogg Museum colleagues. Burns selected Elizabeth H. Jones, who entered on duty the following May after the branch converted the largest, lightest office in its dingy, parking-garage laboratory to a paintings conservation studio for her use. She initiated the practice of surveying and recording the condition of paintings in park collections to select the pictures in most critical need. She brought to the Park Service the technique of "facing" deteriorating oil paintings before moving them to the laboratory and specified the design for packing boxes to transport paintings safely. In the studio she patiently applied the delicate processes of cleaning, relining, and restoring as needed with consummate skill.

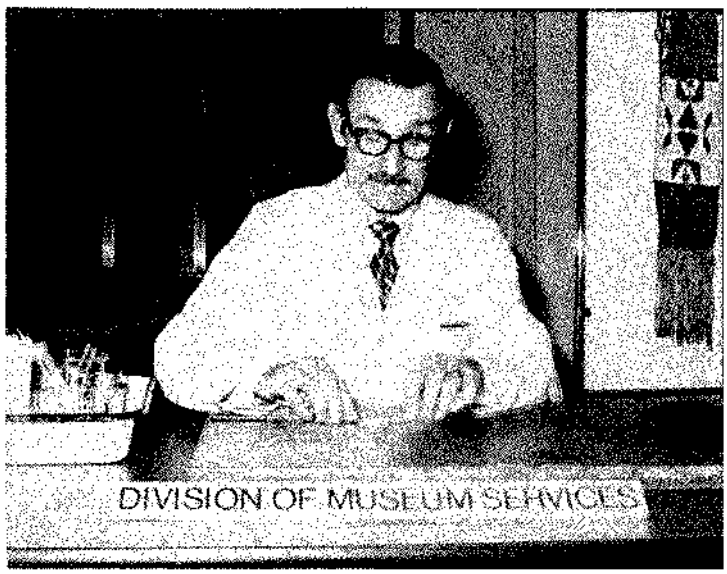
Performing such painstaking work with grace and proficiency, Betty Jones introduced the branch staff to new standards in the practice of object

Elizabeth H. Jones. The Park Service's first professionally trained conservator.
(Courtesy of the Straus Center for Conservation, formerly Center for Conservation and Technical Studies, Harvard University Art Museums, © 1993 President and Fellows of Harvard College.)

conservation. Although she had moved from an art museum environment of fine paintings chosen for aesthetic merit to one in which historical values predominated, she showed equal respect for the integrity of the original works and the same degree of care in examining and treating them. Most of her time went toward the examination and treatment of paintings from Independence National Historical Park and Adams National Historic Site for which the Service felt particularly urgent concern. She had made impressive progress when she returned to the Fogg Museum as its chief conservator in June 1952.[19]

Upon Jones' recommendation, the Museum Branch appointed Walter J. Nitkiewicz as her replacement. He had not trained at the Fogg Museum but had completed under Alfred Jakstas a thorough apprenticeship in art conservation as practiced there.[20] Continuing the knowledgeable examination and treatment program Jones had begun, he remained the staff paintings conservator for the branch and its successors until his death in 1979. The focus of his duties was easel paintings, of which there were more than enough in park collections to keep a single conservator continuously busy.

The necessity to provide conservation of comparable standard for other kinds of cultural objects became apparent even before Jones' appointment, although no pool of formally trained conservators for such artifacts yet existed. Harold Peterson knew that the electrochemical treatment being



Walter J. Nitkiewicz. Park Service fine arts conservator.

used at Jamestown failed to a degree for iron artifacts exposed to salt water, and he had heard of Service archeologists losing some key objects of wet wood or leather that required specialized treatment immediately upon excavation. Upon his urging, the Museum Branch secured the hiring of Harry Wandrus as a full-time conservator assigned to the Jamestown archeological laboratory in April 1951.

Peterson had become acquainted with Wandrus while a graduate student at the University of Wisconsin. The young man had some grounding in chemistry. He was a discriminating arms collector practicing safe, effective ways to clean, restore, and preserve the objects he collected. He could handle machinery. At Jamestown he increased the laboratory's productivity while widening the range of specimens treated. His experiments with an Army field method for rust removal from weapons and equipment using acid demonstrated possibilities for its safe application in the laboratory. He sent his report to Ned Burns along with a sample of the new vapor-phase rust inhibitors he thought might find use in park collections.[21]

The temporary laboratory structure at Jamestown had to come down to make way for the permanent facilities that would mark the 350th anniversary of the Virginia colony, and Wandrus was transferred to the Museum Branch in Washington by early 1954. Setting up shop at the branch's museum laboratory (then in Temporary Building S on the Mall), he became its staff conservator for objects outside Walter Nitkiewicz's area of specialization. Here he faced a considerably wider variety of specimens in need of expert conservation, requiring him to expand his knowledge and skills.

Harry Wandrus. Park Service objects conservator.

In March 1954, for example, the laboratory had four Civil War flags, each unique in various ways, to clean and restore for exhibition. Fragile and sensitive to photochemical deterioration, they called for delicate handling in a sequence of exacting procedures. For help with these the branch turned to the Textile Museum of the District of Columbia. This small, specialized institution had emphasized scientific concern in the care of its collections and practiced well-considered ways of cleaning, repairing, and mounting specimens. Textile Museum staff visited the laboratory to examine the flags and suggest suitable methods for their treatment, and Wandrus attended an intensive three-day course at the museum on scientific cleaning procedures. He then proceeded to wash, restore, and mount the flags with guidance from its staff. From this beginning he developed his knowledge of conservation techniques for historic flags until his advice and help became widely sought.[22] Other textiles on which he worked included the Washington tents for Colonial National Historical Park and a 17th-century ecclesiastical stole, which he had the Textile Museum staff clean and repair before he devised a secure mounting.

March 1954 also saw a 19th-century carriage, which had been donated to Hampton National Historic Site, moved bodily into the laboratory for Wandrus to restore. Because horse-drawn vehicles and their accouterments were historically associated with many parks and required specialized historical knowledge, the Museum Branch engaged Paul H. Downing to

advise on the recurring problems of identification, evaluation, conservation, and interpretation of such objects.[23] Downing, who was guiding similar work at Colonial Williamsburg, specified the desired results of the carriage's restoration, directed Wandrus to the authentic materials required, and explained techniques carriage makers had historically employed. He did not believe that modern spray applications of paint and varnish, for example, could accurately replicate the original appearance. Work on this specimen, extending over two and a half years, provided a valuable learning experience for the conservator and set a restoration standard for vehicles in Park Service custody.

