

**FINDING OF NO SIGNIFICANT IMPACT  
BATSTO RIVER FISHWAY RESTORATION PROJECT  
SECTION 206, ECOSYSTEM RESTORATION  
BURLINGTON COUNTY, NEW JERSEY**

**OVERVIEW**

The United States Army Corps of Engineers has evaluated the construction of a fishway in the Batsto Village State Historic Park in Batsto, Burlington County, New Jersey.

**PURPOSE AND SPECIFICATIONS**

The goals of the project are to restore historic fish passage in the Batsto River for native migratory fish species, specifically alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*). The Batsto River is located within the central portion of the New Jersey Pinelands National Conservation Area, an internationally recognized ecosystem important for many types of fisheries and wildlife, including anadromous and catadromous fish populations, migratory birds, and other wildlife. Improving fish access will benefit the entire estuarine ecology and economy of the New Jersey Pinelands.

Batsto Lake is located approximately two miles upstream from the confluence of the Batsto River and the Mullica River. The Batsto Lake dam, which is owned, operated, and maintained by the New Jersey Division of Parks and Forestry for scenic and recreational purposes, consists of a rolled earth embankment with a concrete spillway and a concrete apron extending 48 feet from the spillway. Once the Batsto Lake dam becomes more passable for fish, this river will provide access to approximately eight miles of continuous habitat to migratory fish and other aquatic species.

Alaska Steeppass fishways will be used for the project, specifically the aluminum Model A type. These fishways are passive flume-like (inclined water chute) structures equipped with a series of baffles or weirs that interrupt the flow of water, creating ascending pools. They reduce the water's velocity to a level that fish can navigate. The fish negotiate a fishway, at their own pace, just as they would negotiate natural rapids. Steeppass fishways are used at dams on small to medium sized rivers with relatively consistent flows. They are designed to pass small populations of herring. Each fishway unit is ten feet long and permits a vertical rise of 2-3 feet. Batsto Lake will require the installation of three fishway units in addition to an open flume. The fish ladder and open flume will be covered with a facade of timber planking, which will allow for undiminished historic quality to the area without compromising the appearance of the Mill Building to the west of the existing dam.

**COORDINATION**

The project was developed by cooperating agencies including: the U.S. Army Corps of Engineers, the New Jersey Department of Environmental Protection, and the U.S. Fish and Wildlife Service.

The Draft Environmental Assessment (EA) for the project was forwarded to the U.S. Environmental Protection Agency Region II, the U.S. Fish and Wildlife Service, the National

Marine Fisheries Service, the New Jersey Pinelands Commission, the New Jersey Department of Environmental Protection, and all other known interested parties.

### **ENDANGERED SPECIES IMPACT**

The Environmental Assessment has determined that the selected plan, if implemented, would not jeopardize the continued existence of any species or the critical habitat of any fish, wildlife or plant, which is designated as endangered or threatened pursuant to the Endangered Species Act of 1973 as amended by P.L. 96-159.

### **WATER QUALITY COMPLIANCE**

Pursuant to Section 401 of the Clean Water Act, a 401 Water Quality Certificate will be obtained for this project through the New Jersey Pinelands Commission and their General Permit Program. Our project partner, the U.S. Fish and Wildlife Service, New Jersey Field Office, has submitted an application for a New Jersey Pinelands Commission General Permit for this project.

### **CULTURAL IMPACTS**

The project site is within the borders of the Batsto Village State Park, which is listed on the State and National Registers of Historic Places. Extensive coordination with the New Jersey State Historic Preservation Office (NJSHPO) has been undertaken on this project and measures have been made to reduce the impact on the significant historic attributes that could be affected by the proposed activity. The proposed fish ladder design has incorporated recommendations of the NJSHPO to reduce impacts on cultural resources. In addition, the plan has been designed to avoid archaeologically sensitive areas, and is therefore not expected to impact archaeological deposits. The flume and the steppass will be covered by removable timber planking at ground surface to minimize the visual impacts to the historic setting and structures of the park. Coordination under Section 106 of the National Historic Preservation Act has been completed for this project.

### **RECOMMENDATION**

Because the Environmental Assessment concludes that the work described is not a major Federal action significantly affecting the human environment, I have determined that an Environmental Impact Statement is not required.

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Date

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Thomas C. Chapman, P.E.  
Lieutenant Colonel, Corps of Engineers  
District Engineer

**ENVIRONMENTAL ASSESSMENT**

**BATSTO RIVER FISHWAY RESTORATION PROJECT**  
**SECTION 206, ECOSYSTEM RESTORATION**  
**BURLINGTON COUNTY, NEW JERSEY**

**PREPARED BY:**  
**PHILADELPHIA DISTRICT**  
**U.S. ARMY CORPS OF ENGINEERS**  
**PHILADELPHIA, PENNSYLVANIA 19107**

**AND**

**NEW JERSEY FIELD OFFICE**  
**U.S. FISH AND WILDLIFE SERVICE**  
**PLEASANTVILLE, NEW JERSEY 08232**

**FEBRUARY 2003**

ENVIRONMENTAL ASSESSMENT  
 BATSTO RIVER FISHWAY RESTORATION PROJECT  
 SECTION 206, ECOSYSTEM RESTORATION  
 BURLINGTON COUNTY, NEW JERSEY

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## 1.0 Project Location

The Batsto River Fishway Restoration Project site is shown in Figure 1. The project site is located in Batsto, Washington Township, Burlington County, New Jersey. The project is located in the 2<sup>nd</sup> New Jersey Congressional District. The Batsto River is located within the central portion of the Pinelands National Reserve in southern New Jersey, an area internationally recognized for its unique pigmy forests and pristine rivers within the Mullica Watershed, in addition to its pre-historic and Revolutionary War sites. The Pinelands area supports major activities such as agriculture, recreational fishing and canoeing, anadromous and catadromous fish populations, resource extraction, shellfishing, military and federal uses, and residential and commercial development. This project is located at the Batsto Village State Historic Park, which is a historic area designed to preserve the historical accuracy of a 19<sup>th</sup> century New Jersey community (Burlington County Library 2001).

## 2.0 Study Authority

The U.S. Army Corps of Engineers' (Corps) study authority for the Batsto River Fishway Restoration Project is Section 206 of the Water Resources Development Act of 1996, which is used for aquatic ecosystem restoration that will improve environmental quality and is in the public interest. The U.S. Fish and Wildlife Service's (Service) authority for the subject restoration project is pursuant to the Service's Coastal Program.

## 3.0 Purpose and Need for Action

The Batsto River Fishway Restoration Project, with the installed fishway, would provide access to spawning and rearing habitat for migrating fish and would benefit migratory fish populations that historically spawned in the Batsto River including: alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*). A fish ladder at Batsto Dam would provide access to approximately eight miles of spawning habitat for alewife. Currently, migratory fish are impeded from reaching historic spawning and foraging areas by the Batsto Lake dam.

Currently, alewife are able to use the Batsto River up to Batsto Dam (Zich 1977). However, alewife are prevented from using areas upstream of the Batsto Dam due to the obstruction. As a result of the Batsto Dam, hundreds of alewife congregate at the base of the dam every spring during the spawning run (Carberry, pers. comm. 2001). Reports by Lance Cobb published in Beck (1963) identify that "herring was once so thick in this here river (Mullica River drainage) that you could almost walk across on them." The reason alewife congregate at this site is the result of the Batsto Dam, which prevents the alewife from continuing to move upstream. Based on the pH (4.8 to 5.6) and other physical parameters of water quality (e.g., dissolved oxygen) within the Batsto River (see Air and Water Quality section of this Environmental Assessment), there are no limiting factors that would prevent spawning activities by alewife upstream of the Batsto Dam. In addition, Zich (1977) identifies that Henry Beck in his book *Jersey Genesis* (a history of the Mullica River) there is a report that historically river herring ran far past Batsto almost to Atsion, New Jersey.

