Creation of the National Forests (1891 to 1905)

The public lands currently managed as national forests are the result of ideas germinated in the mid- and late 19th century. During this period, the government sold and gave away millions of acres of land in an effort to promote settlement of the Western United States. As thousands of acres were cleared to make way for railroads and the settlers that followed, the idea that natural resources were not inexhaustible began to germinate. The seeds of this concept can be found in a book entitled *Man and Nature*, published in 1864. The author, George Perkins Marsh, spoke directly about the issue of exploiting and overusing America's natural resources and extolled the philosophy of "responsible stewardship" of public lands (Dussol 1996). Marsh's words later helped to spawn the "conservation movement," a period from 1890 to 1920 when numerous Congressional acts aimed at government management and protection of America's natural resources were passed.

Transforming Marsh's eloquent thoughts to action took years of hard work by such men as Franklin B. Hough and Bernard E. Fernow, both of whom worked for the Department of Agriculture within the newly established Division of Forestry (Steen 1976). Fernow's efforts paid off when in 1891 Congress passed the Forest Reserve Act, which gave the President power to set aside lands as Federally managed forest reserves. Exercising this newly acquired right, President Benjamin Harrison set about establishing Yellowstone Park Timberland Reserve. This was the first of 15 new forest reserves, totaling more than 94 million acres, to be placed under the Department of the Interior. The way had been paved for Federal creation and management of public forests (Runte 1991; Steen 1976; Steen 1992).

In 1898, Bernard Fernow turned over leadership of the Division of Forestry to Gifford Pinchot. One of Pinchot's first and most fervent issues was to gain control of forest reserves from the Department of the Interior's General Land Office and turn them over to the Department of Agriculture. With the help of his friend President Theodore Roosevelt, Pinchot succeeded. On February 1, 1905, the Department of the Interior transferred 63 million acres of forest reserves to the Department of Agriculture, which would be managed by the Bureau of Forestry (formerly the Division of Forestry). Within a year, funding for this new organization doubled and its title changed yet again. From this time forward, the management of America's forest reserves (soon to be renamed national forests) would rest with the USDA Forest Service (Runte 1991).

The Early Years (1905 to 1933)

Providing access to forest resources required a system of roads and bridges capable of taking man and machine to the peripheries of the forests and beyond. In addition, forest rangers needed trails to reach the interior depths of forests. Prior to 1905, engineers were pressed into service primarily as mapmakers and surveyors, using transit and chain to establish forest boundaries. An early pioneer in the engineering field was F.G. Plummer, who transferred to the Department of Agriculture from the U.S. Geological Survey in 1905. Plummer compiled statistical and map data and described for the first time conditions on many of the western forest reserves. In 1906, the Washington Office established a section called Reserve Engineering and charged it with "general supervision of all engineering work on reserves done by private interests or by the Forest Service" (USDA Forest Service 1990).

Development of an infrastructure within the national forests began in earnest following the devastating forest fires of 1910. Once the smoke cleared, the Forest Service used its engineering staff to formulate an ambitious construction program, which developed 320 miles of roads, 2,225 miles of trail, 1,888 miles of telephone line, 65 bridges, 181 miles of fire line, and 464 cabins to house backcountry staff (USDA Forest Service 1990) (figure 3).

Figure 3—Early bridge construction in 1914.

A major step in fire protection took place when Engineer and Regional Forester Major Evan Kelly produced a design for permanent fire lookouts to be used atop mountain peaks, commanding a clear view of the surrounding forest. These small, self-contained structures allowed fire lookout personnel to remain on post and monitor the surrounding forest 24 hours a day. With this modest infrastructure in place, the Forest Service could better manage and protect the ever-increasing acres of land under its control.

As larger amounts of timber acres were placed under Forest Service management, it often imposed hardships on counties whose boundaries contained those lands. To address this problem, Congress enacted the Twenty-Five Percent Fund in 1908, which allowed the Forest Service to share earnings from the public lands it managed. Commonly known as the *25% Law*, it directed that 25 percent of all revenues from timber sales, grazing permits, recreation fees, and other sources, be returned to the counties to help fund schools and build roads. Just as importantly, the revenues shared by the Twenty-Five Percent Fund helped build strong relationships between local communities and the Forest Service (Dussol 1996; USDA Forest Service 1993).

Five years later, a similar law helped provide funding for road and trail construction within the boundaries of the national forests. Enacted on March 4, 1913, the law (16 U.S.C. 501) mandated that 10 percent of all moneys received from the national forest in each fiscal year be allocated for the construction and maintenance of roads and trails. As a result, road and trail mileage within the national forests increased substantially (USDA Forest Service 1993).

Throughout the period between 1905 and 1933, the total acreage of lands under management by the Forest Service continued to grow. In the West, lands acquired for the national forest system came primarily from the public domain, however, lands in the East were more likely to be held privately. The Weeks Act of 1911 expanded on ideas spelled out in the Forest Reserve Management Act of 1897, which emphasized the need to protect timbered watersheds. Through passage of the Weeks Act, the Forest Service could now acquire (purchase) lands (mostly located in Eastern States) containing the watersheds of navigable streams previously held in private ownership. As a result, the Forest Service purchased millions of acres of private land, much of it farmland suffering from overgrazing, nutrient depletion, overuse, and erosion. Under careful management, these damaged acres recuperated and now constitute the nearly 25 million acres of land managed by the Forest Service east of the 100th meridian (Dussol 1996; Steen 1976).

The Depression Years (1933 to 1942)

Following the busy years from 1908 through the early 1930's, the Forest Service was slowed by the downward spiral of the lumber market, a trend that began several years earlier. As the Great Depression set in following the stock market crash of October 1929, the agency, like so much of the country, felt the pain of a crippled economy (Steen 1976).

In 1932, the election of President Franklin Delano Roosevelt ushered in a host of domestic programs designed to rebuild the nation's shattered economy. One of Roosevelt's most ambitious social programs was the Civilian Conservation Corps, known simply as the CCC. Working hand in hand with the Forest Service and other Federal agencies, Roosevelt crafted a program that accomplished two important goals: it put thousands of young, unemployed men to work and completed hundreds of badly needed conservation projects for the Forest Service.