Other materials also demanded the conservation skills Wandrus was maturing. When Pinky Harrington discovered at Fort Necessity National Battlefield the location and ground plan of George Washington's short-lived field fortification, some of the long-buried stockade post stubs required prompt conservation. Wandrus chose alum impregnation as the surest, most practical method then available. The laboratory lacked the necessary equipment but he quickly improvised heaters and containers for prolonged immersion of the wood in hot alum solution, with satisfactory results.

This treatment would not do for the massive timbers uncovered by archeologists at Fort McHenry in 1958. They had supported the flagpole during the bombardment and were the only tangible remains at the fort so closely associated with the star-spangled banner of the national anthem. Sharing the early interest in polyethylene glycol as a preservative for waterlogged wood, Wandrus began studied application of this hygroscopic wax to the timbers in November 1958 and watched the effect of repeated treatment as incipient cracks closed and the wood resisted shrinkage or warping.[24] Before epoxies came into use to consolidate seriously decayed wood, Wandrus also experimented with soluble nylon as a consolidant in restoring an unusual ammunition cart from Morristown, although he later abandoned its use because of its aging characteristics. The collection of river boats he treated at Grand Canyon National Park required still other techniques.

Metal conservation remained the center of Wandrus's professional concern. In 1954 he checked all the specimens in the Fuller arms collection (Chapter Seven) and treated those exhibiting active deterioration. He repeated the inspection and needed treatments on an approximately annual schedule for years thereafter. Also in 1954, he carefully de-rusted and applied protective coatings to a substantial collection of architectural ironwork at the Jefferson National Expansion Memorial and conserved a recently excavated 16th-century sword for the state of New Mexico. His 1956 assignments included preservative treatment of arms and armor for Colonial National Historical Park and San Juan National Historic Site. The next year enough excavated iron awaited cleaning to warrant reassembly of

the former Jamestown laboratory equipment in his Washington shop. Conservation of the iron balcony railing at Congress Hall in Independence National Historical Park required his attention in 1961.[25]

Wandrus trained coworkers to assist in conservation and continually worked to improve his own technical knowledge and skills. He personally bought and studied at home the technical publications most pertinent to the problems he faced at work. He conferred with other conservators when possible and attended professional conferences. Before his untimely death in November 1965 he had become widely known and respected in the growing community of professional conservators. His influence on the collections in national park museums continued through the labors of the successor he had nurtured and the substantial technical library he donated to the Park Service.

Walter Nitkiewicz's basic task of caring for the easel paintings in park collections suffered interruption in 1955 when the Old Courthouse rotunda at Jefferson National Expansion Memorial underwent restoration. Its upper walls, dome, and lantern carried extensive mural decorations requiring conservation. Four large historical scenes by Carl Wimar occupied lunettes around the base of the dome, and more than twenty allegorical and historical figures by Ettore Miragoli completed embellishment of the soaring space. Nitkiewicz recruited and instructed a team of local art students and artists. Under his close supervision they worked day after day on high scaffolds readhering loose paint or plaster, cleaning the grime from paint surfaces with tested solvents, in-painting where necessary, and finally applying a protective coating. The job took from April 1955 to July 1956 and cost about $45,000.[26]

Nitkiewicz's extended absence from his normal duties emphasized how understaffed the Museum Branch laboratory was for painting conservation. Anne F. Clapp, the other of the two Fogg Museum-trained conservators John Gettens had recommended six years earlier, was again available after serving as conservator for collections at the Jamaica Institute. The branch seized the opportunity to hire her in October 1956. Initially sharing laboratory facilities with Nitkiewicz, she applied her expertise in cleaning and rematting 18th-century prints for George Washington Birthplace National Monument and Colonial National Historical Park. In January 1957 her duty station shifted to a new satellite conservation laboratory at Independence where she could care for that park's extensive portrait collection and other important Service paintings in the Northeast.

Anne Clapp's equipment also permitted treatment of paper-based specimens, and she managed to include a significant amount of paper conservation in her output. A historic ceiling painting in the Senate Chamber of Congress Hall became another addition to her primary workload. Paint, plaster and ceiling supports had so deteriorated that

adequate conservation required temporary removal of the ceiling section bearing the painting. In the summer of 1959 Clapp prepared the painted surface for the rigors of moving, and Frank Phillips from the Museum Branch supervised the delicate operation of cutting out the section and maneuvering it by crane out of the building and into a workroom. There Clapp executed a thoroughly professional conservation treatment of the painting and its support. Two years later Phillips saw to the mural's return intact to its original place in the restored chamber ceiling.[27]

In 1960 Anne Clapp accepted a position as paper conservator for the Intermuseum Conservation Association, terminating the satellite laboratory in Philadelphia and leaving Walter Nitkiewicz as the Service's only fine arts conservator. Independence could fill the gap in part by sending portraits in critical need to Betty Jones at the Fogg Museum under contract. Nitkiewicz, meanwhile, had continued to shoulder special assignments. At Castillo de San Marcos National Monument in 1958 he addressed difficult problems of preserving historic graffiti on plaster walls, a severely weathered coat of arms carved in stone over a fort entrance, and carved stone fonts in the fort chapel. That summer he cleaned and restored two large landscape paintings of Yellowstone and the Grand Canyon by Thomas Moran set in the paneled walls of the secretary of the interior's conference room.

Beginning in the fall of 1959 Nitkiewicz tackled a project of extreme technical complexity that would take two-and-a-half years to complete: restoring for permanent exhibition the Gettysburg cyclorama, about 27 feet high and 353 feet in circumference. The Service was erecting a carefully sited structure designed by Richard Neutra in which to display the colossal painting properly. Because special equipment would be needed to move large sizes and weights of canvas with precision and safety in confined spaces, Nitkiewicz enlisted Henri G. Courtais as a consultant conservation engineer. He also organized a team of four assistants drawn largely from the crew he had trained for work on the courthouse murals in St. Louis.