The Mullica River, which is immediately adjacent to the Batsto River and runs parallel to the Batsto River, is a very similar river to the Batsto River. Water quality parameters between these rivers are similar, land use in the surrounding uplands is similar, and aquatic ecology of the rivers is similar. Alewife currently spawn within the Mullica River up to Atsion Lake nearly 7.2 miles upstream of Batsto Dam (Zich 1977; Carberry, pers. comm., 2001). Water quality parameters (e.g., pH, temperature, dissolved oxygen, and flow rates) on the Mullica River downstream of Atsion Lake (i.e., pH between 4.5 and 5.4) are similar to those on Batsto River (i.e., pH between 4.8 and 5.6) (DeLuca *et al.* 2000). This information provides good evidence that with fish passage at Batsto Dam, alewife will successfully spawn upstream within the headwaters of Batsto River. In addition, in order to improve the success of fish ladder utilization by alewife, the New Jersey Division of Fish and Wildlife (NJDFW) will stock alewife upstream of the proposed fish ladder in order to reinitiate a spawning run.

Improving migratory fish access into Batsto Lake and the headwaters of the Batsto River will enhance the biological diversity of the riverine ecosystem, also benefitting wading birds and other wetland-dependent wildlife species. As studies have shown, the reintroduction of herring populations through spawning runs not only makes available the juvenile herrings as a food supply for other marine or freshwater fish, but other life stages of the herring provide additional foraging opportunities for birds, amphibians, reptiles, and mammals (U.S. Army Corps of Engineers 2001). Thus, the number of fish species and piscivorous birds upstream of the dam will rise due to the overall improvement in the health of the Batsto's riparian system as natural aquatic food webs are rebuilt.

Recreational fishing opportunities for the public will increase with future "herring runs." The recreational fishery for striped bass (*Morone saxatilis*) will benefit from the increases in aquatic biodiversity and forage fish populations. A variety of warm-water fish (e.g., chain pickerel (*Esox niger*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*M. salmoides*)) will feed on alewife, thus providing recreational fishing opportunities for both anadromous and warm-water fisheries.

The project goal would be accomplished through the installation of a permanent 30-foot-long Model A Alaska Steeppass fishway (three steeppass sections) on the Batsto River and an open flume to the Batsto Lake to allow migratory fish to proceed unimpeded to historic spawning and foraging areas upstream. The open flume will be installed beneath the roadway (with a bridge over the flume to allow vehicular traffic), traversing its width, with an outlet into Batso Lake. The open flume and the fishway will be entirely covered by a timber fascia in order to preserve the historical character of the dam and mill area. The installation of a fishway at Batsto Lake would provide access to approximately eight miles of river to migratory fish.



Project success will be measured by the number of fish using the installed fishway after construction is complete. According to NJDFW, in past fishway projects for alewife, the fishways have yielded the following results: 50 alewife for year one, 100 year two, 300 year three, 900 year four, and 1800 by year five. The NJDFW is supportive of seeding adult alewife in Batsto Lake and further upstream waters both before and after the fishway installation. This will facilitate usage of the fishway by migratory fish.

#### 4.0 Alternatives

Due to the nature of this project, a limited number of alternatives are available to achieve the goals of fish passage and be sensitive to engineering, environmental, and historical criteria. The alternatives include no-action, preferred fishway design, wooden fishway design, temporary fishway design, and other structural design measures.

#### 4.1 No-action

The no action alternative would leave the current stream conditions as they exist and no increased fish access would be established. The health of the fishery populations in Batsto River would stagnate as access to additional foraging and spawning areas would continue to be blocked. Over time, this impediment could stifle growth of the river herring and alewife populations in the Batsto River. In addition, recreational fishing opportunities and benefits to other wildlife would not be realized.

#### 4.2 Preferred Fishway Design

The proposed project involves installation of a permanent 30-foot-long aluminum Model A Alaska Steeppass fishway (three steeppass sections) on the Batsto River and a concrete open flume to Batsto Lake to allow migratory fish to proceed unimpeded to historic spawning and foraging areas upstream (Figures 2 - 4). The open flume will be installed beneath the roadway (with a bridge over the flume to allow for vehicular traffic), traversing its width, with an outlet into Batso Lake. The fishway and open flume would be approximately 4 feet wide and would be constructed below grade to obscure the visibility of the fishway. In addition, the open flume and the fishway will be entirely covered by removable timber fascia in order to preserve the historical character of the dam and mill area. The timber fascia will be made of wood similar in color and texture to that of adjacent historic buildings thereby eliminating adverse impacts on the visual historic character of the project site. The timber fascia would have approximately 1 inch spacings between the planks to allow for natural light to penetrate into the fishway and ensure utilization. In addition, after the spawning season is complete, stop logs can be placed at the entrance of the fish ladder to temporarily stop water from going through the fishway. The installation of a fishway at Batsto Lake would provide access to approximately eight miles of river to migratory fish.

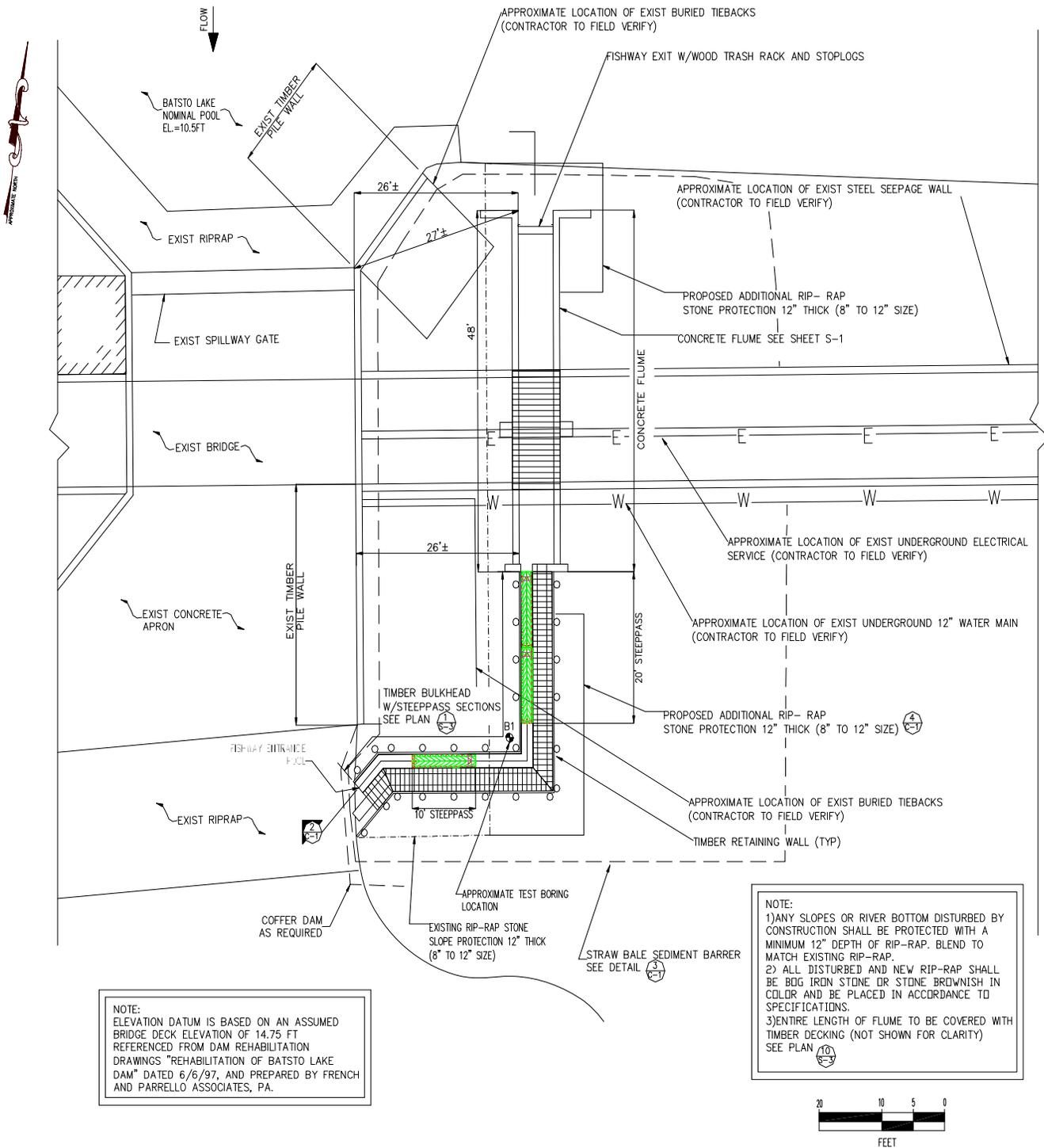


Figure 2. Batsto River Preferred Fishway Design.

