

**Assessment of Environmental Opportunities  
London Locks and Dam  
Kanawha River**

**Sustainable Rivers Program**



Photo by Thad Tuggle, USACE

U.S. Army Corps of Engineers  
Huntington District  
Huntington, West Virginia

September 2022



## **Introduction**

London Locks and Dam is located on the Kanawha River, 82.8 miles above the confluence with the Ohio River and about two miles downstream from Montgomery, West Virginia (WV). London Locks and Dam are operated by the U.S. Army Corps of Engineers (USACE), Huntington District, with authorized missions of Navigation, Recreation, and Fish and Wildlife Conservation.

Initially the Kanawha River, London Locks and Dam, was identified for study as the pool has limited amounts of navigation traffic and appeared to have greater operational flexibility for managing the pool elevation compared to other navigation pools within Huntington District (District). This dam is the uppermost navigation structure in the Kanawha River and is characterized by good water quality, connection to miles of riffle/run habitat, and the presence of multiple endangered mussel species. These conditions may have allowed a prompt and beneficial ecological response to any alteration of our operations. cursory evaluation had revealed areas that could provide potential ecological uplift in the form of aquatic, emergent vegetation habitat. Aquatic, emergent vegetation is beneficial to the riverine habitat as it provides “important habitat and food sources for wildlife; filtering and/or trapping of soil; and trapping of nutrients during runoff and absorption of nutrients” (Utah State University Extension 2020). The District assembled an interdisciplinary team to carry out the study, including members from Planning, Operations, and Water Quality.

London Locks and Dam is in its first year of the Sustainable Rivers Program study. During the first year the District team conducted baseline data gathering and analysis, determined the operational flexibility of the navigation project, assessed potential adverse impacts that could occur as a part of operational changes, and completed limited coordination with external agencies. The information gathered as part of the first four tasks of the scope of work below was adequate for the team to provide recommendations on any future SRP Plans for London Locks and Dam.

## **Scope Activities**

### **1. Data Gathering and Application**

#### ***Scope Task Description***

Analyze existing hydrographic surveys to identify areas that would benefit environmentally without impacting navigation from altered pool operations. Complete additional targeted hydrographic mapping along shoreline to determine minimum drawdown levels which could achieve ecosystem benefits. Compile all the data collected into a single location or database.

## Analysis

The Sustainable Rivers Program funded a study within the London Pool of the Kanawha River to determine if there are opportunities to provide ecological uplift. Specifically, the District team investigated the potential for ecological uplift upstream of London Locks and Dam on the Kanawha River by reducing the elevation of this navigation pool by up to two feet during the normal growing season. This seasonal reduction in pool could expose river bottom and shallow bank habitat allowing the growth of beneficial, emergent aquatic vegetation.

Initial team meetings conducted between Planning, Operations, and Water Quality discussed potential areas within London Pool that could be affected by a pool drawdown that could expose river bottom for potential habitat alteration. Three sites were identified and recommended for further study and survey within the London Pool based on knowledge from the Operations Office and aerial imagery analysis.

The three areas chosen were shallow areas that could be exposed within a two-foot drop of the pool.

The team assessed each of these areas (Figure 1) by boat to determine if any significant ecological uplift was possible. Due to the local topography of very steep banks, the London Pool provided only one sizeable area with the potential for significant ecological. This potential uplift site is identified as Site 1 (Figure 2) and is situated on the right descending bank within one mile upstream of London Locks and Dam. Site 2, located between two island features in the upper pool, did not prove to provide a very large area for habitat uplift. Site 3 was along an extremely steep bank in the upper pool that did not contain adequate shallow water habitat to allow for significant habitat uplift for this project (Figure 3).



Figure 1. Location map showing London Locks and Dam, Potential Sites 1, 2, and 3.



Figure 2. Location map showing London Locks and Dam and Potential Site 1.