Nitkiewicz and his crew began by facing the entire painting with squares of Japanese tissue paper to hold in place any paint that might come loose. The usual facing technique required adaptation to counteract tensions in the weakened canvas. Using a transit, they established a level line around the complete circle of painted scene that would prove vital during reinstallation. Next they cut the painting into vertical strips narrow enough to fit on the twenty-foot-wide relining table. Lowering each strip in turn face down onto the padded table, they flattened the stiff, friable canvas by painstaking application of controlled heat and moisture working from the center outward. Infusion of a gelatin size enabled them to limit penetration of the relining adhesive. Patching breaks, replacing old repairs, and removing former reinforcements followed. Stretching the linen relining

canvas called for precise teamwork by all hands as well as the use of innovative devices. After relining they turned the strip face up, removed the facing paper, and cleaned the painted surface with gauze wads and a mixture of carefully chosen solvents, wiping away the dirt from 10,000 square feet of surface without loss or damage to the paint. The final stage of mounting the strips in the new building and rejoining the cut edges along the natural curvature the hanging canvas assumed proved most difficult of all.[28]

Successful completion of the project on schedule allowed Nitkiewicz to resume his duties in the Washington laboratory. There he treated painting after painting from park collections selected on the basis of his surveys of their condition. The number of examined but untreated paintings demonstrated the urgency of continuing this work. When more special tasks again interrupted Nitkiewicz, the use of outside conservators under contract to restore easel paintings for parks required consideration.[29]

The Branch of Museums/Museum Operations in the mid-1960s was wary of contract conservation. Most of the relatively few fine arts conservators who had received thorough training in the new scientific techniques and materials worked full-time for established institutions. Moreover, no recognized certification of qualified conservators existed. The branch concluded that park museum specimens that could not wait for conservation by its staff specialists should be entrusted only to conservators specifically recommended by a fellow of the International Institute for Conservation of Historic and Artistic Works.[30]

In 1965 the Branch of Museum Operations took steps to contract with two conservators of unquestionable repute for sustained services to two or three nearby park collections. Susanne P. Sack, paintings conservator for the Brooklyn Museum (and later president of the International Institute for Conservation), agreed to conduct condition surveys at Theodore Roosevelt Birthplace and Sagamore Hill national historic sites as a start. Betty Jones of the Fogg Museum consented to survey The Wayside, Nathaniel Hawthorne's home in Minute Man National Historical Park, and the Derby House at Salem Maritime. After submitting reports the following spring, both women received contracts for conservation treatment. To this extent the trial proved successful and instructive, but fluctuations in branch funding and contractors' priorities prevented long-term maintenance of the arrangements.

The Museum Branch also needed to augment its object conservator manpower. Part of the overload facing Harry Wandrus consisted of specimens sent from the Western Museum Laboratory for preservative treatment and perhaps restoration before being mounted in exhibits. The western laboratory lacked a staff conservator and at the time could hardly expect to find a properly trained one. Having to ship objects back and forth

across the country delayed exhibit production and exposed the specimens to increased risk.[31] In 1960 the Museum Branch recruited and crash-trained a conservation technician for the western laboratory, Kurt Hauschildt. He entered on duty at San Francisco that December but left the next summer, whereupon John Jenkins hired Richard L. Andersen as his replacement.

Andersen was educated at the University of Nebraska and had sharpened his manual skills in the repair of testing instruments. After a month of introductory conservation training under Wandrus, he began treating exhibit specimens and processing backlogs of specimens in several parks with aptitude and zeal. In 1962 he continued preservation of veteran river boats at Grand Canyon National Park and Lake Mead National Recreation Area. In 1963 and again in 1965 he spent weeks on the collection at Fort Laramie National Historic Site. Sitka National Monument sent excavated objects from its study collection to him in 1964. Development target dates at Fort Davis National Historic Site in 1966 required him to set up a virtual assembly line of specimen cleaning and treatment. Bent's Old Fort National Historic Site summoned him to treat several hundred specimens in 1967. Andersen transferred to the Army Materiel Command in March 1968 as closure of the Western Museum Laboratory became imminent.[32]

When the western laboratory closed, the Branch of Museum Operations again provided the only staff source for professional object conservation. Edward P. Brown had become Wandrus's assistant early in 1961 and succeeded him as general objects conservator at the end of 1965. A reserve Army ordnance officer when the Park Service hired him, he was proficient in technical matters. He had also served a full seven-year apprenticeship followed by years of experience in the manufacturing jewelers' trade and thus had a thorough grasp of metalworking. From his years of association with Wandrus he learned the professional tenets of conservation. Park museum collections benefited substantially from his productive labor until he retired in 1976.[33]

Museum Operations selected James B. Smith, Jr., as Brown's assistant in August 1966. Pat Smith had worked as a technician and curator in the museum of the Armed Forces Pathological Institute and as curator for the George Washington University Medical School's anatomy department. Versed in techniques of tissue preservation and accustomed to a research environment, he had also attended the Service's four-week Museum Methods Course. Smith showed a commendably strong interest in reviewing the technical conservation literature on the materials being treated and in seeking expert advice. Unavoidably this tended to increase the time it took to complete work, as did his desire to learn more about the objects under treatment. Smith's development as a conservator under Brown's guidance

continued nearly four years until the move from Springfield to Harpers Ferry separated their work stations for a time.[34]

During the same period the Park Service conservation program found increasing need for conservators specialized in other kinds of objects. Growth in the number of furnished historic structure museums created insistent demands for an expert furniture conservator. Although the conservation profession had not yet established formal training for specialists in furniture, Harold Peterson found and recruited a craftsman who possessed exceptional practical knowledge and ability in the field. For thirty years Ralph Sheetz had operated a shop in the Shenandoah Valley making accurate reproductions and repairs of 18th- and 19th-century American furniture. He thoroughly understood the materials and methods involved in the construction and finish of a wide range of pieces. From the spring of 1966 until he retired in October 1978 he devoted his talents to the care of historic furniture in park collections, performing conservation of high quality in spite of continual pressure to meet target dates for museum openings.[35]

Other areas of special need in the late 1960s necessitated the use of contract conservation. A succession of unusually important textile specimens requiring treatment included the Treasury Guards flag that had snagged Booth's spur as he leapt from Lincoln's box at Ford's Theatre, the suit of clothes Lincoln had worn that night, a much older and more fragile suit associated with George Washington, and an embroidered silk bedspread the empress of China had given Theodore Roosevelt. In each of these cases the Branch of Museum Operations enlisted the help of James W. Rice, conservation scientist for the Textile Museum in Washington.