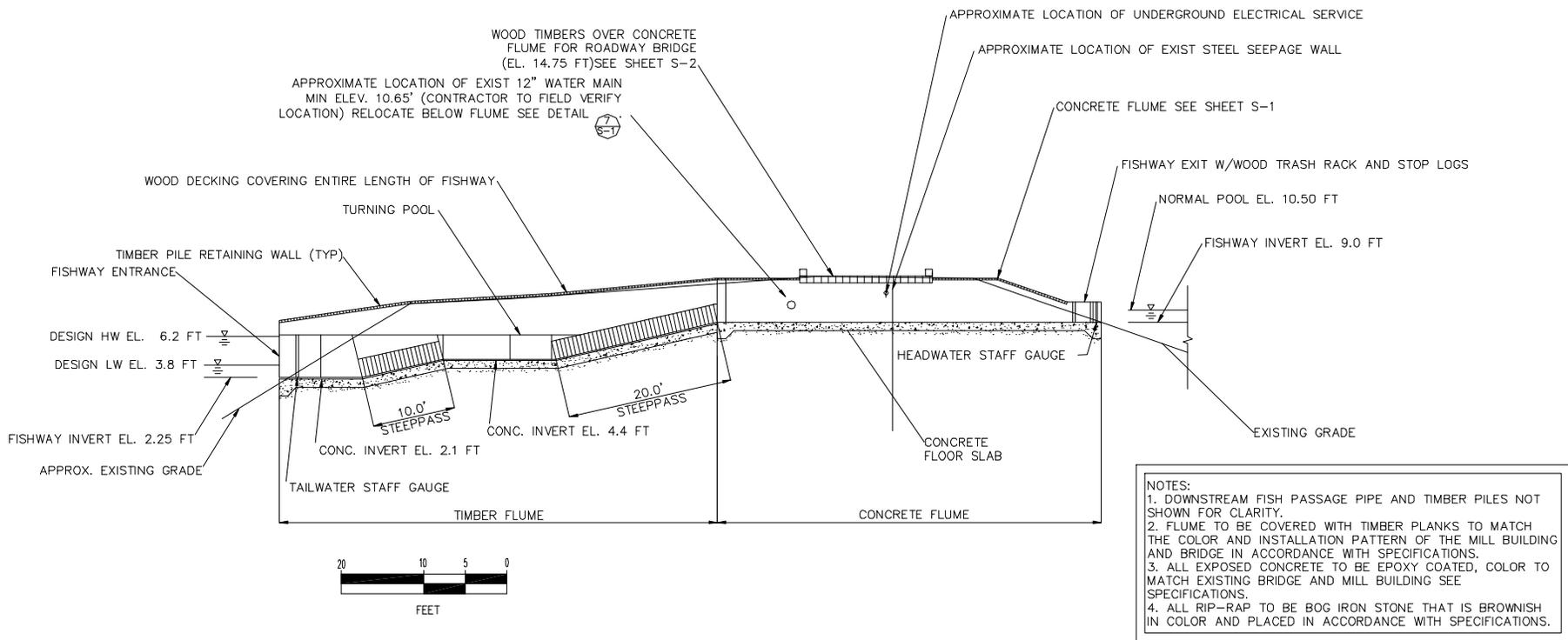


Figure 3. Batsto River Preferred Fishway Design (plane view).

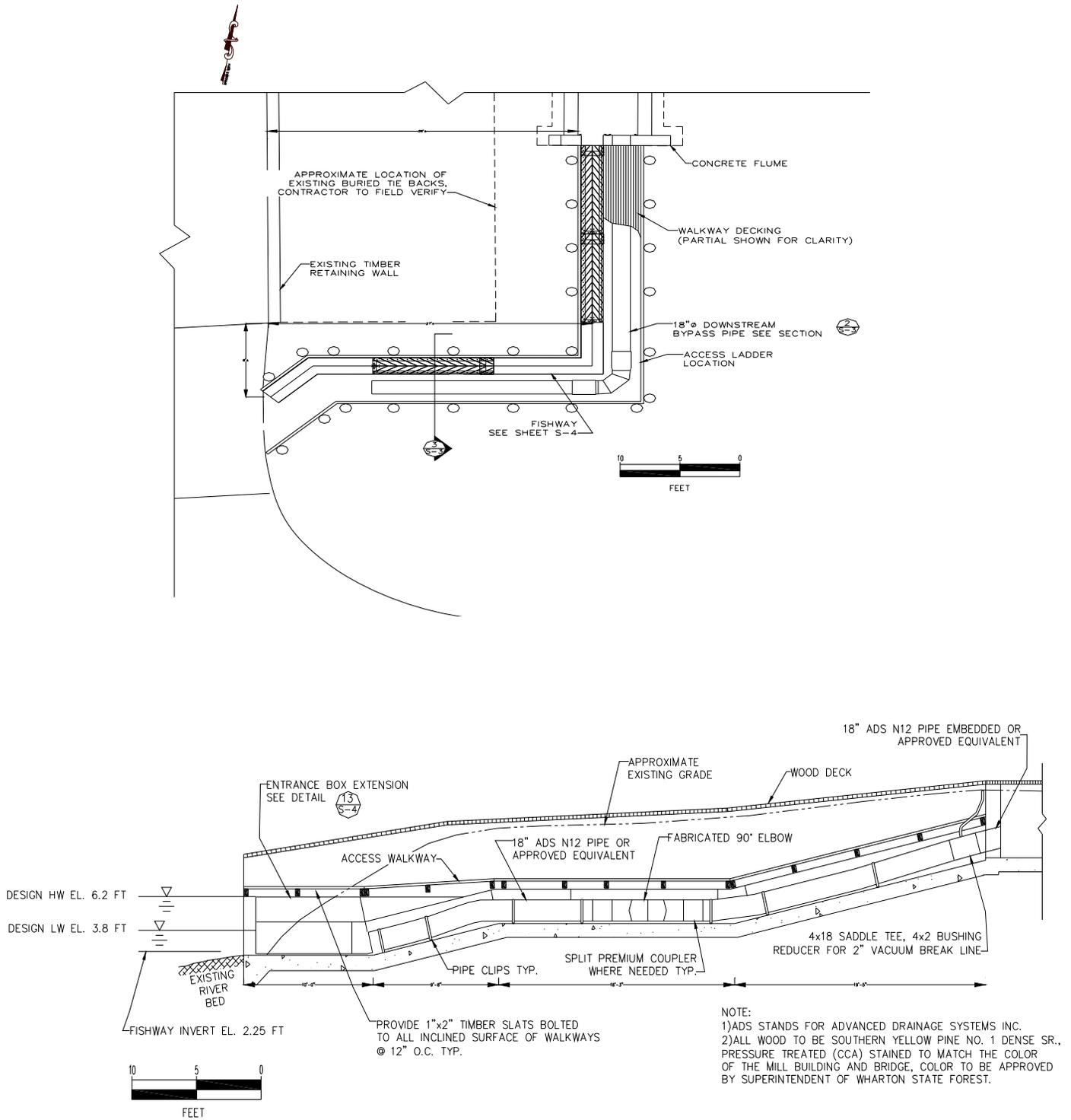


Figure 4. Batsto River Fishway Preferred Design (cross sections).