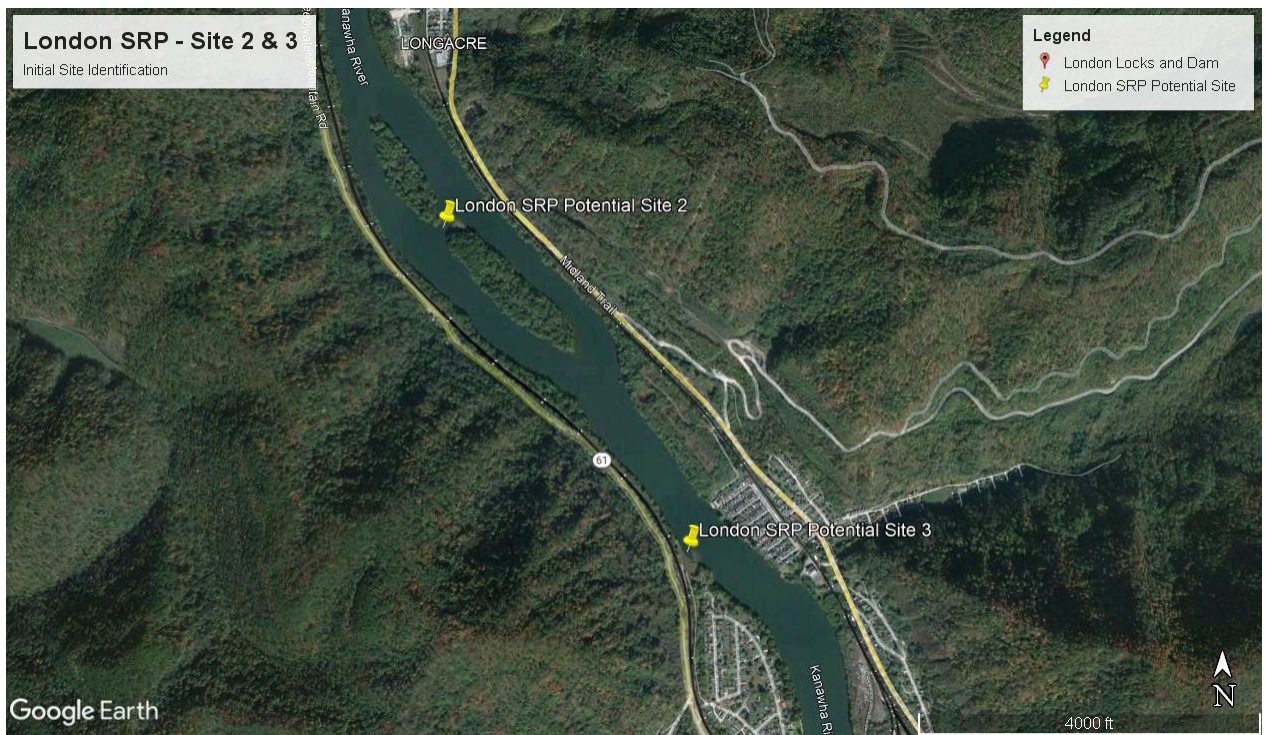


Figure 3. Location map showing Potential Sites 2 and 3.

The District team concentrated further assessment on Site 1 just above London Locks and Dam because it provided the largest contiguous area that could benefit from a lowering of the navigation pool. The area assessed is adjacent to the Upper Approach of the London Locks and Dam. This shallow area contains small pockets of emergent vegetation which would imply there is currently a seed bank present (Figure 4).



Figure 4. Small areas of emergent vegetation can be seen within in the Upper Approach of the London Locks and Dam. These pockets of vegetation suggest that a seed bed is established within the area that would be exposed if the navigation pool were dropped two feet (USACE photo).

The District Water Quality Team conducted bathymetry surveys of this site to determine exactly how much area would be exposed if the navigation pool elevation was lowered. A SonTek M9 Acoustic Doppler Current Profiler (ADCP) unit attached to the hull of the boat was used to survey the area. These soundings were analyzed within Hypack software and a TIN model was generated. This model developed total areas (in acres) for each level the pool would be dropped. The analysis revealed that approximately three acres of river bottom would be exposed if the pool was dropped one foot and eight acres of river bottom if the pool was dropped two feet (Table 1; Figure 5).