Typical CCC projects included reforestation (more than 2 billion trees were planted), timber stand improvements and inventories, surveys, and the development of forest maps. Technical projects included the construction of dams, diversions, roads, and bridges; erosion control; and the design and construction of campgrounds. In many cases, the men built the very camps and barracks they lived in, often providing their own unique touch. A camp near the Ninemile Ranger Station in Montana, for example, included a 20-foot-high wooden archway at the entrance that served as a portal to usher in enrollees, officers, and visitors.

As the project list for the CCC expanded, engineers stepped in to make maps, design buildings, bridges, and various other structures, as well as supervise construction of roads, trails, communication systems, campgrounds, and watershed improvements. By the hundreds, engineers found Forest Service employment between the years 1932 and 1933, primarily to assist with CCC projects (USDA Forest Service 1990).

Roadwork took on greater importance as transportation needs increased. Just prior to the advent of the CCC, the Forest Service began developing a system for locating, designing, and constructing “truck trails,” which were simple roads used primarily for fire protection. On the Shasta National Forest, the engineering staff developed a Truck Trail Locators school that offered instruction on how to properly locate and uniformly design truck trails. Truck trails became important CCC projects and once completed, helped give greater access to the forests (USDA Forest Service 1990).

Bridge construction proved to be another important role for the CCC. Bridge teams generally consisted of an engineer and assistant engineer, chief foreman, carpenter foreman, steel and concrete foremen, and a labor foreman who directed the CCC crews. They helped build a variety of roadway bridges, using styles that included continuous beam, steel beam suspension, and continuous truss. Many of these bridges are still standing, with some continuing to be used after more than 60 years. Their unique style, design, structural integrity, and historic value make many of them eligible for listing on the National Register of Historic Places (figure 4).

Throughout the country, CCC crews carried out much needed conservation projects that greatly benefited the Forest Service and, ultimately, the American public. The work of the CCC came to a close as World War II drew more and more men from its ranks. Many felt that with so much of the Nation’s resources being poured into the war effort, having an active CCC working on the home front took on even greater importance. Attempts to make the CCC a permanent organization failed, and on June 12, 1942, all active operations ceased. More than 60,000 enrollees were discharged and 1,650 camps were closed down as one of Roosevelt’s most successful New Deal programs came to an end (Otis et al. 1986; Salmond 1967).

With the increased demand for natural resources during World War II came the need for upgraded roads and bridges to reach the raw materials. Forest Service engineers worked at a harried pace to design, complete, and in some cases, rehabilitate logging and mining roads. In an example of wartime cooperation, Forest Service engineers helped build a road for the massive copper giant, the Anaconda Mining Co., after war restrictions made it impossible for the company to utilize their own equipment (Steen 1976).

Figure 4—Post-War bridge construction in the 1940’s.

The Post–World War II Years (1945 to 1960)

The technological advances that came out of WWII, such as the development of the chain saw and crawler tractor, greatly increased the efficiency of the woods products industry. Likewise, the returning veterans with the GI Home Loan now had the ability to purchase their own homes. The Forest Service responded to this demand by constructing new roads throughout the forests for timber harvest. Additionally, the peace and prosperity of the postwar years led to an increase in recreational activities within the national forests. People now had more time and money to enjoy the beauty and tranquility found within America's public lands. Towards this end, a bill enacted in 1960 helped set the stage for a wider ranging use of national forest lands. The Multiple-Use Sustained Yield Act spelled out specific ways in which national forests would be managed for a host of purposes, including outdoor recreation, range, timber, watershed, and wildlife and fish habitat. No longer was economic return to be used as a primary focus in forest planning (Steen 1976; Bergoffen 1976) (figure 5).

Figure 5—Civilian Conservation Corps camp on the Thompson River in Montana.

According to American bridge designer J.A.L. Waddell, a bridge is a "structure that spans a body of water, a valley or a road and affords passage for pedestrians, vehicles of all kinds, or any combination thereof." Bridges are defined differently by various Federal agencies and also within the Forest Service. The Forest Service Handbook defines a bridge as "a road or trail structure (including supports) erected over a depression or an obstruction, such as water, road, trail, or railway, and having a deck for carrying traffic or other loads." Regions within the Forest Service refine this definition for road and/or trail bridges to limit what is defined as a bridge. Most Forest Service regions define a trail bridge as being 20 feet long and 5 feet above the feature being crossed. The Federal Highway Administration, National Bridge Inventory defines a bridge as a structure having a clear span of 20 feet or greater measured along its centerline.

Historical significance is not affected by whether or not the structure is defined as a bridge! Just because a structure does not fall within the local definition of a bridge does not mean it is not a "historic bridge."

This publication discusses USDA Forest Service bridges by dividing them into three general categories: road bridges, trail bridges, and other bridges.

Road Bridges

The majority of road bridges owned and constructed by or for the USDA Forest Service are those built after World War II in conjunction with the immense road construction program initiated by the agency for development of the timber program. Many of these are simple log or sawn-timber stringer bridges, which may be replaced on a cyclical basis. These bridges seldom exceed 50 years of age and are seldom considered for NRHP listing.

On the other hand, many road bridges within the agency are more elaborate structures and meet the 50-year age requirement. Enrollees of the Civilian Conservation Corps (CCC) from Camp 54 built the Squaw Creek Bridge in the 1930's (figure 6). Located on the Gallatin National Forest, the Squaw Creek Bridge is a single-span, open spandrel concrete arch with concrete abutments and guardrails. The Squaw Creek Bridge has been determined eligible for National Register listing under criteria A and C.