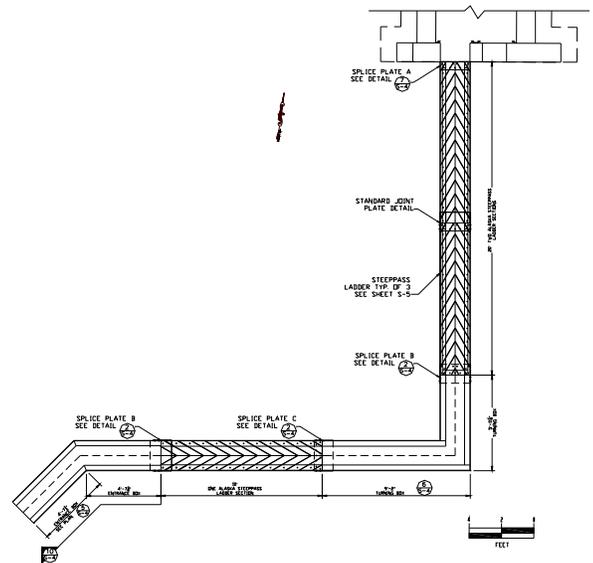
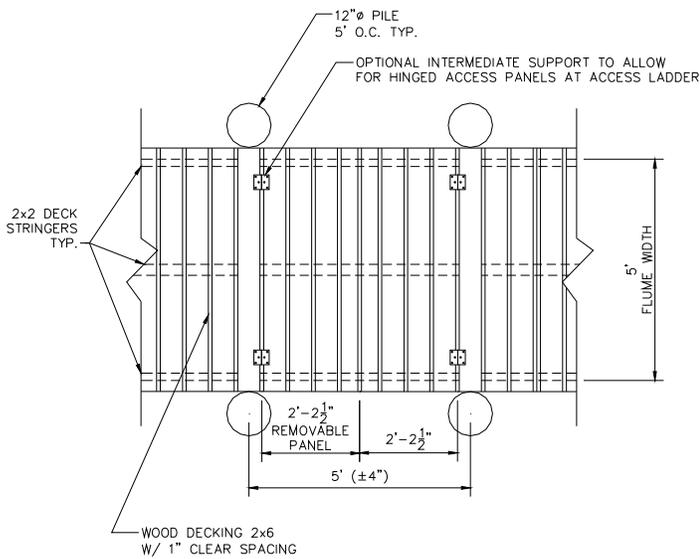
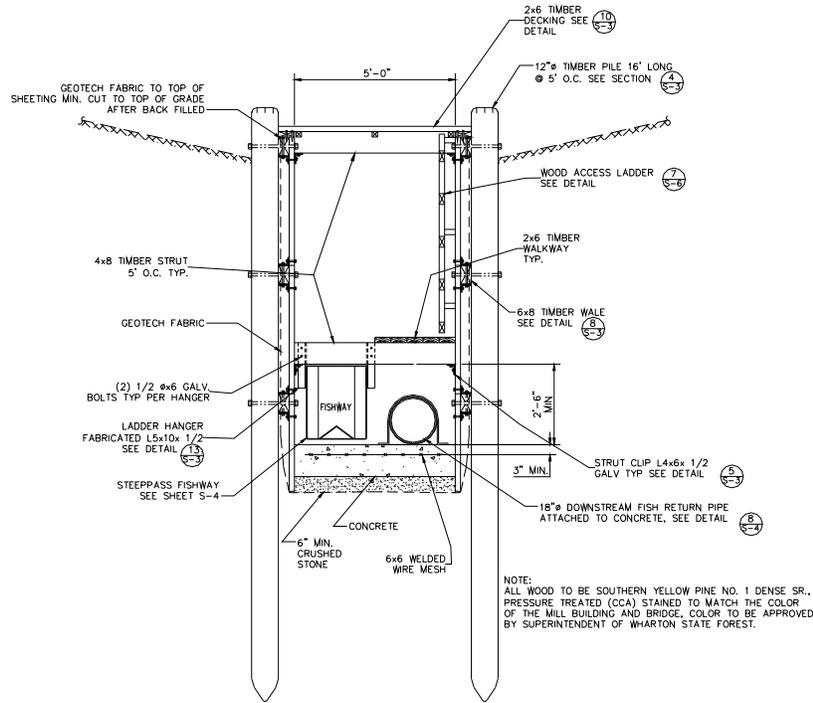


Figure 5. Batsto River Fishway Preferred Design (detailed specifications).

### 4.3 Wooden Fishway Design

The wooden fishway design would be comparable to the preferred fishway design except that the fishway and open flume would be constructed entirely of wood (Figures 5-7). In addition, other than a bridge over the fishway at the road crossing, no timber fascia is proposed with this alternative. The wood would be similar in color and texture to that of adjacent historic buildings. This design would still eliminate adverse impacts on the visual historic character of the project site. However, this fishway design will be significantly more expensive than the preferred alternative and due to degradation of wood versus concrete and aluminum would require frequent maintenance, replacement, and repair with no additional benefit.

### 4.4 Temporary Fishway Design

The temporary fishway design would require construction of a Model A Alaska Steeppass fishway constructed parallel to the eastern wingwall of the Batsto Dam. A timber fascia standing upright similar to the wingwall could be constructed to obscure the fishway preserving the visual historic character of the area. However, a notch in the steel tidegate would be necessary to provide an exit site for the fishway. The temporary fishway could be removed following the spawning run. However, removal would require the use of crane to lift the fish ladder and a flatbed truck to move the fish ladder, which is approximately 1,000 pounds per section. The temporary fishway will not pass fish other than during the peak spawning runs, would require heavy equipment to move and store the fish ladder, and would leave a notch in the existing tide gate upon removal of the fishway. As such, this design is inferior to the preferred alternative.

### 4.5 Other structural alternatives

Several other structural alternatives were considered but discounted due to engineering, maintenance, cost, or historical resources constraints. These alternatives included dam removal, a fish ladder with a pipe, a fishway within the sawmill, a pool and weir structure, and manually moving fish over the dam.

Dam removal would involve elimination of the existing dam originally built 200 years ago and reconstructed as a modern dam in 1958. This alternative would permit unimpeded access of alewife up the Batsto River. However, this option would substantially alter the historic character of the Batsto Village and is not considered a feasible option.

The fish ladder with a pipe was originally proposed as a viable alternative as it would require minimal wood sheeting and would essentially hide the fish ladder. However, after further discussions with fishery biologists it was determined that this design would limit use of the fishway by alewife due to the lack of light within the flume (many fish are believed not to use fishways with limited visible light). In addition, it is difficult and potentially unsafe to clean an underground pipe increasing maintenance costs and safety concerns.