Rice visited the branch laboratory at Springfield to analyze the object, then planned an appropriate cleaning procedure. In two of the cases this involved washing and in at least one of the others dry cleaning. Both processes required him to formulate a particular cleaning solution with chemical properties designed to remove the identified soiling safely. Both also required setting up improvised cleaning tanks in the laboratory. Rice supervised the staff object conservators and staff curator Vera Craig closely as they performed the cleaning. The cleaned textile next needed proper support. The flag, for instance, was laid on a stretched backing of carefully selected wool flannel and covered with an almost invisible protective layer of fine silk. To join the three layers without affecting the integrity of the specimen, Rice brought in highly skilled needlewomen from the Textile Museum. Working on opposite sides, Helene Kovacs and Louise Cooley passed the needle back and forth to create minute, precisely placed stitches holding weak or broken threads securely.[36]

The Branch of Museum Operations also needed the help of outside experts in conserving paper artifacts. As it had since the 1940s, the

National Archives conservation laboratory continued to treat manuscripts, maps, and other single-sheet documents from park collections requiring fumigation, deacidification, and lamination. Deteriorating books with damaged bindings and brittle pages called for other types of conservation. Vera Craig found a skilled bookbinder on the growing conservation staff of the Library of Congress and another expert at the Catholic University library who undertook contracts for their preservation and restoration.

The late 1960s brought another form of outside assistance to the Park Service conservation program. The sustained influence of John Gettens at the Freer Gallery evidently persuaded the leaders of the Smithsonian Institution to increase emphasis on specimen conservation throughout its museums by establishing a central laboratory, modeled on the well-established one at the British Museum. The chief of the Conservation Analytical Laboratory would have no line authority to impose conservation standards and practices on the departmental curators, who by long tradition held responsibility for the care of collections, but he would offer them valuable supplementary services demonstrating the scientific approach and standards upheld by the profession. By 1968 Robert M. Organ, a distinguished conservation scientist formerly with the British Museum Laboratory, had assembled staff and equipment to make the new laboratory a reality. He initiated two developments ancillary to its mission that proved signally beneficial to the quality of conservation in the Park Service.

One was a course of study in the fundamentals of chemistry for conservators, a series of weekly lectures targeted principally for the Smithsonian technicians engaged in collection care. At Organ's invitation, the Branch of Museum Operations conservators and some of the curators including branch chief Ralph Lewis attended as many of the lectures as they could. The course helped significantly to bridge gaps in their training. "You have deepened their understanding of the scientific basis for the care and treatment of specimens and have instilled a philosophy of conservation as important as the practical methods you taught them," the Harpers Ferry Center director wrote Organ at the end of the eighty-hour cycle in 1972.[37]

The other was the Washington Conservation Guild, which welcomed conservators, conservation scientists, and curators as members. Its monthly meetings generally centered on the presentation and discussion of technical papers concerning aspects of conservation. Meeting places changed so that members could become better acquainted with the facilities and collections of numerous cultural institutions and no one institution would dominate. Participation enhanced members' sense of involvement in the standards, philosophy, and ethics of the profession, helped keep them up-to-date in technical matters, and furthered their contacts with knowledgeable colleagues. Museum Operations conservators and curators were active in the guild from the start. Harold Peterson served as its first president, Ralph

Lewis was on its council, and several more Park Service members held office during the 1970s and into the 1980s.

The contact the guild provided with a wide spectrum of expert conservation and the scientific background gained in Robert Organ's course helped raise the professionalism of the Service's object conservators to that of the academically trained conservators emerging from the new training programs at New York University, Cooperstown, and Winterthur. The first of these graduate conservators to join the Park Service was Janet Stone. She had worked in several museums and served in the Peace Corps as curator for the Sierra Leone Museum before training at the Conservation Center of New York University's Institute of Fine Arts and interning at the Smithsonian's Conservation Analytical Laboratory. The Branch of Museum Operations hired her as a paper conservator in 1970, as it was moving from Springfield to Harpers Ferry.

Officially the Division of Museums moved to the Harpers Ferry Center that March. Because the new HFC building contained no conservation laboratories and HFC's administration had secured no space for them elsewhere, most of the conservators had to remain behind at Springfield for an uncertain period (Chapter Five). An interim solution had taken shape for the furniture conservator. When David Wallace became assistant chief of the Branch of Museum Operations in 1968, he joined the Museum Support Group organized at Harpers Ferry pending HFC's activation and shared an office in the Brackett House, a partially rehabilitated historic building in Harpers Ferry National Historical Park. This building contained large unoccupied rooms readily adapted for the furniture conservation laboratory. Moving his work benches and power tools from Springfield, Ralph Sheetz put the new shop into production in November 1969.

After the Division of Museums settled into the new HFC building in the spring of 1970, it faced up to the space requirements for conservation. Adapting two large rooms in the park's Morrell House for paintings and paper conservation laboratories received first attention. By early 1971 Walter Nitkiewicz and Janet Stone occupied these facilities, which were intended to be temporary until Museum Operations could unite the conservation staff in the Paymaster's House. The park had recently completed exterior restoration of this larger structure and had restored and refurnished two rooms to illustrate their historic occupancy by Storer College. The branch concluded that the basement could initially accommodate the furniture and two object conservation laboratories and that the second floor could later house the painting and paper laboratories.

A succession of events altered the scheme. When HFC and the park urged interim use of a vacant store on Shenandoah Street to help enliven the lower town and give park visitors something interesting to see, the two conservators still at Springfield, Edward Brown and Pat Smith, moved there

and were joined by Herbert Martin. By the time the Paymaster's House basement was rehabilitated for their use early in 1972, the Branch of Museum Operations needed it for a registrar newly appointed to establish safe management of the museum objects converging on the center. Soon, however, the branch obtained use of the old Shipley School building, which accommodated more spacious and better equipped laboratories for all the conservators as well as meeting the registrar's requirements (Chapter Five).