Table 1. The TIN model generated total amount of area exposed as the Navigation Pool is dropped in elevation. A two-foot drop in elevation would result in roughly eight acres of exposed river bottom in the Upper Approach of the London Locks and Dam.

Elevation	Area exposed (Acres)
Normal Navigation Pool (614 feet)	0.00
1 ft below Pool (613 feet)	2.93
2 ft below Pool (612 feet)	7.85

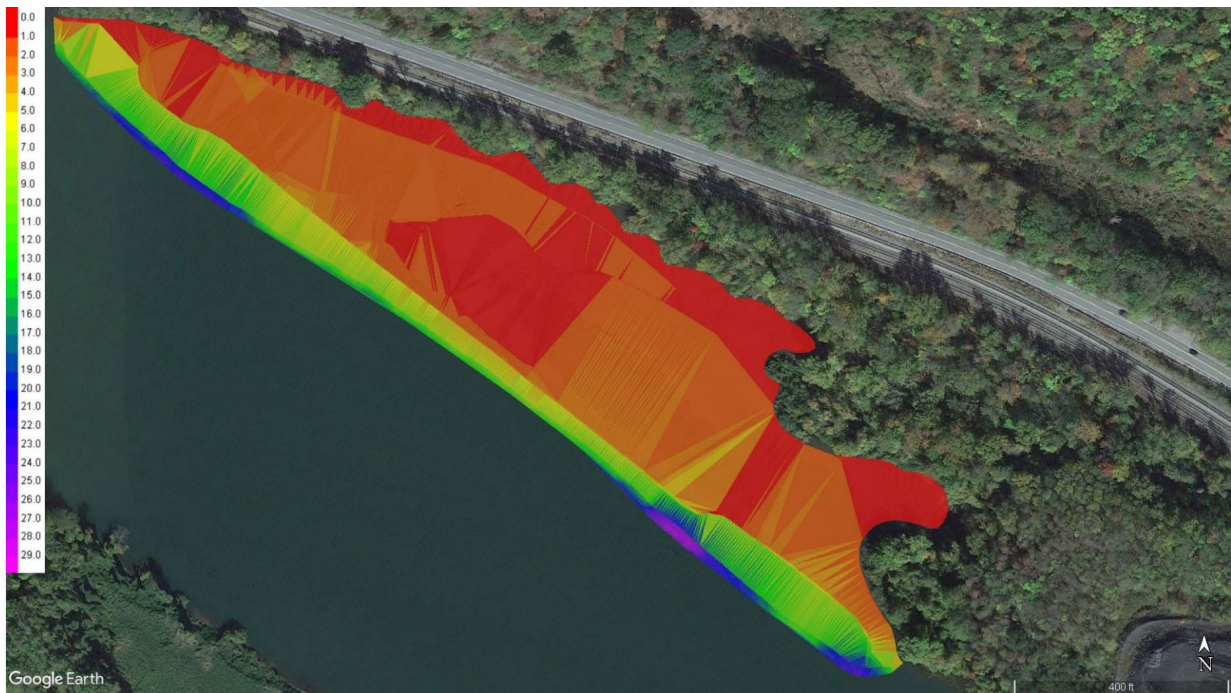


Figure 5. The TIN model created from the bathymetry readings reveals depths of the assessment area (~8 acres) near the Upper Approach of the London Locks and Dam. The scale shows the total depth located within this area, ranging from 0 (exposed ground) to 29 feet (near Navigation Channel).

The team is also aware that by lowering the pool, it is likely that fringe habitat along the banks of the river and the islands within the pool would see some change. However, the District team did not quantify this additional exposure of bank and fringe habitat within the pool because of the small amount of habitat expected to occur due to the steepness of the topography in the area.