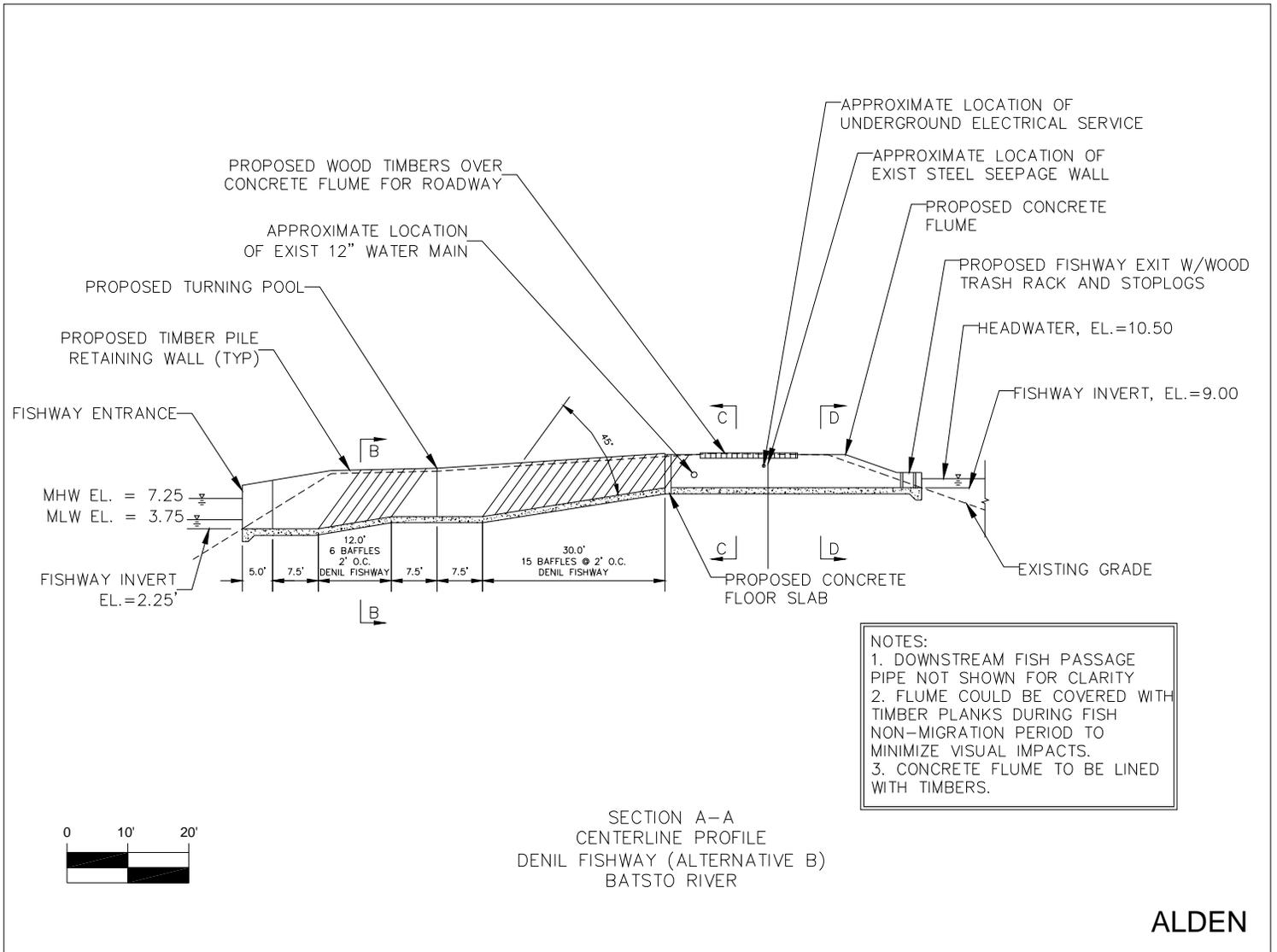


Figure 7. Batsto River Fishway Alternate Design (plane view).

A fishway in the existing historic sawmill was considered as a potential design. This design would also obscure the visibility of the fishway. However, this alternative was discounted because the entrance way is too far from the attractant flow; the cost of construction is very high; and, it would require alteration of a historic building.

A pool and weir structure was considered as an alternative and would show a more natural pool and riffle structure. However, this alternative was eliminated because a structure more than three times longer than the proposed structure does not blend into the historic context of the Batsto Village, and is considerable more expensive to construct.

## 5.0 Environmental Analysis

The Batsto River is located within the northern portion of the Mullica Watershed, a unique riverine system of the New Jersey Pinelands. This site has been a place for commercial and recreational fishing and provides habitat for anadromous and catadromous fish populations, and other riparian wildlife. Little anthropogenic development has occurred to the area, preserving the relatively pristine waters of the area. In spite of this, the Pinelands have a characteristic low species diversity, due in part to the relatively harsh sandy and acidic environment, which seems to especially limit the number of aquatic and amphibious species. Though the area does not contain species constrained specifically to the Pinelands, it is recognized as having unique and delicate communities found nowhere else in New Jersey (Hastings 1978). Batsto is also historically significant as a former Pinelands bog iron and glass making industrial center from 1766 to 1867, with the Batsto Iron Works being an important supplier of ammunitions and other wartime products during the American Revolution and the War of 1812.

### 5.1 Vegetation and Soils

Soils surrounding the Batsto River are generally sterile, highly acidic (pH ranging from 3.6 to 5.5), sandy, podzol, nutrient-poor soils with only a small accumulation of humus (Boyd 1991). The vegetation in the uplands surrounding the Batsto River is dominated by oak-pine forest. Lowland area vegetation is dominated by cedar (i.e., Atlantic white cedar (*Chamaecyparis thyoides*)) and hardwood (i.e., red maple (*Acer rubrum*)) swamps. A variety of aquatic macrophytes are common within the Batsto River including, but not limited to: pondweed (*Potamogeton confervoides*), rush (*Juncus pelocarpus*), bur-reed (*Sparganium angrocladium*), bulrush (*Scirpus* spp.), and pickerelweed (*Pontederia cordata*) (Lloyd *et al.* 1980).

Currently the area where the fish ladder is proposed is not vegetated and is comprised of sandy disturbed soil or rip-rap. As such the proposed project will not have an affect on soils or vegetation within the project area.

## 5.2 Wetlands

The Batsto Village State Historic Park, located in Wharton State Forest, is a managed park mainly used for its recreational and historical amenities. Other than the Batsto River and Batsto Lake, no wetlands occur within the project area. Extensive palustrine emergent, scrub-shrub, and forested wetlands occur both upstream and downstream of the project area. However, the area where the fish ladder will be constructed is currently maintained lawn or disturbed soil and no wetlands will be impacted.

## 5.3 Macroinvertebrates and Fish Resources

Non-impaired rivers have a benthic community comparable to other undisturbed streams within the region. Maximum taxa richness, balanced taxa groups, and good representation of intolerant individuals or sentinel species characterize such a community. The macroinvertebrate orders found inhabiting the riverine and riparian zones of the Batsto River within 1,000 feet downstream of the project site include, but are not limited to the following: Trichoptera, Ephemeroptera, Diptera, Odonata, Plecoptera, Coleoptera, Veneroida, and Annelida. The sample (taken on 2/10/2000) contained 45.45% EPT (Ephemeroptera, Plecoptera, and Trichoptera). The New Jersey Department of Environmental Protection (NJDEP) calculated an optimal habitat score of 168 out of 200 for this site on the Batsto river, with a positive change in the score since last tested in 1995, indicating that the this stream contains high quality habitat for macroinvertebrates (New Jersey Department of Environmental Protection 2001).

The acidic nature of undisturbed Pineland waterways, usually ranging between pH 3.6 to pH 5.2, limits the introduction of broad-ranging and intrusive species, which can tolerate acidic levels only as high as pH 5.0. Moreover, any exotic species' inability to establish and overpopulate Batsto River water has enabled areas of habitat to be relatively free from introduced aquatic competition, allowing for larger numbers of native fishes in Batsto River and Lake. Thirteen out of the 20 species recorded in the Pinelands occur in Batsto River (Lloyd, et al. 1980). Fish species likely to be found in the Batsto River include: American eel, redbfin (grass), chain pickerel, eastern mudminnow (*Umbrypygmaea* spp.), golden shiner (*Notemigonus crysoleuces*), pirate perch (*Aphredoderus sayanus*), banded sunfish (*Enneacanthus obesus*), tessellated darter (*Etheostoma olmstedii*), yellow perch (*Perca flavescens*), blueback herring, pumpkinseed sunfish (*Lepomis gibbosus*), white perch (*Morone americana*), eastern silvery minnow (*Hybognathus regius*), bluegill (*Lepomis macrochirus*), largemouth bass, golden shiner (*Notemigonus crysoleucas*), black crappie (*Pomoxis nigromaculatus*), banded killifish (*Fundulus diaphanus*), and common carp (*Cyprinus carpio*) (Hastings 1978).

The main anadromous fish to use the Batsto River to any significant degree is the alewife. Currently use of the Batsto River by alewife is restricted to the lower half of the river below the Batsto Dam at Batsto Village. Alewife in recent years have been at depleted levels for a variety of reasons including overharvest, restrictions to spawning areas as a result of dams and other blockages, and water quality degradation (Atlantic States Marine Fisheries Commission. 1985).

Landings of alewife and other river herring have declined dramatically since the mid-1960s and have remained very low in recent years.

The proposed project would significantly improve fisheries within the Batsto River by opening up approximately eight miles of riverine habitat for use by alewife to spawn. It will also enhance the existing alewife population within the Mullica River watershed. Juvenile alewife are an important forage fish for a variety of warm water fish species. Warm-water fish that would benefit from the introduction of alewife upstream of the Batsto Dam include chain pickerel, smallmouth bass, and largemouth bass. Finally, the proposed project will restore the ecological integrity of the Batsto River to its original condition prior to the construction of the Batsto Dam.