In 1972 the Park Service had a professional staff of five conservators, all in the Branch of Museum Operations. Walter Nitkiewicz had come to the Service after a thorough apprenticeship under a highly qualified practicing conservator, and Janet Stone had followed the academic path of graduate training and internship. Both these channels, which would continue to be the principal avenues into the profession, rested on a fine arts background. In the absence of formal programs for training conservators in other specialties, Edward Brown and Ralph Sheetz had mastered their craft skills in the long tradition of apprentices and journeymen. Pat Smith had entered the professional ranks from a background in curatorial work. All five continued to take advantage of training opportunities such as Robert Organ's class in conservation chemistry. All actively participated in the growing network of the conservation community and each had earned wide respect within that community. Few museums in 1972 could claim a larger or more expert conservation staff.

Although the combined knowledge and skills of the five conservators embraced a wide range of cultural objects, the collections of national park museums contained a still broader spectrum. The existing team needed supplementing with conservators skilled in additional specialties, under contract if not on staff. The sheer number of specimens in need of conservation also exceeded the productive capacity of the five-person staff. The conservation *program would need to expand.*

Ideally, professional object conservators would work in close consultation with scholarly curators responsible for the long-term study and care of the objects. Pooling the knowledge and concerns represented by both points of view would ensure more accurate diagnoses of objects' conditions and wiser prescriptions of treatment. Few park museum collections could support scholarly curators, however, and bringing them often to the central laboratory for consultation was infeasible. The Branch of Museum Operations had two scholarly curators, Harold Peterson and David Wallace, available to consult with the conservators, and others could occasionally be called upon. Although they helped bridge the gap, they could seldom bring to bear the intimate knowledge about individual specimens their curators should possess.

Another program weakness lay in scientific support. Professional conservators necessarily guide many of their most crucial actions by the

chemistry and physics of the materials involved. They must make routine analyses and tests and require the facilities to do so. Beyond that they depend on conservation scientists to carry out more sophisticated analyses and the experiments necessary to verify and improve conservation methodology. The lack of a staff scientist undoubtedly lowered to a degree the standard of service the branch could provide, although its conservators were able to refer questions occasionally to the Conservation Analytical Laboratory and other government laboratories.[38]

The conservators in 1972 likely felt more concern about the Shipley School building they would obtain, outfit, and occupy that year. A large, main floor classroom became the paintings laboratory for Walter Nitkiewicz. It accommodated his examining table, large new vacuum relining table and smaller old one, easel, bench for work on frames and stretchers, soapstone sink, and most other necessities. Although the spray booth for applying picture varnish had to be installed on the second floor, Nitkiewicz had easier access to the paintings storeroom just across the hall. Another main floor classroom was transformed into the paper conservation laboratory for Janet Stone. It contained a new chemical bench with fume hood, additional sinks, work tables, drying racks, and cabinets for paper storage. One of its principal features consisted of a large, shallow tank custom-built with special temperature controls and piped deionized water.

Edward Brown's facility for conserving historical artifacts, upstairs over the paintings laboratory, contained his work benches, lathe, drill press and other metalworking equipment, sink, and cabinets. At the other end of the second floor two classrooms provided for Ralph Sheetz's furniture laboratory. One held work benches, cabinets, and open space for the pieces being treated; the other housed the woodworking machinery and wood storage. The fifth laboratory fitted to best advantage in the basement, where Pat Smith would work mostly on objects recovered through historical archeology. For smaller items he had a former classroom containing a long work bench, a chemical bench with reagent cabinets, additional cabinets, and closet storage. Adjacent open space in the wide hall and an alcove provided for airbrasive, ultrasonic, and electrochemical cleaning equipment and for working on big objects.

The new laboratories afforded a much-improved work environment and permitted a start on staff expansion. Allen Cochran, a private furniture restorer for more than twenty years with whom the branch had recently contracted, came to work with Ralph Sheetz in the furniture laboratory in 1972. Fonda Thomsen, the other new conservator hired that year, extended the variety of objects for which the branch could provide expert treatment. She had an academic background and some research experience in chemistry and biology, had done graduate work in the fine arts, and had trained at the Smithsonian's Conservation Analytical Laboratory. In line

with her interests, the branch assigned her to conserve ethnographic and historic artifacts largely of organic materials, such as textiles and leather, and equipped another main floor classroom across from the paper laboratory for the purpose.[39]

In 1974, following establishment of the Division of Museum Services with Arthur Allen as chief, two more positions were added to the conservation staff. F. Daniel Riss, a military veteran with a degree in anthropology/archeology and practical experience in photography, began as conservation assistant to Pat Smith in the excavated materials laboratory. Riss shared Smith's habit of thoroughly reviewing the pertinent technical literature as he proceeded and became increasingly responsible for the staff's reference resources. Upon Smith's death in January 1977, Riss succeeded him as conservator of archeological materials. In his second 1974 appointment Allen recruited Barclay Rogers, a naval reserve officer with experience as a metalsmith, corrosion control officer, ordnance officer, and aviator, to work under Edward Brown in the metal artifacts laboratory. When Brown retired in 1976 after fifteen years of able conservation service, Rogers succeeded him as metal artifacts conservator.

Charles Shepherd, who had graduated from the West Virginia School for the Deaf and acquired molding and casting skills in a dental laboratory, became Rogers' assistant in December 1976. Later he acquired special competence in the cleaning and repair of natural history specimens, enabling the division to expand its service.[40] Conservation technicians and conservators in training would prove useful in other division laboratories as well. Thurid Clark and Anna Johnson became apprentices in the ethnography conservation laboratory in 1976 and 1977, continued their association with the later textile laboratory, and went on to careers in conservation. The division hired Dale Boyce as an apprentice to the furniture conservators in 1978; he remained as a valued helper for about three years. Janet Werner served as an intern and apprentice in paper conservation under Janet Stone beginning in 1975 and later provided technical assistance to Walter Nitkiewicz in the paintings laboratory before continuing her conservation training at the Smithsonian Institution.