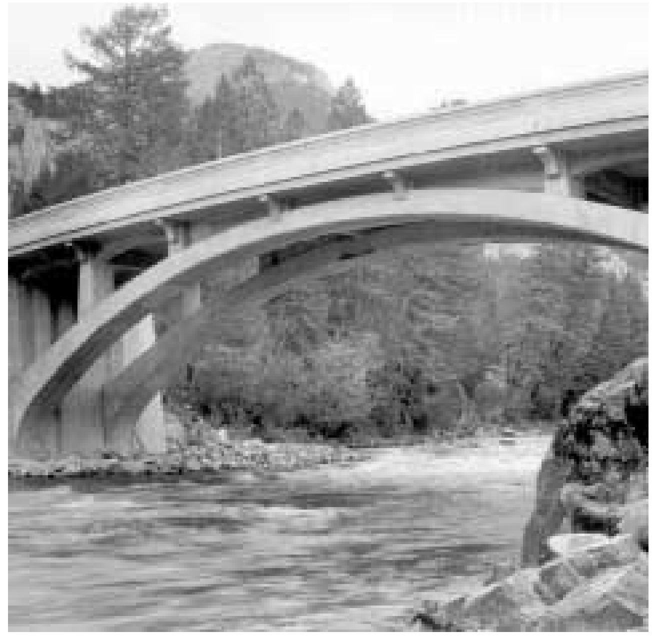

Figure 6—Squaw Creek Bridge on the Gallatin National Forest. The Squaw Creek Bridge is eligible for the National Register of Historic Places as a contributing element to the Squaw Creek Ranger Station Historic District.

Another example of a historically significant Forest Service road bridge was the Whispering Pines Bridge located on the Tonto National Forest in Gila County, AZ. The Whispering Pines Bridge was a riveted Pratt through-truss bridge, originally built by the Office of Indian Affairs in 1913 as one of seven spans for the San Carlos Bridge across the Gila River. The San Carlos Bridge washed out a year later in 1914 and stood abandoned for 6 years before it was repaired. The San Carlos Bridge carried traffic for only 14 additional years before it was totally replaced and the individual spans distributed around the State to new locations. The Whispering Pines Bridge was one of the relocated spans.

The Whispering Pines Bridge is an excellent example of a bridge that was historically significant even after it had been moved from its original location. Obviously the Whispering Pines Bridge would also have been eligible for listing on the NRHP if it had been left in its original location. The Whispering Pines Bridge has since been replaced following mitigation using Historical American Engineering Record (HAER) documentation, which is discussed in detail later in this publication.

A final example of a historically significant Forest Service road bridge is the Deep Creek Masonry Arch on the Bitterroot National Forest in Idaho (figure 7). This arch is a single-span masonry arch built by the CCC in the 1930's. The Deep Creek Arch was designed by Arthur (Art) Kahl, the USDA Forest Service regional bridge engineer between 1934 and 1962. Mr. Kahl was responsible for the design and construction of numerous USDA Forest Service bridges in Montana and Idaho. A case could be made that he was a significant individual in the early development of bridges and transportation systems in the Northern Region of the USDA Forest Service during the early days of the agency.

Additionally, Lithuanian stone masons, noted experts in stone masonry, hand cut and placed the stone used in construction of the bridge. Several of these men had worked on the stone masonry guardrails on the "Going to the Sun" road in Glacier National Park prior to becoming foremen at the Deep Creek CCC camp. Finally, the CCC enrollees, under supervision of the skilled foremen, actually constructed the Deep Creek Bridge. The quality of craftsmanship, the architectural style, and the association with Art Kahl and the Civilian Conservation Corps could make the Deep Creek Bridge eligible for National Register listing under criterion A, B, or C.

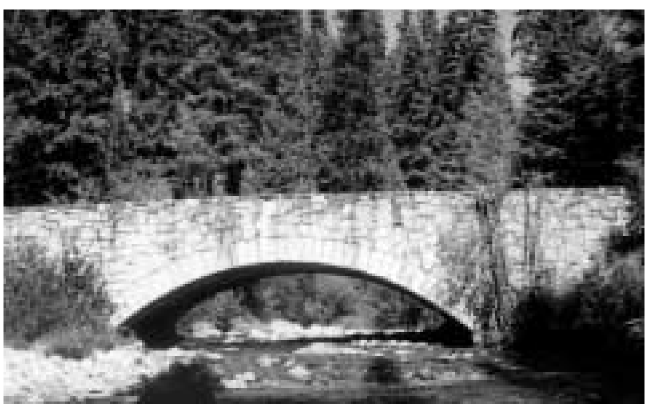

Figure 7—Deep Creek Arch Bridge on the Bitterroot National Forest in Idaho. The Civilian Conservation Corps constructed this masonry arch in the late 1930's under the direction of Art Kahl. Photo by Dan Summerfield.

Trail Bridges

The majority of trail bridges within the national forest system are usually simple log or sawn-timber stringer bridges, often designed for a life span of less than 50 years. Consequently, most USDA Forest Service trail bridges would not be eligible for NRHP listing.

However, there are some historic USDA Forest Service trail bridges. The Minam River Horse Bridge, located in the Eagle Cap Wilderness of the Wallowa-Whitman National Forest near Enterprise, OR, is one such example (figure 8). The Minam River Horse Bridge, built in 1945 and 1946, is a Howe through-truss bridge, constructed of wood and steel. According to local sources, the bridge was flown into Red's Horse Ranch in pieces on a Ford tri-motor aircraft. Equestrian trail bridges of this size, complexity, and age are extremely rare. The Minam River Horse Bridge is representative of a period in USDA Forest Service history when a project of this magnitude could be accomplished with little fanfare. The fact that the Minam River Horse Trail Bridge is the only surviving example of its type in the Pacific Northwest Region of the USDA Forest Service made it eligible for NRHP listing under criteria A and C.

Figure 8—Minam River Horse Trail Bridge on the Wallowa-Whitman National Forest. This Howe through-truss bridge was completed in 1945.