All necessary soil erosion and sediment controls will be used during the construction of the fishway to minimize project impacts to the fish and macroinvertebrates within the Batsto River. Controls that will be implemented include a lowering of the lake to an acceptable level to permit construction to occur in the dry and the installation of soil erosion control fences to prevent runoff and debris from entering the river. In addition, the contractor will be required to complete a plan that describes measures to prevent hazardous construction materials (e.g., oils) from entering the river. Furthermore, all construction debris will be disposed of in an appropriate manner.

#### 5.4 Wildlife Resources

Due to the expanse of relatively undeveloped and continuous land surrounding Batsto Lake, the project site is inhabited by a large variety of wildlife species. Reptiles species most characteristic of the stream and lake habitats near the project site are the following: common snapping turtle (*Helydra serpentine*), common mud turtle (*Kinosternon subrubrum*), spotted turtle (*Lemmys gutiata*), wood turtle (*Lemmys insculpta*), box turtle (*Terrapene Carolina*), painted turtle (*Chrysemys picia*), red-bellied turtle (*Chrysemys rubriventris*), common water snake (*Nairix sipedon*), eastern hognose snake (*Heterodon platyrhinos*), corn snake (*Elaphe guttata*), milk snake (*Lampropeltis triangulum*), and the timber rattlesnake (*Crotalus horridus*). The much more abbreviated list of amphibians inhabiting Batsto Lake and River consists of the red and the red-backed salamanders (*Pseudotrilon ruber* and *Plethodon cenereus*), found mostly around streams, and the carpenter frog (*Rana virgatipes*), which is common around larger rivers and lakes (Hastings 1978).

A variety of neotropical birds, wading birds, shorebirds, and waterfowl use the area surrounding Batsto River. A variety of piscivorous birds use the Batsto River for foraging and nesting habitat include red-throated loon (*Gavia stellata*), great blue heron (*Ardea herodias*), little blue heron (*Egretta caerulea*), great egret (*Egretta alba*), yellow-crowned night heron (*Nycticorax violaceus*), and osprey (*Pandion haliaetus*) (Brady, 1980; Hastings 1978). Batsto Lake is also home to various waterfowl including the wood duck (*Aix sponsa*). The emergent vegetation and forests surrounding the project area provide habitat for redwing blackbird (*Agelaius phoeniceus*), swamp sparrow (*Melospiza Georgiana*), song sparrow (*Melospiza melodia*), turkey vulture (*Cathartes aura*), and red-winged hawk (*Buteo platypterus*) (Hastings 1978).

Mammals conspicuous to the Pinelands and the surrounding project site area are the white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), and gray squirrels (*Sciurus carolinensis*). Other significantly abundant, though illusive species are the virginia opossum (*Didelphis virginiana*), eastern mole (*Scalopus aquaticus*), eastern chipmunk (*Tamias striatus*), beaver (*Castor Canadensis*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), and mink (*Mustela vison*) (Hastings 1978). In addition, the piscivorous river otter (*Lutra canadensis*) also occurs within the Batsto River.

The proposed project will enhance foraging opportunities for piscivorous wildlife, both birds and mammals, by providing an additional foraging source in the upper eight miles of the Batsto River. It is likely that this will improve overall habitat quality for these species and improve biological diversity within the upper eight miles of Batsto River.

Wildlife inhabiting the Batsto Lake and river have adequate area to remove themselves and temporarily relocate away from any harm or noise of construction. Any project impacts would be minor; however, some indirect impacts (disturbance) to aquatic species may result during construction of the fishway entrance, which will be located at edge of the river. All precautions will be taken to avoid detrimental effects to aquatic resources during the construction phase of the project.

## 5.5 Air and Water Quality

The air quality within the project area is considered to be excellent, due to the lack of commercial and industrial development in the vicinity of the project area. Construction of the proposed fishway would cause temporary reduction of local ambient air quality due to fugitive dust and emissions generated by construction equipment. These temporary reductions in air quality are considered to be insignificant.

The Batsto River is approximately 16 miles long and drains approximately 67 square miles of southern Burlington County. Water quality within the Batsto River is considered to be very good to excellent (Robinson 1983). Water quality data taken on the Batsto River in Batsto, New Jersey between October 1999 and September 2000 indicates excellent dissolved oxygen amounts (varying between 81 and 91 percent saturation) and slightly acidic conditions (varying between 4.8 and 5.6 pH) (DeLuca *et al.* 2000). Similar water quality data taken on the Mullica River at Atsion Lake between October 1999 and September 2000 indicates excellent dissolved oxygen amounts (varying between 88 and 96 percent saturation). This was slightly higher than at the Batsto station, probably due to being immediately downstream of the Atsion Lake outlet. Similarly the water on the Mullica River downstream of Atsion Lake is slightly acidic (varying between 4.5 and 5.4 pH) (DeLuca *et al.* 2000).

The USGS gauging station immediately downstream of the Batsto Dam has been collecting surface water flow information on the Batsto River since 1957. The mean monthly streamflows on the Batsto River at that gauging station (station number 01409400) between 1957 and 2000 have varied between 61.7 cubic feet per second (cfs) in September to 161 cfs in March. During

some years lows of 21 cfs and highs of 277 cfs have been recorded (U.S. Geological Survey 2001).

The Batsto River, categorized as part of the Mullica watershed, has an acceptable dissolved oxygen rating and very high sanitary conditions. Organic nitrogen and ammonia, as well as total phosphorous levels were characteristic of undisturbed Pinelands areas. Inorganic nitrogen levels (NO<sub>2</sub> and NO<sub>3</sub>) were slightly higher in 1996 than levels collected prior to 1987, according to the NJDEP (1996), indicating greater in-stream occurrence. Heavy metal violations were observed, but only once out of five samples for each of the copper, lead, and zinc criterion (Watershed Management Area 14 1996). In regard to this information, the selected project site is appropriate for the establishment of an alewife population, with the Batsto River being viewed as a non-impaired waterbody. In addition the dissolved oxygen, pH level, flow rate, and other water quality criteria upstream of the Batsto Dam are appropriate for spawning activities of alewife.

Implementation of this project is not expected to alter water quality. All necessary soil erosion and sediment controls will be used during construction of the fishway to minimize project impacts to the Batsto River. Controls that will be implemented include a lowering of the lake to an acceptable level to permit construction to occur in the dry and the installation of soil erosion control fences to prevent runoff and debris from entering the river. In addition, the contractor will be required to complete a plan that describes measures to prevent hazardous construction materials (e.g., oils) from entering the river and possibly traveling downstream. Furthermore, all construction debris will be disposed of in an appropriate manner.

The fish ladder may result in minor water level fluctuations within Batsto Lake. However, the fish ladder is only designed to pass approximately 2 cfs, so any water passing through the fish ladder is minor (between 1 to 3 percent depending on the month) compared to that spilling over the dam face on a monthly basis (between 62 and 161 cfs) (U.S. Geological Survey 2001). In addition, after the spawning season is complete, stop logs can be placed at the entrance of the fish ladder to temporarily stop water from going through the fishway. The proposed project will not have any long-term adverse impacts on water quality in the Batsto River.

## 5.6 Threatened and Endangered Species

According to the Service, extant populations of the federally listed threatened or endangered bog turtle (*Clemmys muhlenbergii*), swamp pink (*Helonias bullata*), Knieskern's beaked-rush (*Rhynchospora knieskernii*), American chaffseed (*Schwalbea americana*), and sensitive joint-vetch (*Aeschynomene virginica*) occur within 4 to 8 miles of the project site. However, no habitat for these species occurs within the project area. Similarly, the federally listed candidate bog asphodel (*Narthecium americanum*) occurs within 2 miles of the project site, but no habitat occurs within the project site. The federally listed threatened bald eagle (*Haliaeetus leucocephalus*) nests within 6 miles of the project area and bald eagles could forage adjacent to the project area. However, since construction will occur 6 miles from the nest site and construction is temporary, the proposed project will have no effect on the bald eagle (see Intra-Service Section 7 biological evaluation form - Appendix A).