Internships for a time provided a form of mutual assistance benefiting the conservation laboratories. At least two interns were final-year graduate students in the select academic programs of conservation training. More represented the broader museum studies programs recently instituted in various colleges and universities. Letitia Allen was from Hood College, like Janet Werner, and interned particularly under Walter Nitkiewicz. Richard Trela of the first class in the graduate conservation program at Cooperstown also interned in the paintings laboratory. Carol Snow from Shepherd College interned in the ethnographical laboratory and went on to become a respected professional conservator. Richard Rattenbury, one of

several interns from Texas Tech University, gained practice in the metals and excavated objects laboratories. Brook Bowman, Nancy Hillery, and Barbara O'Connell from Texas Tech spent time in the paper laboratory among others. The paper laboratory also provided practical experience to Jeffery Goldstein, an Antioch College chemistry major who worked on deacidification methods and solvent research.

Interns, like apprentices, supplied practical assistance, but the instruction and close supervision they required reduced the time staff conservators could devote to their primary work. The instructional workload tended to become excessive during the 1975-79 period when it included the Phase II curatorial methods students from the parks (Chapter Five).

In 1976 the Park Service consulted with the Fish and Wildlife Service regarding conservation of the historic materials they had jointly helped salvage from the wreck of the SS *Bertrand* in DeSoto National Wildlife Refuge, Nebraska. The preservation of some 40,000 artifacts that had lain submerged in the Missouri River steamboat for more than a century was at stake. The two bureaus agreed that the Division of Museum Services should set up a temporary conservation laboratory on site to put the objects into a proper state of preservation and safe storage and to get them under catalog control. Fonda Thomsen was asked to manage the *Bertrand* laboratory project. She hired Edward McManus as an experienced archeological conservator in April 1977, and the two began work at the site the next month. They completed their difficult assignment in the fall of 1979.

To meet the need for conserving ethnographical specimens at Harpers Ferry during this interval, the division selected Toby J. Raphael in September 1977. After graduation from the University of California at San Diego with a double major in art and anthropology, he had enrolled in George Washington University's museum studies graduate program specializing in the conservation of ethnographic objects. An internship under Carolyn Rose in the anthropology conservation laboratories at the National Museum of Natural History was followed by a third year of advanced training at the Paul Coremans Center for Conservation in Mexico City. Raphael continued as the division's ethnographical conservator through the 1980s and beyond.

Just before Raphael's appointment, the division broadened the scope of its conservation services by staffing and equipping another specialized laboratory. Gregory S. Byrne entered on duty as conservator of ceramics and glass in August 1977. He had attended courses at the Cooperstown graduate program in conservation while apprenticed to Sidney S. Williston, a master objects conservator in private practice. After his apprenticeship he continued as a staff conservator for Mario's Conservation Services in

Washington until moving to the Smithsonian's Conservation Analytical Laboratory. The division fitted out a laboratory for him in the Shipley School basement but soon shifted his operation to the main floor.

Other staff changes ensued. To prepare for the retirement of Ralph Sheetz the division recruited his nephew, Ronald E. Sheetz, in February 1978. Ron possessed comparable technical knowledge and skills gained from a similar background, having successfully operated his own furniture restoration and reproduction business for nearly twenty years. With his uncle's retirement that October he succeeded Allen Cochran, who moved up to senior furniture conservator. In 1979 Janet Stone accepted appointment to the faculty of a new conservation training program at the Canberra College of Advanced Education in Australia. She was replaced as paper conservator by Susan Nash Munro, who had trained at Cooperstown and worked at the Canadian Conservation Institute and the Pacific Regional Conservation Center in Hawaii. Munro resigned in 1983 to care for her newborn child but later performed paper conservation for the Park Service under contract.

The death of Walter Nitkiewicz in January 1979 left the Service without a paintings conservator. To carry on his essential work the division selected Thomas G. Carter, chief conservator of the National Collection of Fine Arts (now National Museum of American Art). Carter had begun an apprenticeship there in the conservation of paintings before his graduation from George Washington University and had remained ten years afterward. When hired by the Service in October 1979 he was already a fellow of the American Institute for Conservation of Historic and Artistic Works and soon received fellowship in the International Institute as well. The paintings in park collections remained in good hands.

By this time the conservation organization, then including eight professional conservators and two conservation technicians in seven specialized laboratories, had expanded to the point where it merited status as a formal branch within the Division of Museum Services. Pending official approval by Harpers Ferry Center management, Arthur Allen proclaimed a de facto Branch of Conservation Laboratories. The *Bertrand* project had progressed far enough by the end of 1978 for him to recall Fonda Thomsen to assume the role of branch chief.[41] She coordinated the operation with a support staff of six. Among them were James (Mike) Wiltshire, by then a skilled and well-equipped photographer who provided the conservators with the critical before-, during-, and after-treatment visual records essential for their reports, and museum technician Tyra Walker, responsible for locating qualified conservators in private practice or other needed specialists and arranging and administering contracts.

About a year and a half of organizing and overseeing the Branch of Conservation Laboratories on the heels of her managerial stint with the

Bertrand project led Fonda Thomsen to request reassignment to the hands-on conservation she preferred. In 1980 she was appointed textile conservator with a newly equipped laboratory in the Shipley School basement. Thomas G. Vaughan transferred from the superintendency of Grant-Kohrs Ranch National Historic Site that July to head the branch, by then formally established. Having strongly advocated higher standards of collection management in parks where he had served, he proved ready to support the specimen conservation program with vigorous leadership.

Now with nine conservators, two conservation technicians, and seven support positions, the branch had grown to its ultimate size. In the process it had kept pace with the maturing profession. The staff conservators reflected the advances in professional training that had developed. The equipment of their laboratories had increased correspondingly in sophistication. Backed by a well-organized support staff and efficient procedural system, the conservators under Vaughan's direction offered park collections a service of exceptional quality.

The conservators grasped opportunities for advanced training to maintain their professional currency. In the 1977 fiscal year, for example, Janet Stone's laboratory hosted a two-week workshop course taught by Keiko Mizushima Keyes, a widely renowned paper conservator who bridged the gap between oriental and western techniques. She guided Stone, Walter Nitkiewicz, and Janet Werner through the analysis and treatment of 15 park specimens presenting unusual difficulties. The same year Allen Cochran attended a course in the identification of wood species at San Diego, and three years later he participated in a conference on historic upholstery and drapery at the Boston Museum of Fine Arts and Old Sturbridge Village. In 1980 Toby Raphael spent four weeks at the International Centre for the Study of the Preservation and the Restoration of Cultural Property (ICCROM) in Rome taking its Scientific Principles of Conservation course. To refresh and refine her skills in textile conservation Fonda Thomsen studied at the Abegg-Stiftung Bern, a Swiss museum outstanding for its scientific care of textiles.