Another example of a historically significant Forest Service trail bridge, which has been evaluated for eligibility and is listed on the NRHP, is the Benson Footbridge at Multnomah Falls, near the Columbia Gorge in northern Oregon (figures 9, 10). The Benson Footbridge at Multnomah Falls is an open-spandrel, reinforced-concrete deck arch constructed in 1914 and located between the upper and lower falls. According to historical accounts, Simon Benson (a millionaire lumberman and major benefactor to the Columbia River Highway) remarked to S.C. Lancaster (engineer of the Columbia River Highway), "Wouldn't it be nice if there were a footbridge across the lower waterfall with a path up to it? What would it cost?" Lancaster calculated on the back of an envelope the cost and showed it to Benson. Benson wrote out a check for the amount and directed Lancaster to go ahead and build it.

The total length of the bridge is 52 feet with a 7-foot-wide deck. The ribs of the concrete deck arch span 45 feet. The bridge was erected as one of the first continuous-pour concrete bridges in the United States. The process took more than 2 days to complete. The railings are precast concrete sections consisting of balustrade columns. The bridge was designed by K.R. Billner under the supervision of S.C. Lancaster and was constructed by the Pacific Bridge Co. of Portland.

The bridge was placed on the NHRP in 1981 along with the Multnomah Lodge and the footpath from the Multnomah Lodge to the Benson Footbridge. Today, 1 million pedestrians may cross the footbridge annually.

Other Bridges

Not categorized under trail bridges or road bridges are a diverse and interesting group of bridges. Many are former railroad bridges transferred to the USDA Forest Service through land exchanges or abandonment. Others include former road bridges bypassed by new road construction and officially not classified as road or trail bridges.

Figures 9, 10—Multnomah Falls Trail Bridge (Benson Footbridge) on the Mount Hood National Forest in Oregon. This open-spandrel concrete arch bridge was constructed in 1914.

As an agency, the USDA Forest Service did not construct railroad bridges. Nevertheless, many national forests throughout the country have acquired railroad bridges, trestles, and tunnels. Many railroad bridges are small simple wooden bridges, while others may be elaborate structures made of wood, steel, and/or concrete. Some of these bridges are historically significant due to their design and/or role in western expansion during the 19th and early 20th centuries.

One example, on the Idaho Panhandle National Forest, is the Clear Creek Trestle (figure 11). The Clear Creek Trestle was constructed in 1906 and 1907 for the Chicago, Milwaukee & St. Paul Railroad. This trestle design included a solid, treated-timber deck pan holding 10 to 12 inches of ballast. The track was then laid on ties embedded in the ballast. This was a new development in railroad construction.

In 1980, the Milwaukee Railroad declared bankruptcy and much of the track and associated features were sold as scrap. The Idaho Panhandle National Forest in Idaho and the Lolo National Forest in Montana acquired the right-of-way from the Milwaukee Railroad between Avery, ID, and St Regis, MT. The right-of-way acquisition included numerous tunnels and trestles that, including the Clear Creek Trestle, are eligible for NRHP listing individually or as part of a historic district under criteria A and C.

Currently, the former Milwaukee Railroad corridor, including the tunnels and trestles, is an extremely popular mountain-bike route and interpretive trail named the Route of the Hiawatha. The railroad corridor serves more than 10,000 hiking and biking enthusiasts annually (figure 12).

The Mexican Canyon Trestle, located approximately 1 mile northwest of Cloudcroft, NM, was constructed by the Alamogordo and Sacramento Mountains Railroad in 1899. The standard-gauge railroad was a branch of the Eddy brothers' El Paso and Northeastern Railroad and was constructed to access logging areas. The line became a part of the El Paso and Southwestern Railway in 1905 before being purchased by the Southern Pacific Railroad Co. in 1924. It operated continuously until September 12, 1947, hauling logs and tourists to Cloudcroft. The Mexican Canyon Trestle played a major role in the development of Cloudcroft and Alamogordo, NM.

Figure 11—Clear Creek Railroad Trestle Bridge on the Idaho Panhandle National Forest. Under construction in 1906 by the Chicago, Milwaukee & St. Paul Railroad. Now part of the route of the Hiawatha Hiking and Bicycle Trail.

Figure 12—Mexican Canyon Railroad Trestle. Constructed in 1899 by the Alamogordo and Sacramento Mountains Railroad.

The 300-foot long, curved trestle was constructed of locally grown, treated timber. Its 21 spans rise up to 60 feet from the valley bottom. The USDA Forest Service assumed ownership of the railroad right-of-way in 1947. The trestle was placed on the New Mexico Register of Cultural Properties in 1970 and on the NRHP on May 7, 1979, under criteria A.

No maintenance has been done on the trestle since it was abandoned in 1947. Extensive timber deterioration has occurred, and a repair project is planned using an enhancement grant from the Inter-Modal Surface Transportation Act of 1998.

To do nothing to stabilize this bridge would be considered a "benign neglect" of a significant historic property. This would be considered an adverse effect under condition 5 (see "Determination of Effect" section). This bridge, which does not serve vehicular or pedestrian traffic, is nevertheless an important landmark for the cities of Cloudcroft and Alamogordo and the Lincoln National Forest.

Occasionally bridges exist that are no longer used as originally intended or as significant landmarks. One example is the Neihart Masonry Arch across Sheep Creek on the Lewis and Clark National Forest (figures 13, 14, 15, 16). The USDA Forest Service constructed the Neihart Arch in 1916 as part of the Neihart Road project. It is a single-span masonry arch crossing Sheep Creek near the old mining community of Neihart, MT. When the Neihart road was reconstructed in the 1940's, the arch was bypassed and abandoned. Because this arch is not used as either a road or trail bridge, it does not show up on the road or trail bridge inventories and it is not visible to most tourists. However, it is very likely a historically significant bridge under criteria A and C.

Unique features of the Neihart Arch are the bold lettering "U.S.F.S. 1916" and the Forest Service shield cut into the smooth keystone of the arch.

Figure 13—Neihart Masonry Arch Bridge. The Neihart Arch on the Lewis and Clark National Forest in Montana was constructed in 1916. Note the USDA Forest Service shield and date cut into the keystone.