## 5.7 Land Use

Land use in the Mullica River basin is predominantly undeveloped state park and forests, which together comprise 84 percent of the land, while less than 5 percent of the land is developed (Robinson 1983). Agriculture in the upland portion of the basin consists primarily of horse and swine farms, with crop acreage devoted to apples, peaches, tomatoes, blueberries and sweet potatoes. The upland areas drain primarily pine-oak forests. The lowland areas are dominated by cedar and hardwood swamps. Agriculture in the lowland areas is dominated by horse and swine farms, with crop acreage devoted to cranberry and blueberry production. The project site is within the Batsto Village, a historic village that is currently managed as a state park. The Batsto Village attracts more than 100,000 visitors annually.

The proposed project will not have an affect on land use within the project area.

## 5.8 Socioeconomics

The Batsto Village is a historical and tourist destination visited by more than 100,000 visitors annually. Batsto Village is currently a state park and is listed on the New Jersey and National Registers of Historic Places.

Alewife are used commercially, although stocks have been declining since the mid-1960s. In New Jersey commercial harvest over the last 10 years has varied between 300 and 43,000 pounds (National Marine Fisheries Service 2000). The majority of the U.S. landings were used for fish meal and fish oil to be added to fertilizer, pet foods, and domestic animal feed. A minor portion was used for fishing bait, and the remainder was sold salted or fresh for human consumption. Roe from alewife is canned and is highly valued (Fay et al. 1983). Recreational fishing for alewives is significant during spring spawning runs in the Batsto River. Most of the recreational catch serves as bait for other sport fish.

The proposed project has received strong support from a variety of organizations including the New Jersey Marine Fisheries Council, the Press of Atlantic City, the Absecon Saltwater Sportsmen, the Delaware Riverkeeper, the New Jersey Environmental Federation, and Fish America Foundation (see Appendix B). In addition, a coalition of federal and state agencies have come together to support this project including NJDFW, the Service, and the Corps.

The addition of a fish ladder at the Batsto Dam, particularly one that will be essentially hidden from view as a result of wooden fascia will not adversely affect the socioeconomics of the existing State Park. Rather the enhancement of fish passage and restoration of spawning habitat along the Batsto River will improve and expand recreational fishing opportunities for the public. In addition, it is likely that the additional spawning habitat created will enhance alewife populations along the New Jersey coast potentially resulting in an incremental improvement in overall alewife population improvement.

## 5.9 Historic and Cultural Resources

The Corps and the Service is consulting with the New Jersey State Historic Preservation Office (NJ SHPO) and other interested parties in order to identify, evaluate, and assess project impacts on historic properties pursuant to the cultural resources responsibilities under the National Historic Preservation Act of 1966 (NHPA), as amended, and its implementing regulations, 36 CFR 800. Section 106 of the NHPA, as amended, requires the Corps and Service to consider the effect of its undertakings on cultural and historic resources (including prehistoric and historic sites, buildings, districts, or objects) which are listed or eligible for listing on the National Register of Historic Places (NRHP). Consultation under Section 106 is ongoing and will be concluded prior to the initiation of any project construction activity.

### 5.9.1 History of Batsto Village

The Batsto Village is the site of a former bog iron and glass-making community. Founded in 1766 by famous Ironmaster Charles Reed, the Batsto Iron Works was constructed on the banks of the Batsto River. The name derives from the Swedish "Batstu", which means *bathing place*, and the bathers were probably the Lenni-Lenape Indians (Boyd 1991).

The Iron Works soon changed hands and was bought by John Cox in 1773 and Joseph Ball in 1779. Throughout this period it was instrumental in supplying the Continental Army with a variety of war products, from munitions to kettles, and parts for ships.

In 1784 William Richards purchased the Iron Works and it remained in his family, operated by his son and grandson, for the next 92 years. The Williams family was responsible for building the majority of the village.

Eventually the pig iron industry declined as did the Batsto village in the mid-1800's. After a brief period of manufacturing glass, it fell into receivership. The Batso complex was purchased by Joseph Wharton in 1876. Mr. Wharton built a sawmill, cleared the land, planted cranberries and other crops, and ran a forest products and agricultural business until he died in 1909. In 1952 the estate of Joseph Wharton intentionally breached the dam to lower the water level of Batsto Lake to reconstruct the Batsto Dam. The dewatering channel constructed in 1952 is at the same location as the proposed fish ladder.

In 1954 Batsto Village was purchased by the State of New Jersey and is currently the core of Wharton State Forest. In 1954 Hurricane Hazel washed out the spillway of Batsto Dam and required the reconstruction of the Batsto Dam between 1958 and 1961. The Batsto Dam spillway was rehabilitated in 1998. Finally in 2000 the Batso Dam was reconstructed with a steel tidegate, concrete abutments, the existing concrete apron, and extensive rip-rap on both sides of the dam extending back approximately 50 feet.

### 5.9.2 History of Alewife and Historic Fish Laws

Early colonial records refer to the alewife as providing food for the first inhabitants of New England, and from the time when Samoset first taught the Pilgrims the method of fertilization on corn fields, this fish has had considerable influence on the welfare of the country (Belding, 1921).

In 1623 the first fishery law in the Colonies (known as the Plymouth Colony Fish Law) was passed for the protection of alewives (Belding 1921). Between 1682 and 1727 a series of laws were enacted for the construction and maintenance of fish passage facilities, and for the prevention of all obstructions to the passage of fish in rivers, except mill dams. In 1741, an act which provided that a sufficient passageway be made through or around each dam from the first day of April to the last day of May annually. The owners of the dams were required to give a sufficient water flow for the young to pass down and that the cost of installing fishways in dams erected before 1709 be borne by the towns and the future maintenance by the owner of the dam. In 1745, however, mill owners through political pressure secured a provision eliminating fishways if the fish did not pass upstream in adequate numbers to be of greater benefit than the loss due to the diminished water power. In addition, no dam owner had to keep open any passageway if there were no longer runs of alewives, shad, or salmon (Belding 1921).

It is presumed that the Lenni-Lenape used alewife within the Batsto River prior to its establishment as an Iron Works in 1766. The affect on these fish laws on the establishment of the dam at Batsto River in Batsto Village is unknown.

### 5.9.3 Impacts on Archaeological Resources

The construction associated with reconstructing the Batso Dam in 1952 by the estate of Joseph Wharton required dewatering of Batsto Lake in order to rebuild the dam. Photographic evidence and the plans for this work in the State of New Jersey Dam Application (Dam Application Number 462) (Appendix C) identify that a dewatering channel was constructed 36 feet wide approximately 33 feet away from the eastern wingwall of the dam. This dewatering channel (identified in the plans as temporary bypass to drain the lake) is approximately 10 feet deep from the road elevation and approximately 6 feet deeper than the lake elevation. Double sheathing was driven to support the sides of the dewatering channel. This evidence demonstrates that the area between 33 feet and 69 feet east of the eastern wingwall of the dam has been excavated to a depth of 10 feet below the road bed. The proposed fishway is designed to be constructed between 36 feet and 42 feet east of the eastern wingwall of the existing dam and will not require excavation deeper than 10 feet from the roadbed. As such, the proposed fishway is entirely within an area previously excavated in 1952. Any historic or cultural resources within the footprint of the proposed fishway have been damaged by excavation of the dewatering channel constructed in 1952 and the integrity of any such resources has already been compromised.

The plans of the reconstruction of the Batsto Dam in 1958 (Appendix C) identify a feature (identified as L) running between the Batsto Lake and the Batsto River between 66 and 86 feet east of the eastern wingwall of the Batsto Dam. It is not clear what this feature is, but it is presumed that it is another dewatering channel necessary for the reconstruction of the Batsto

Dam. If this feature is a dewatering channel then additional excavation within and adjacent to the footprint of the proposed fishway was completed in 1958 and 1959, further degrading the integrity of historical and cultural resources within the project area.