## **2. Determine Operational Flexibility of the Pool**

### ***Scope Task Description***

Using the current Operations Plan for London Locks and Dam, determine the operational flexibility that may allow for seasonal pool drawdowns. Develop a strategy to modify the Operations Plan, if needed.

### ***Analysis***

A note is provided to the navigation industry within the Kanawha River Navigation Charts that states:

*The pool reach above London Locks and Dam from mile 82.8 to mile 90.57 may be drawn down a maximum of 2 feet below project elev. 614.0.*

This statement (USACE 2016) was originally interpreted by the District team to mean that USACE had the authority to operate the navigation pool between elevations 612.0 and 614.0 feet. If this flexibility was authorized, it would allow the District to balance navigation needs with the potential ecological uplift that could be provided by seasonal drops of two feet within the pool. Operations team members reviewed operating manuals, authorizing documentation, and engineering/design documents to evaluate the operational flexibility for the London navigation pool. This review found no documentation that operational flexibility exists for USACE at London Locks and Dam that would allow operation of the dam to expose/alter river habitat. Instead, the statement is meant to inform river users that sudden and significant decreases in pool elevation can occur within London Pool. The temporary pool drops are caused by sudden changes to the operations of the non-federal, Hawks Nest Hydropower Project upstream of the London Pool. These changes in operation can cause a lag in river flow and a two-foot drop within the London pool. In summary, USACE is not currently authorized to operate the London Pool to provide a two-foot decrease in pool elevation.

## **3. Assess and Document any Adverse Effects from Operational Changes**

### ***Scope Task Description***

Gather baseline information to identify any adverse effects any altered operations may have on the pool such as navigation, recreation, hydropower, and infrastructure.

### ***Analysis***

The study focused on the drop of the pool by one foot and two feet. With the drop of two feet, it is not expected that there would be any adverse effects to navigation, as there would be minimal change to the pool depth and the navigation channel would be able to be maintained. There could be some adverse effects to recreation and infrastructure, the severity depending on the location and composition of the structures. In the Kanawha River Navigation Charts, six commercial docks (3 inactive) and two public recreational docks are charted, other private docks could also exist within the pool. There are also three transportation bridges that span the London Pool. No water intakes were designated in the navigation charts in the London Pool. Dropping the pool by two feet could cause issues with using the docking/ramp facilities, cause for the facilities to be relocated, and potential for erosion throughout the pool.

There could also be additional effects to the hydropower facility at the dam. Although river flows would be unchanged by this proposed project, a two-foot loss of head upstream of the hydropower project would result in decreased efficiencies for electrical generation. Currently, the hydropower facility is undergoing re-licensing with the Federal Energy Regulatory Commission (FERC) and USACE and optimal pool elevation operating bands has been a topic of negotiation. Any proposed changes to the operation of London Pool would need to be documented in the Memorandum of Operating Agreement with our non-federal hydropower partner.

The two-foot drop of the pool could also have an effect on the aquatic life that lives along the banks and within the pool, most notably mussels. There are potentially seven endangered mussel species within the Kanawha Pool listed by U.S. Fish and Wildlife Service (USFWS) including the fanshell, northern riffleshell, pink mucket (pearlymussel), sheepsnose mussel, snuffbox mussel, spectaclecase, and tubercled blossom (USFWS 2021). There is also a USFWS posting in the National Register for the listing of two additional mussel species, round hickorynut and longsolid, and the proposed mussels' critical habitat that would fall within the London Pool (USFWS 2020). Per the West Virginia Mussel Protocol 2020, the Kanawha River below Kanawha Falls is considered a Group 4 Stream which by definition is "Large Rivers where Endangered Species are expected." It would also fall under the work category of "Lake/Stream Drawdowns" which requires coordination with West Virginia Division of Natural Resources (WVDNR) and USFWS, mussel surveys, and salvaging of any exposed mussels (WVDNR 2020). Recent mussel survey and salvage contracts for the District within WV totaled around \$425,000 for approximately 8,000 feet. The perimeter of London Pool is approximately 134,000 feet and potentially it may need to be surveyed. A mussel survey of this magnitude would be costly.