Figure 14—Neihart Masonry Arch circa 1916. Note the "ginpole" for moving heavy stones into place.

Figure 15—Neihart Masonry Arch circa 1916. USDA Forest Service employees inspect the completed arch.

Figure 16—Neihart Masonry Arch circa 1999. This arch is not currently listed on the National Register of Historic Places and is not used as a road or trail bridge.

Field Recording

Recording field information for bridges being evaluated for the NRHP listing is similar to the process used in collecting data for other cultural resources, such as historic buildings or archeological sites. A local, State, or Federal agency Cultural Resource Site Form is usually sufficient for initial recording. Documentation should include an accurate description of the bridge condition, as well as a recommendation regarding NRHP eligibility. A description of features and historical information, such as how the transportation systems, roads, or railroads developed in the area, and the significance the particular bridge played in the historic development of the area should also be included.

The site form should include present-day photographs and, if available, photographs of the bridge under construction or in use during the historic period. Photographs, construction plans, and maintenance records are excellent sources for determining changes that have occurred and are essential for determining integrity of materials, workmanship, and design.

Research Sources

The following is a partial listing of sources where historical and technical information can be obtained for use in determining if a bridge is eligible for NRHP listing:

USDA Forest Service Files—Files containing historic and engineering information about bridges often exist at the national forest or ranger district levels, usually within the engineering organization. Perhaps the best source of information is the regional office engineering staff, particularly the regional bridge or structural engineer. Picture, design, and construction files are kept for most major bridges. Original design calculations, drawings, and other valuable historic information may also be available. Biannual bridge inspection reports should be on file and will provide a chronological history of deterioration, maintenance, and repairs.

USDA Forest Service Bridge Management System—The USDA Forest Service uses a bridge management system maintained by the regional bridge engineer called “Bridge and Major Culverts” (BMC). This Oracle database is a valuable tool for evaluating and inventorying the NRHP eligibility of USDA Forest Service bridges. BMC contains data for all USDA Forest Service road and trail bridges and major culverts. Pertinent information for evaluating historic significance includes construction date, construction materials, and bridge type. Whether the bridge has been determined to be eligible for listing on the NRHP is contained in the database, along with technical information, such as bridge width, length, clear height, and design loading. Section, range, and township are listed, as well as USDA Forest Service ranger district, national forest, road number, and milepost location. BMC contains all of the bridge data that is required by the Federal Highway Administration’s National Bridge Inventory System (NBIS). The database can be queried directly, or a file can be provided that can be viewed with personal computer database software, such as Microsoft Access.

This database is useful for determining the numbers of similar bridges, as well as bridge age, material, and type. Data can be queried and assembled by geographic area (ranger district, national forest, State, Forest Service region, etc.), bridge design type (truss, arch, suspension, etc.), or bridge material type (steel, concrete, etc.).

The BMC is an excellent tool to use in the NRHP evaluation process to determine if the bridge in question is one of a kind or if other examples exist within a specified geographic area. However, keep in mind that the BMC database may not include all existing trail bridges, former railroad bridges, or bridges not currently on a road or trail system.

Local Newspapers—Newspapers can be an excellent source for local historical bridge construction information. One example is the Cyr-Iron Mountain Bridge constructed in 1934 by Civilian Conservation Corps enrollees from Camp Ninemile in western Montana (figure 17). Originally it was a national forest system bridge, ownership was later transferred to the Bureau of Public Roads, and ultimately it became a Montana Department of Transportation (MDOT) bridge. When the MDOT began planning the Cyr-Iron Mountain Bridge replacement, a consulting archeologist was employed to review the proposed undertaking and evaluate the bridge for NRHP eligibility. A March 1934 issue of the local newspaper, *The Mineral Independent*, provided important historical background information about the project. This information was necessary for historic context development. Once the bridge was determined eligible for the NRHP (under criterion A at the local level), mitigation measures were developed. These measures included additional historical research. An advertisement was placed in several local newspapers

Figure 17—Cyr-Iron Mountain Bridge. The Cyr-Iron Mountain Bridge on the Lolo National Forest in Montana. The bridge was constructed in 1934 by Civilian Conservation Corps enrollees from Camp Ninemile.

asking for information about the bridge during the historic period. One individual responded who had been a CCC enrollee at Camp Ninemile in 1934 and had actually participated in the construction of the Cyr-Iron Mountain Bridge.

State Departments of Transportation—Another excellent information source for historic bridges are the State DOT's. All State DOT's receive Federal funds and are required to comply with section 106 of the NHPA. State DOT's have been preserving historic bridges for many years. Most States have conducted statewide historic bridge inventories, NRHP evaluations, and have developed numerous creative preservation maintenance and mitigation procedures. State DOT's are not uniform: if a State DOT does not have a complete inventory and has not evaluated similar historic bridges, contact other State DOT's in the surrounding area. See appendix B for addresses and phone numbers of State DOT's.

State Historic Preservation Offices —SHPO's are also excellent resources for historic bridge information and research material. Not only do they regulate the Section 106 process, they are also the clearinghouses for all NRHP evaluations in the State. The SHPO's will have invaluable information on types and styles of bridges within the State, as well as State and local bridge building companies and designers and numerous examples of NRHP nominations for particular types of bridges. As with State DOT's, not all SHPO's are equal. If a SHPO does not have the technical information you are seeking, contact an adjoining or nearby State office. See appendix C for State Historic Preservation Office addresses and phone numbers.

County Courthouses—Good sources of information regarding historic bridges are the county commissioner proceedings, usually kept on file at county courthouses. USDA Forest Service bridges may have either been constructed by the county or owned by the county for a period of time. Information regarding comparable county owned bridges may also be obtained.

Bureau of Public Roads—The Bureau of Public Roads, now the Federal Highway Works Administration (FHWA), designed and/or constructed many bridges on USDA Forest Service lands. Information about these bridges will usually be available at the USDA Forest

Service regional offices. However, some of the original design and construction information may only be on file at the respective FHWA Direct Federal Construction offices in Denver, CO; Vancouver, WA; or Sterling, VA.