In 1957, an archaeological excavation and removal of a 43-foot-long ore boat was funded by the New Jersey Department of Conservation and Economic Development. The boat was removed from Batsto Lake between approximately 40 feet and 80 feet east of the eastern wingwall of the Batsto Dam. The Phase I Archaeological Survey at Batsto Dam (Silber 1998) identifies that pilings discovered during removal of the ore boat remain at the site. These pilings were evident in 1989 photographs. The pilings may be associated with a 19<sup>th</sup> century dock. However, since the footprint of the proposed fishway is within an area previously excavated in 1952 it is unlikely that the subject pilings or other historic or cultural resources would be found intact within the construction site.

Recent erosion events on the shoreline of Batsto Lake and Batsto River in the area of the exit and entrance of the proposed fishway, respectively, and construction have occurred between 1999 and 2001, further compromising the integrity of historic and cultural resources within the vicinity of the fishway (Appendix C). Photographs from June 5, 2000 and March 27, 2001 show substantial erosion east of the eastern wingwall along Batsto Lake and downstream of the spillway (Appendix C). In addition photographs from the reconstruction of the Batsto Dam dated March 21, 2001 show a cofferdam and excavation within the site of the proposed fishway further demonstrating the construction impacts that have already occurred within the proposed fishway site (Appendix C).

Archival research indicates that the entire footprint of the proposed fishway was extensively altered in 1952 by the construction of a dewatering channel through the dam. Subsequent erosion and dam restoration activity has also impacted the proposed fishway location. It is the Corps and Service's opinion that the likelihood for intact and undisturbed archaeological deposits in the proposed fishway location is extremely minimal and that no archeological survey is required within the project site.

#### 5.9.4 Impacts on Historic and Cultural Resources

The Batsto Village was listed in the New Jersey and National Registers of Historic Places in 1970 and 1971. The Batsto Village is a unique and historical site that demonstrates a 19<sup>th</sup> century village of New Jersey. Much of the architecture and historical views within the village have been preserved for the enjoyment of visitors. The majority of the buildings within the Batsto Village are timber construction and are similar in style. Similarly appurtenant facilities are also constructed in timber to match the historical context of the Batsto Village.

Beginning in September 1999, the NJSHPO has provided the Corps and Service with early technical assistance and preliminary comments on numerous fish passage alternatives (see Appendix B). In a letter dated August 6, 2001, and again during a meeting and site visit on October 4, 2001, the NJ SHPO expressed strong concerns that all previously proposed

alternatives did not comply with the Secretary of the Interior's Standards for the Treatment of Historic Properties and that a fish ladder at Batsto Lake Dam is an incompatible use. The NJSHPO also reviewed and provided comments on an early draft of this Environmental Assessment in a letter to the Corps dated November 21, 2001 (see Appendix B).

Based on a review of the documentation and comments referenced above, it is the Corps' opinion that the selected plan as detailed in this draft report, has the potential to visually impact important historic qualities and features of Batsto Village State Park, a property listed on the National Register of Historic Places. However, it is our position that these potential impacts can be avoided and that measures can be taken to ensure that the project will have no adverse effect on Batsto Village State Park. Based on comments received from NJSHPO on March 7, 2002 in response to the Draft Environmental Assessment for this project, they requested five conditions for project approval. In that correspondence they stated that the project would not adversely affect historic properties if the following conditions were met:

1. The concrete flume should be covered with timber planks year-round (see sheet 2 of the plans).
2. The proposed handrail must be constructed below grade in a manner to ensure that no part of the handrail is visible from existing grade (see sheet 2 of the plans).
3. The entire length of the fishway must be covered by "wood decking" or removable timber planking similar in color and texture to that of the surrounding buildings within the village (see sheet 2 of the plans).
4. All concrete must be tinted to match the color of the timber fascia (see sheet 3 of the plans).
5. The aforementioned items must be clearly specified in project plans and specifications.

All requested conditions by NJSHPO have been incorporated into the revised designs (see Section 4.2). The proposed fishway will be constructed with historically compatible materials to ensure that it blends with the historic view of the Batsto Village. The fishway and the open flume will be constructed below grade such that the bottom and sides of the fishway and open flume will not be visible. The top of the fishway will be covered with removable timber fascia (designed to match the exterior of adjacent buildings) such that the fishway and the open flume will not be visible. The timber fascia will be constructed to allow them to be removed thus allowing for maintenance of the fish ladder and flume. In addition, the timber plank spacing will be separated by approximately 1 inch to allow for light penetration to the fishway and open flume thus ensuring that alewife and other anadromous fish will use the fishway. The open flume through the roadway will be covered with more substantial planking to allow for vehicular access over the fishway and will be of similar design to the existing bridge over the Batsto Dam. Upon completion, the fishway will look like a simple wooden walkway between the Batsto Lake and Batsto River.

Furthermore, in a correspondence from NJSHPO dated October 25, 2002, they requested that riprap used for the project be bog iron stone or a stone that is brownish in color. These conditions will be incorporated into the final plans and specifications for the project. In that same letter,

NJSHPO concludes that the project is in conformance with the Secretary of Interior’s Standards for the Treatment of Historic Properties, and therefore, does not constitute an encroachment under the New Jersey Register of Historic Places Act (see Appendix B).

#### 5.10 Environmental Justice

All of the alternatives, including the selected plan, identified in this study are expected to comply with Executive Order 12989-Environmental Justice in Minority Populations and Low-Income Populations, dated February 11, 1994. The selected plan is not located in close proximity to a minority or low-income community, and no impacts are expected to occur to any minority or low-income communities in the area.

#### 6.0 Relationship of Selected Plan to Environmental Requirements, Protection Statutes, and Other Requirements

The Service and the Corps through the EA process will obtain a State water quality certificate and all necessary regulatory approvals.

**TABLE 1. COMPLIANCE WITH APPROPRIATE ENVIRONMENTAL QUALITY PROTECTION STATUTES AND OTHER ENVIRONMENTAL REVIEW REQUIREMENTS**

<b>STATUTE</b>	<b>COMPLIANCE STATUS</b>
Clean Water Act	Full
Coastal Zone Management Act	Full
Endangered Species Act	Full
Fish and Wildlife Coordination Act	Full
National Historic Preservation Act	Full
National Environmental Policy Act	Full
Clean Air Act	Full
Pinelands Preservation Act	Partial*

NOTE:

Full Compliance: Having met all requirements of the statute, E.O., or other environmental requirements for the current stage of planning.

Partial Compliance: Some requirements of the statute, E.O., or other policy and related regulations remain to be met.

\*All applicable laws and regulations will be fully complied with upon completion of the environmental review, obtaining State water quality certification, coastal zone consistency determination, and concurrence with our determination on cultural resources.

Noncompliance: None of the requirements of the statute, E.O., or other policy and related regulations remain to be met.

#### 7.0 Coordination

During the preparation of the Draft and Final Environmental Assessment, several agencies were contacted and provided information. A pre-draft Environmental Assessment was circulated to various state and federal agencies for comments. Coordination, discussions, and project site visits have been conducted with the U.S. Fish and Wildlife Service, New Jersey Department of Environmental Protection – Division of Fish and Wildlife and Division of Parks and Forestry, as well as other agencies and individuals with interests in the project. See Appendix B for more detailed information on the coordination for this project.

## 8.0 References

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9.0 CLEAN AIR ACT STATEMENT OF CONFORMITY

**CLEAN AIR ACT STATEMENT OF CONFORMITY  
BATSTO RIVER FISHWAY RESTORATION PROJECT  
BURLINGTON COUNTY, NEW JERSEY**

Based on the conformity analysis in the subject report, I have determined that the selected plan conforms to the applicable State Implementation Plan (SIP). The Environmental Protection Agency had no adverse comments under their Clean Air Act authority. No comments from the air quality management district were received during coordination of the draft feasibility report and environmental assessment. The selected plan would comply with Section 176 (c)(1) of the Clean Air Act Amendments of 1990.

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Date

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Thomas C. Chapman, P.E.  
Lieutenant Colonel, Corps of Engineers  
District Engineer

## **Appendix A**

### **Intra-Service Section 7 Biological Evaluation Form**

## **Appendix B**

### **Correspondence and Public Comments**

## **Appendix C**

### **Historical Documentation**

## **Appendix D**

### **Public and Agency Comments to the Draft Environmental Assessment and Corps Responses**