The conservation program still lacked a conservation scientist to carry out refined preliminary analyses and similar research that characterized the top echelon of conservation laboratories, and the Park Service still could not provide the level of curatorial scholarship needed to guide conservation treatment of many individual objects. The reorganization of mid-1982 that separated the conservation staff from the chief curator's oversight while leaving her responsible for the conservation of the collections in park museums (Chapter Five) did nothing to correct either fault.

Two developments aimed to alleviate if not yet solve at least the curatorial problem. First, the new curatorial services staff under Chief Curator Ann Hitchcock in the Washington Office collaborated informally

with the Harpers Ferry Center conservators, particularly on matters of preventive conservation. Aspects of collection environment and care were of concern to both parties, and the conservators cooperated in providing expert advice. Second, professional conservation for park collections began to decentralize. The Western Archeological Center had set up a conservation laboratory in 1977 staffed with an able conservation technician, a step viewed with some anxiety at first by the Division of Curatorial Services in Harpers Ferry. When Edward McManus completed his assignment with the *Bertrand* project, the North Atlantic Region hired him as objects conservator. He engaged in both specimen treatment and curatorial training. When Janet Stone returned from Australia in 1983, the same region employed her as a full-time conservator focused especially on its massive problem of conserving plans at Frederick Law Olmsted National Historic Site but helping other parks as well.

The Branch of Museums and its successors had discouraged field areas from hiring or contracting with conservators, but conditions had changed. In earlier years qualified conservators were rare, training opportunities for them were scarce, and many restorers soliciting park museum business were unreliable. By 1982 the conservation profession still lacked a recognized referral system, but effective graduate training programs had acquired stature. So had several cooperative conservation centers that brought trained conservators and well-equipped facilities closer to the parks.[42] The Pacific Northwest Region began contracting with the Rocky Mountain Regional Conservation Consortium to treat park museum specimens in 1982 and later set up a cooperative agreement with this nonprofit organization.

Growth in the conservation profession also relieved the concern long felt by Park Service curators about the treatment given archeological collections. Archeological sites and the objects associated with them became a focus of training and research in the conservation community. When the Service's Western Archeological Center occupied its new quarters in Tucson in 1980, the facility included a conservation laboratory that would treat specimens deposited at the center and sent in from parks.

Scientific conservation in the national parks may be said to have come full circle in 1982. Thirty-three years after John Gettens had introduced the scientific approach to Park Service conservation problems in his study of the Tumacacori Mission murals, the ruin again needed the attention of experts. This time the Service called on ICCROM. Three internationally respected mural conservators, Paul Schwartzbaum, Carlo Giantomassi, and Donatella Zari, visited the park, analyzed the problems, then supervised Service conservators and historical architects in weeks of painstaking treatment. Notably, this was the first actual treatment project ICCROM personnel had undertaken in the United States.[43]

NOTES

1. Public Law 64-235, U.S. *Statutes at Large* 34: 335.

2. In cleaning and relining paintings, for example, fine arts restorers bad no way of understanding the long-term effects of their adhesives, solvents, and procedures. In an occupation without established standards, a clever craftsman might dismember a fine antique chair, incorporate each part into an otherwise reproduced copy of the chair, and sell each reproduction as an antique.

3. American Institute for Conservation of Historic and Artistic Works, *1989-90 Directory,* p. 21.

4. New York University's Institute of the Fine Arts established its Conservation Center with a four-year graduate training program in 1960. The New York State Historical Association in collaboration with the State University College at Oneonta opened a similar program at Cooperstown in 1970. The Henry Francis du Pont Winterthur Museum and the University of Delaware began their joint program in 1974. The Intermuseum Conservation Association launched an apprenticeship program with Oberlin College in 1968, and the Fogg Museum, which had largely dismantled its conservation research and training program in the late 1940s, resumed formal apprenticeships in 1970. *The History and Future Directions of Conservation Training in North America* (Washington: National Institute for the Conservation of Cultural Property, 1984), pp. 5-7, 8, 11, 18, 26.

5. "The Conservator-Restorer: A Definition of the Profession," *ICOM News* 39, no. 1 (1986): 5-6.

6. U.S. Department of the Interior, *Report of the Director of the National Park Service to the Secretary of the Interior for the Fiscal Year Ending June 30, 1919* (Washington: Government Printing Office, 1919), p. 125; *Report of the Director for 1926,* p. 49; "Master Plan Brief for Sitka National Monument," 1965, Sitka NM box, NPS History Collection.

7. Museum Preparation Memorandum No. 1, Feb. 15, 1935, Exhibit/Museum History before 1938 box, NPS History Collection; Plenderleith, *The Preservation of Antiquities* (London: The Museums Assn., 1934); Leechman, "Technical Methods in the Preservation of Anthropological Museum Specimens," *Annual Report for 1929,* National Museum of Canada Bulletin No. 67 (Ottawa: National Museum of Canada, 1931).

8. Lee G. Crutchfield, "The Chemical Preparation and Preservation of Museum Antiquities," *Museum News* 14, no. 14 (Jan. 15, 1937): 7-8.

9. Burns, "Report of the Museum Division on the Present Status and Future Development Program of National Park Service Museums," Dec. 4, 1936, p. 10, Annual Reports, Branch of Interpretation box, NPS History Collection; Museum Division monthly reports, June 1937 and September 1938, Monthly Reports, Museum Division 1936-39 box, ibid.

10. Burns, "Preservation of the Mammoth Cave Mummy," *Museum News* 17, no. 8 (Nov. 1, 1939): 8.

11. Museum Division monthly report, April 1941, Monthly Reports Museum Division box, NPS History Collection.

12. Museum Division monthly reports, February and August 1940, ibid.

13. Museum Division monthly report, April 1941, ibid.

14. *Field Manual for Museums* (Washington: National Park Service, 1941), pp. 118-19. The chapter reveals no familiarity with the fine arts conservation work underway at the Fogg Museum.