Historic American Engineering Record (HAER)—HAER, a program within the National Park Service, is a tremendous informational resource regarding historic bridge types, construction methods, and materials. Founded in 1969, HAER has been working to identify, evaluate, record, and save the engineering, industrial, and technological heritage of the United States. HAER does this by photographing historic features, such as bridges, and collecting historic documents, such as original designs, drawings, and construction and maintenance information. In 30 years, HAER has recorded over 6,000 sites, structures, and objects (including more than 1,000 bridges) in the HAER archives.

The Historic American Engineering Record sets the standards and guidelines for mitigating documentation when a significant HAER resource will be irreparably damaged or destroyed by an undertaking. To utilize the HAER resources, contact:

Eric DeLony
Chief, Historic American Engineering Record
National Park Service
1849 C Street NW
NC 300
Washington, DC 20240-0002
(202–343–4237)

Application of the National Register of Historic Places Evaluation Criteria

Once the bridge and any related historic features, such as roads, landscapes, retaining walls, homesteads, etc., have been recorded and photographed and a contextual history developed, the NRHP criteria of eligibility is applied and the overall bridge integrity is assessed. The first question asked is if the bridge is over 50 years in age (or will it become 50 years old during the planning period). If the answer is yes, the NRHP criteria is applied and integrity is assessed. Do not totally discount a bridge's NRHP eligibility if the bridge is less than 50 years old. The Pugsley Bridge discussed in the "Exceptional Significance" section was less than 50 years old when it was evaluated, but it was determined to be eligible for NRHP listing because it had exceptional significance.

To be eligible for NRHP listing, a bridge must retain at least five of the seven elements of integrity listed in the "National Register of Historic Places Evaluation Criteria" section. Generally, bridges will be eligible for NRHP listing under criterion A or C (often both A and C). Occasionally, criterion B is applicable if a famous person had direct contact with the design and/or construction of the bridge. Bridges are seldom eligible under criterion D, although eligibility is possible if something significant can be learned from its design methodology or construction process.

A good example of a bridge determined eligible for NRHP listing under criteria A and C exists near the town of Wagner in eastern Montana's Phillips County. The Milk River Bridge at Wagner is a pin-connected Pennsylvania through-truss bridge constructed in 1909 by O.E. Peppard, a bridge builder based in Missoula, MT (figure 18). Under criterion A, the bridge is associated with the homestead boom that swept eastern Montana between 1909 and 1917. The Milk River Bridge allowed access to the Great Northern Railroad Station at Wagner for homesteaders and ranchers who lived in the area south of the Milk River. The bridge has always been used as it was originally built and is representative of one of the many bridges the Peppard Co. built in Montana before creation of the Montana Highway Commission (later to become MDOT) in 1913. Under criterion C, the Milk River Bridge is structurally important as one of a handful of pin-connected Pennsylvania through-truss bridges constructed in Montana during this period.

The Montana SHPO felt the Milk River Bridge may also be significant under criterion B for its association with O.E. Peppard. Mr. Peppard owned one of three Montana-based bridge construction companies active in the State between 1887 and 1917. However, while Mr. Peppard may be a significant individual, he did not have a hand in constructing that particular bridge. The bidding process was handled by one of his agents and the construction by a crew that did not include Mr. Peppard. Because Peppard did not have a direct role in constructing the Milk River Bridge, NRHP eligibility was not justified under criterion B.

Although this example comes from the MDOT and not the USDA Forest Service, it clearly illustrates the evaluation of NRHP criteria A, B, and C to a historic bridge.

Figure 18—The Wagner Bridge across the Milk River near Glasgow, MT. Constructed by O.E. Peppard, a noted bridge builder in the early 1900's.

Determining the Effect of Bridge Alterations

Routine maintenance of bridges, such as painting or deck replacement with in-kind materials, is generally considered by the USDA Forest Service and the SHPO's as a "No Effect" determination. Therefore, the ACHP would not be involved.

More complex undertakings, such as guardrail replacement or replacing timber stringers with steel girders, may have an effect, but that effect may not be adverse. Again, if the SHPO and the USDA Forest Service agree the undertaking will have "No Adverse Effect" on the historic property, the ACHP would not be involved.

If the proposed undertaking results in the destruction or severe alteration of the property or isolates it from its surrounding environment, then the agency and SHPO would concur that the effect was adverse. An "Adverse Effect" ruling mandates review by the ACHP, as well as the general public, local governments, permit or licensee applicants, and Indian tribes if they have issues of concern. If the undertaking occurs on an Indian reservation or affects tribal properties, the Tribal Historic Preservation Office (THPO) would be involved in the same capacity as the SHPO. This consultation usually results in a Memorandum of Agreement that outlines measures the agency agrees to take to avoid, minimize, or mitigate the adverse effect.

Occasionally, the consulting parties (the agency, SHPO, and ACHP) may agree that no acceptable mitigation measures are possible, or feasible, and the "Adverse Effect" designation will be accepted as being in the public interest, without mitigation measures being assigned.

Historical American Engineering Record—Bridge Documentation Program

Historical American Engineering Record documentation is one method of preserving important information about our historical engineering and industrial resources. It is one of the primary options for mitigating an adverse effect of a Federal undertaking.

Replacement, rather than sympathetic repair or relocation, is sometimes the only alternative for historic bridges that are listed or eligible for listing on the NRHP. If a bridge is replaced, the only record of its existence would be the drawings, photographs, and data in the HAER collection stored in the Library of Congress.

The level of compexity for HAER documentation depends on whether the bridges are significant at the National, State, or local level: the most complex standards are required at the National level. Regardless of significance level, the person compiling documentation should be a qualified professional with demonstrable experience in bridge history and in documenting historic bridges. The requirements for HAER documentation should be included in the Memoranda of Agreement and agreed to and signed by the SHPO, the ACHP, and the USDA Forest Service (appendix D.)