#### **4. External Agency Coordination**

##### ***Scope Task Description***

Coordination with federal, state, and local agencies on potential pool operation changes and potential impacts (positive or negative). Coordination would include West Virginia Department of Environmental Protection (WVDEP), WVDNR, USFWS, WV State Historic Preservation Office (SHPO), etc.

##### ***Analysis***

Limited coordination was completed with external agencies due to the project not having the authorization for the proposed pool drop and the limited potential environmental uplift that would occur within the London Pool.

#### **Development of Recommended Plan/Test Proposal**

#### **5. Memorandum of Operations Agreement Modification**

##### ***Scope Task Description***

Modify Memorandum of Operations Agreement between USACE and hydropower licensee, if necessary.

### *Analysis*

Due to USACE not having the authorization to modify the operation of London Locks and Dam for ecological uplift, a modification of our Memorandum of Operations Agreement with our non-federal hydropower partner was not deemed necessary or applicable.

## **6. Formulate and Document a Test Proposal**

### *Scope Task Description*

Formulate a test study proposal and document for testing and monitoring in the next year.

### *Analysis*

Due to USACE not having authorization to modify the operation of London Locks and Dam for ecological uplift and due to the limited amount of uplift that would be provided, the District proposes that no additional assessments or tests should be conducted.

## **Conclusion**

The goal of this assessment was to determine if the District had the opportunity and authority to provide ecological uplift within London Pool without significant impacts to river users, existing infrastructure, and the project's authorized purposes of recreation, navigation and fish and wildlife conservation.

Our analysis forecasted that approximately three acres of river bottom would be exposed at a one-foot drop of pool and that approximately eight acres exposed at a two-foot drop just upstream of the London Locks and Dam. Additionally, small areas of fringe habitat would likely be exposed along the banks of London Pool. Existing areas of emergent vegetation at Site 1 reveal that the river bottom likely has a capable seed bank that would allow a successful re-vegetation of exposed habitat.

Currently, the USACE is not authorized to operate London Locks and Dam for this proposed drop in pool elevation. Any future changes to operation at the project to decrease the elevation of the navigation pool would likely require a re-authorization from Congress. This would require a significant change to the project for a minimal return of ecological benefits.

The District would also be required to do additional studies including but not limited to mussel surveys and recreational impacts analysis. These analyses would feed into a national environmental policy act (NEPA) document that could be time consuming and costly depending on the severity of the impacts.

This study found that the USACE does not have authority to lower the elevation of the navigation pool upstream of London Locks and Dam, there is only a small opportunity for ecological uplift of river habitat as a result of lowering London Pool, and that significant impacts to recreation and mussels could potentially occur. Therefore, the District team has determined that operational changes to lower the navigation pool elevation upstream of London Locks and Dam should not be pursued at this time.

## Resources

U.S. Army Corps of Engineers. 2016. *Kanawha River Navigation Charts*.

U.S. Fish and Wildlife Service. 2020. "Endangered and Threatened Wildlife and Plants; 12-Month Finding for Threatened Purple Lilliput; Species Status With Section 4(d) Rule for Longsolid and Round Hickorynut and Designation of Critical Habitat" *Federal Register*, FWS-R4-ES-2020-0010-0001, vol. 85, no. 189, pp. 61384-458.

U.S. Fish and Wildlife Service (USFWS). 2021. "IPaC Resource List." *IPaC: Information for Planning and Consultation*, <https://ipac.ecosphere.fws.gov/>.

Utah State University Extension. 2020. "Water Quality Site.", <https://extension.usu.edu/waterquality/resources/utah-water-bodies#:~:text=Emergent%20plats%20live%20near%20the,other%20animals%20living%20near%20water>.

West Virginia Division of Natural Resources (WVDNR). 2020. *West Virginia Mussel Survey Protocols*.