15. Museum Division monthly reports, July 1947, May and July 1948, Monthly Reports Museum Division box, NPS History Collection.

16. Steen and Gettens, "Tumacacori Interior Decorations," Western Archeological Center Archives.

17. Letter, Small to Lee, May 4, 1949, Salem Maritime NHS box, NPS History Collection.

18. Region One circulars, July 13 and Sept. 7, 1949, and report, August 1949, Exhibit/Museum History 1943-59 box, ibid.

19. Betty Jones continued to head the conservation department at the Fogg Museum as it expanded during 22 ensuing years.

20. Diana Pardue, comp., "Preserving the Past: An Introduction to the Division of Museum Services, National Park Service, Harpers Ferry Center," 1980, pp. 97-99, Museum History 1975-79 box, NPS History Collection.

21. "Technical Report: The Use of Acid-Type Rust Removers Containing Iodine in Museum Field Work," Sept. 30, 1951, and transmittal letter, Wandrus to Burns, Oct. 2, 1951, Museum/Exhibit History 1941-59 box, ibid.

22. The state of Ohio, for example, turned to Wandrus in restoring the flags its regiments had carried in the Civil War. In 1959 he devised a safe and effective mounting for the heavily embroidered Anspach-Bayreuth regimental standard, a Hessian trophy of the Revolutionary War, for exhibit at Colonial National Historical Park.

23. Museum Branch monthly report, February 1954, Monthly Reports Museum Division box, NPS History Collection; "Paul H. Downing, Editor Emeritus," *The Carriage Journal* 10, no. 2 (Autumn 1972): 54-60.

24. Memorandum, Acting Chief, Branch of Museums, to Regional Director, Region Five, Nov. 25, 1959, Branch of Museums Dailies 1959-62 storage box, NPS History Collection. Wandrus's experience with polyethylene glycol led the Smithsonian to request his help in treating a Revolutionary War gunboat salvaged from Lake Champlain.

25. Museum Branch monthly reports, March and June 1954, January 1955, February and September 1956, April 1957, March 1958, April 1960, August 1961, Monthly Reports Museum Division box, ibid.

26. Museum Branch monthly reports, April 1955, March and July 1956, ibid.

27. Museum Branch monthly report, September 1959, ibid.; U.S. Department of the Interior, *1961 Annual Report, The Secretary of the Interior* (Washington: Government Printing Office, 1961), p. 370.

28. Nitkiewicz, "Treatment of the Gettysburg Cyclorama," *Studies in Conservation* 10, no. 3 (August 1965): 91-118.

29. In 1963 Nitkiewicz removed two large murals from the deteriorating main building on Ellis Island pending restoration of the structure. A ceiling mural in Glenmont at Edison National Historic Site required complicated conservation in 1966. In 1971 Nitkiewicz cleaned and restored seven large Ezra Whiter murals in the memorial building at George Rogers Clark National Historical Park and removed many layers of paint from William Rush's large carved wood statue of George Washington at Independence Hall.

30. Ralph H. Lewis, *Manual for Museums* (Washington: National Park Service, 1976), pp. 40, 63.

31. One shipment of specimens reached Wandrus with an empty package. The missing item, a significant fur trade relic intended for display at Grand Teton National Park, was found in the freight car that had transported it.

32. Memorandum, Chief, Western Museum Laboratory, to Chief, Museum Branch, Sept. 1, 1961, and various Western Museum Laboratory monthly reports 1962-68, Monthly Reports Museum Division box, NPS History Collection. For several of Andersen's special assignments the laboratory detailed John Segeren, its exhibits sculptor, as his technical assistant.

33. Mature judgment, steady application, and cheerful cooperation characterized Brown's work. Characteristically he asked only one question about working conditions when he applied: Might he use his leave during the Pennsylvania deer-hunting season? He was not an ardent hunter, but his hunting friends depended on him as camp cook.

34. Smith became very interested in the fuses of unexploded Civil War artillery shells received for cleaning and preservation, developing x-ray methods of studying them and presenting a paper on the subject at an archeological conference. Brown with his ordnance background doubtless felt relieved to distance himself from Smith's probing of old fuses in unexploded shells.

35. Director's staff meeting minutes, Apr. 14, 1966, Staff Meetings (Director) 1964-69 box, NPS History Collection; letter, Russell Hendrickson to Ralph and Dorothy Sheetz, Oct. 19, 1978, NPS Archives Ace. No. 31 storage box, ibid.

36. James B. Smith, Jr., "Conservation of the Regimental Unit Color The U.S. Treasury Guards," *Studies in Conservation* 14, no. 3 (August 1969): 119-25; James W. Rice, "The Lincoln Assassination Garments: A Case Study in Cleaning," *Museum News* 48, no. 6 (February 1969): 44-48.

37. Letter of Mar. 28, 1972, Branch of Museums/Museum Operations Dailies August 1962-December 1966 storage box, NPS History Collection.

38. This was perhaps an unsolvable problem at the time. Conservation scientists were scarce and equipping their laboratories was expensive. The 1989 salary survey of the American Institute for Conservation of Historic and Artistic Works included only eight such professionals among 411 respondents *(AIC Newsletter* 15, no. 2 [March 1990]: 10).

39. Other staff conservators had previously coped as necessary with the kinds of objects Fonda Thomsen would treat. The transfer of responsibilities engendered individual reactions ranging from relief to disappointment. Increased specialization nevertheless seemed the proper direction for improving the branch's work quality.

40. "1977 Annual Report, Museum Services, National Park Service, Harpers Ferry Center," pp. 43, 53-58, 123, 126-27, Curatorial Services Division files, Harpers Ferry. Allen arranged supplemental training for Shepherd at the National Museum of Natural History where he learned methods of rehabilitating older natural specimens.

41. She continued to monitor the *Bertrand* work until Park Service participation was completed in October 1979.

42. In 1952 Richard Buck from the Fogg Art Museum established the Intermuseum Conservation Association, which pooled resources of several midwestern museums to operate a conservation laboratory at Oberlin College. Similarly conceived regional laboratories followed in other parts of the country.

43. Douglas L. Caldwell, "Rome Center Experts Direct Tumacacori Project," *CRM Button* 5, nos. 1-3 (September 1982): 1-4.