HAER documentation can be costly, complex, and time consuming. It is the least desirable method for mitigating an adverse effect, since the historic bridge will no longer exist except in a written and photographic record. However, it may be the only viable option and should be encouraged in those situations.

Adaptive Use

When moved to a new location, historic buildings and objects, and to a certain extent bridges, lose the integrity associated with the original setting. Some successful alternatives to an adverse effect can be leaving the bridge and the approaches to the bridge in the present location and building a new bridge in a different, but suitable, location. The historic bridge may then take on the role of a secondary automotive route or as a pedestrian, horse, or bicycle bridge. Some inner-city bridges are left in place and used as pedestrian walkways, farmers' markets, or other city cultural features. This was the approach taken with the Great Northern Railroad Bridge crossing the Mississippi River in downtown Minneapolis and the Fort Benton Bridge crossing the Missouri River at Fort Benton, MT (figures 19, 20).

Figure 19—Mississippi River Bridge In Minneapolis, MN. The 1882 Great Northern Railroad Bridge, accessing the flour mills in Minneapolis, is the second oldest Mississippi River bridge in existence.

Figure 20—Mississippi River Bridge. The bridge was modified for use as a pedestrian bridge in 1994.

Moving a Bridge

Many historic bridges, especially steel truss bridges, are too narrow, have insufficient clearance height, or the design is inadequate to accommodate modern vehicles. While moving a historic resource to a new location is generally not a preferred preservation solution, in the case of historic bridges, moving may be the only feasible way to physically save the bridge. Moving the bridge to a different location for another use may be a proactive alternative. Many steel truss bridges are moveable and can make excellent crossings for vehicular or foot traffic in small communities or for private landowners.

State DOT's have *Adopt-A-Bridge* programs to keep historic bridges in use by local governments or private parties. Bridges eligible for this program are advertised for adoption in local newspapers and radio stations. The applicant, when selected, will often receive the estimated demolition cost of the bridge to use in relocating the bridge. The applicant will usually be required to sign an agreement releasing the DOT from all future liability for the bridge.

Transferring bridge ownership to a group that agrees to move and maintain the bridge is a possible mitigation measure for the USDA Forest Service when it is necessary to replace a historic bridge (figure 21).

Figure 21—Jefferson River Bridge at Silver Star, MT. This riveted Warren pony-truss bridge has been "adopted" by the Bonner Development Group and will soon be relocated to a site crossing an overflow channel of the Clark Fork River near Bonner, MT.

The relocation of the Jefferson River Bridge at Silver Star to a site crossing the Clark Fork River near Bonner, MT, is an example of the MDOT's *Adopt-A-Bridge* program. The Jefferson River Bridge was constructed in 1910 as a two-span, riveted Warren pony truss. Each truss is 96-feet long, 16-feet wide, and 10-feet high and is load rated for 11 tons. A new highway bridge is being constructed across the Jefferson River due to the height, width, and load rating deficiencies of the truss bridge.

Ownership of the bridge is being transferred to the Bonner Development Group, a not-for-profit community organization engaged in a project to construct a pedestrian bridge across the Clark Fork River. The $16,000 estimated cost to demolish the truss bridge will be transferred to the Bonner Development Group to help relocate and rehabilitate the bridge.

Historic Bridge Reconstruction

Reconstruction of a historic property is generally not a preferred alternative from a historic preservation viewpoint. Reconstruction means completely rebuilding a historic property from the ground up when no original historic fabric remains. Where possible, the reconstruction uses "in-kind" materials and design in construction. However, since no original materials remain, the reconstructed property is no longer a historic resource or eligible for NRHP listing.

The Verde River Sheep Bridge on the Tonto National Forest in Arizona is a good example of a historic-bridge reconstruction project. The Verde River Sheep Bridge, constructed in 1942 and 1943, was the focal point of sheep ranching in the Bloody Basin area of the Tonto National Forest for nearly 40 years (figure 22). Basque sheepherders built the bridge using hand tools and materials salvaged from construction of the nearby Horseshoe Dam. The bridge was owned by the Flagstaff Sheep Co. and was used each year to move as many as 11,000 sheep to and from summer grazing grounds near Flagstaff. The bridge appears to have been constructed using steel strand salvaged from a highline cable system used at the dam site to remove cofferdams. The reinforced concrete foundations and timber towers supported the 480-foot main span of the 3-foot-wide, 610-foot-long bridge.

The first sheep crossed the bridge in the summer of 1943, the last during the spring of 1979. Before the sheep herders abandoned the area in 1979, it had become a popular entry for hiking and riding into the Mazatzai Wilderness. It was listed on the NRHP in 1978 as "an excellent representation of a way of life and industry once very important in pioneer Arizona." Although the bridge was less than 50 years old, it was considered to have exceptional significance and was eligible for NRHP listing under criteria A and C.

Figure 22—Verde River Sheep Bridge near Bloody Basin in Arizona. This National Register of Historic Properties bridge was demolished in 1988.

The USDA Forest Service closed the bridge in 1984 to protect the public from injury that could result from continued use of the bridge in its deteriorated condition. The Forest Service, in an environmental and cultural assessment, concluded that the bridge should be demolished and replaced with a suspension bridge. This adverse effect to a NRHP property was mitigated by HAER documentation after consulting with the Arizona SHPO and the ACHP. Additional mitigation included reconstructing a bridge similar in appearance to the original and preserving the original foundations.

The old bridge was removed in 1988 and the newly reconstructed suspension bridge was completed in 1989 (figure 23). The cost of the reconstructed bridge was $600,000—an expensive river crossing, but perhaps no more costly than any other crossing option at this site would have been.

Figure 23—Verde River Sheep Bridge. The 1989 reconstructed bridge.

Preserving and Maintaining Historic Bridges—Information Sources

Occasionally, historic bridges will require extensive reconstruction or repair. This type of maintenance is unique and can be very expensive, particularly if performed by inexperienced designers and/or inspectors.

Many Forest Service bridges are just now approaching the age at which they could become eligible for National Register of Historic Places listing, and preservation maintenance will become even more critical in coming years. Many deteriorated historic bridges can be rehabilitated to function as they were originally designed. Numerous examples of bridge rehabilitation exist across the country for steel, concrete, and wooden structures. The following is a partial list of resources where examples of rehabilitated bridges and personnel with technical expertise can be found.

State Departments of Transportation

State DOT's have a wide variation in opinion and expertise related to the preservation of historic bridges. Some State DOT's are extremely proactive regarding the preservation and use of historic bridges; others are not.

The State of Oregon's repair of several historic concrete bridges on U.S. Highway 101 in western Oregon is a good example of proactive historic preservation strategies and techniques.

National Park Service

The National Park Service administers the HAER and can provide invaluable information on the rehabilitation of historic bridges. HAER shares an Internet website with the Historic American Building Survey (HABS) and is also an excellent information source for preservation materials and examples. Their Internet address is http://www.cr.nps.gov/habshaer.

The National Park Service publishes Preservation Tech Notes, which are designed to provide practical information on traditional and innovative techniques for successfully maintaining and preserving cultural resources. All techniques published in Preservation Tech Notes conform to established NPS policies, procedures, and standards. One example from the Preservation Tech Note series is *Rehabilitating a Historic Iron Bridge, The Stillwater Road (Shea) Bridge, Cumberland, Rhode Island, by Joseph P Saldibar III, April 1997.* The National Park Service maintains another website where all the titles and subjects within Preservation Tech Notes can be found. The Internet address is http://www.cr.nps.gov/tps/index.htm.

Other National Park Service resources include:

National Center for Preservation Technology
NSU Box 5682
Natchitoches, LA 71497
318–357–6464

The Historic Preservation Training Center (HPTC)
4801A Urbana Pike
Frederick, MD 21704
301–663–8206
Chris Robison – Masonry; Bill Hose – Carpentry

These facilities can offer advice and provide information on a variety of historic preservation issues, including bridges.

USDA Forest Service

Preservation maintenance of historic bridges is a relatively new experience for most USDA Forest Service engineering staffs because the Forest Service does not yet have a large inventory of historic bridges. Many USDA Forest Service historic bridges are not being used for their original use, such as the former railroad trestles on the Hiawatha Trail or the Mexican Canyon Railroad Trestle. This is considered adaptive use.

The number of historic bridges will increase in coming years as more USDA Forest Service bridges age and are evaluated for NRHP listing.

Training Courses

Training courses on historic bridge preservation are periodically sponsored to disseminate legislated requirements and knowledge gained from the experiences of consulting engineers and historians. The National Highway Institute, the technical training organization of the Federal Highway Administration, developed a course entitled *Historic, Cultural and Archeological Preservation.* Information about NHI training courses can be found at http://www.nhi.fhwa.dot.gov.

The American Society of Civil Engineers is currently sponsoring a course entitled *Analysis and Preservation of Historic Bridges.* Information about ASCE training courses can be found at http://www.asce.org.

State Historic Bridge Evaluations and Inventories

The 1979 Federal Aid Highway Act mandated that States evaluate all bridges they were responsible for to determine if any were eligible for listing on the National Register of Historic Places. These evaluations were the responsibility of the States, usually the State DOT's. Grouping these evaluations resulted in numerous statewide historic bridge inventories.

State personnel, sometimes working with consulting historians, performed the evaluations. These individuals, or evaluation teams, efficiently reviewed and evaluated large numbers of bridges within their States, creating historic bridge inventories, reports, and publications. This information is available from State DOT's and SHPO's.

These statewide inventories and documents are valuable for USDA Forest Service engineers and historians involved in bridge NRHP evaluation. The State data will show similar bridges preserved within the State and can be a guideline for determining historic significance of the bridge in question. Addresses and phone numbers of all State DOT's and SHPO's are provided in appendixes B and C.

Likewise, the National Park Service, using personnel from the HAER, has conducted systematic inventories throughout the National Park system to inventory and evaluate all historic roads and bridges for the NRHP. NPS managers use this information to make informed decisions when historic resources are involved.

USDA Forest Service Historic Bridge Evaluations and Inventories

The Forest Service has not officially conducted district, forest, or statewide historic bridge evaluations. USDA Forest Service regions, forests, or even districts may want to consider conducting comprehensive, areawide historic evaluation of their bridges. Bridges are more efficiently evaluated for NRHP eligibility when looked at as part of a larger group. Date of construction, type of bridge, type of construction material, function, and historic association must all be considered in evaluating for NRHP eligibility. Historic bridge evaluation is best accomplished with trained and experienced cultural resource specialists and engineers. The experience gained by doing multiple bridges at a forest, State, or regional level makes the responsible personnel better equipped to perform efficient NRHP evaluations.

USDA Forest Service line officers, transportation planners, and heritage resource specialists should be familiar with all bridges which are, or may potentially become, eligible for NRHP listing. Late discovery of NRHP eligible bridges, or even the time required to evaluate a potentially eligible bridge, can cause delays and added expense for road and bridge maintenance, repair, or replacement projects. Managers should have current inventories of all bridges that have already been determined to be eligible for NRHP listing, as well as inventories of all bridges that are older than or approaching 50 years of age.

Using the Bridge and Major Culvert Database

We recommend that every USDA Forest Service region, on a periodic basis, query the BMC database to acquire a list of all bridges 45 years of age and older. This query should be grouped by State and national forest and may be further grouped by date, bridge material, bridge type, etc. The primary construction material (wood, steel, wrought iron, concrete, masonry, etc.), bridge age (or date of construction), district location, and previously determined National Register of Historic Places eligibility can also be listed. These queries will provide engineering managers and heritage resource specialists with lists of all bridges that must be evaluated for NRHP eligibility prior to beginning any construction projects that might impact these bridges. This information is also important for planning preservation maintenance of current and future historic resources.

Appendix A lists the results of the query described above as of July 2000. This is not a "historic bridge inventory," but it indicates how many potential historic bridges may be in a given Forest Service geographic area of responsibility.