

Welcome
Bloede Dam Removal Design
Open House



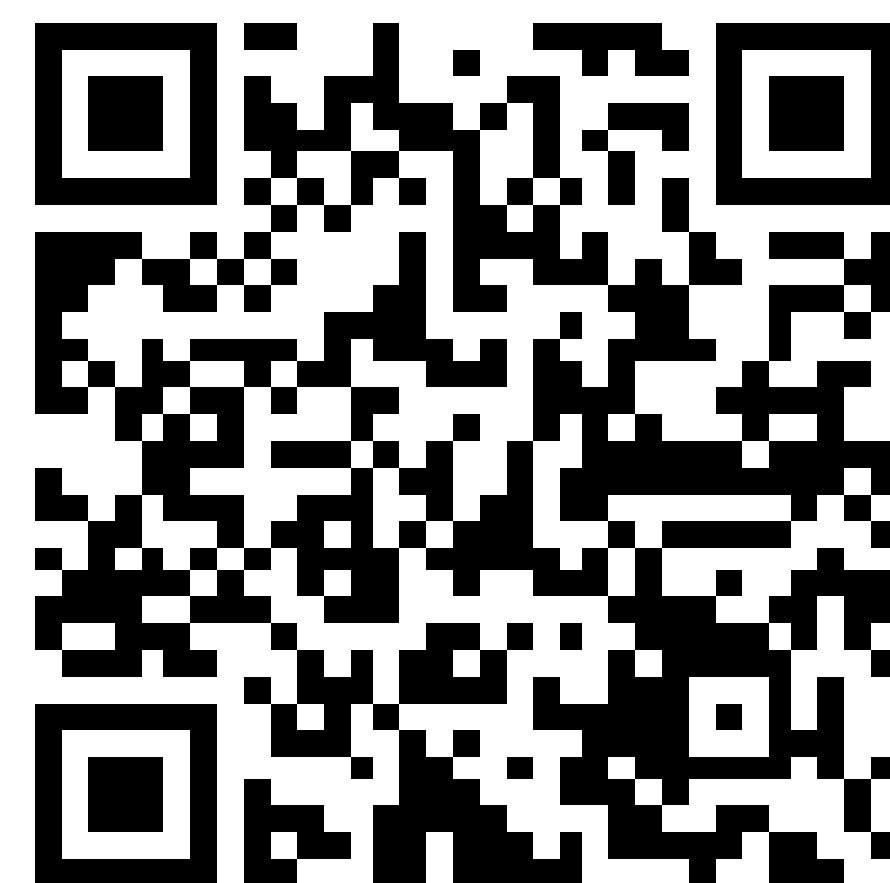
January 2015

Purpose of the Open House

In June 2012, an open house was held on the Bloede Alternatives Analysis and the public was asked to submit comments on the alternatives related to removing the Bloede Dam. Your input was used in several ways including helping us develop dam removal design plans.

The purpose of today's open house is to present the design plan for the removal of the Bloede Dam. A copy of the design report and plans are available here for your review, they can also be found here:

<http://dnr2.maryland.gov/fisheries/Pages/fishpassage/bloede.aspx>



We welcome your comments

The design plans presented today are at the 60% design phase. This means the engineers and project partners have developed their strategy for removing the dam; however, there are still specific details that need to be worked out prior to the next steps. This also means there may still be opportunities to incorporate your input. Please use one of the available notebooks to write down your thoughts, concerns, or ideas.

What if I have a question?

The open house forum allows you to move at your own pace through the presentation materials. If along the way you have a specific question, please feel free to ask one of the open house attendants. Please take as much time as you need and stay as long as you like.



The Maryland Department of Natural Resources.

Mission Statement

The Department of Natural Resources leads Maryland in securing a sustainable future for our environment, society, and economy by preserving, protecting, restoring, and enhancing the State's natural resources.



As owners of the Bloede Dam and custodians of the State's natural resources – it is our responsibility to address the issues associated with this project.

Goals of the Bloede Dam Project

- Restore Fish and Aquatic Organism Passage.

The Patapsco River once supported large runs of shad, herring, and American eels, but the construction of dams has blocked historic migrations. The fish ladders constructed in the 1990's have been ineffective at passing migratory fish.

- Improve Public Safety and Reduction of Dam Owner Liability.

The Bloede Dam is a significant public safety hazard. Several deaths have occurred at or near the dam.

- Consider the Historic, Cultural and Recreational Values.

The Bloede Dam was built in the early 1900's and is part of the Patapsco's rich history. It is also a major feature of the Patapsco Valley State Park. Similarly, herring, and shad were once abundant and a staple of settlers in the Patapsco Valley. The cultural significance of each of these will be commemorated as part of this project and recreational boating and fishing values promoted.

Programs in Maryland DNR

Engineering & Construction (E&C)

E&C provides project management for the engineering and construction phases of the project and is responsible for long-term maintenance of the dam. E&C is working directly with American Rivers and the engineering firm to manage construction funds and obtain permits for the project.

Fisheries Service (FS) – Fish Passage Program (FPP)

FPP is responsible for the operation of the fish ladder on the dam and assists in biological monitoring, education and outreach, and coordination with other units in DNR. FS is responsible for the management and restoration of the State's fishery resources.

Maryland Park Service (MPS)

The MPS manages the surrounding Patapsco Valley State Park and is responsible for protecting the park's natural, cultural, and historical resources and providing outdoor recreational opportunities.

Resource Assessment Service - Maryland Biological Stream Survey (MBSS)

MBSS is conducting a multi-year biological survey of the Patapsco River to understand how the removal of dams affects fish and other aquatic organisms in the Patapsco.

Maryland Geological Survey (MGS)

MGS is responsible for collecting and analyzing a subset of sediment cores from behind the dam. MGS provides data to determine bedrock features of the Patapsco River and additional technical review of the project.

American Rivers (AR)

AR is the leading organization working to protect and restore the nation's rivers and streams. They manage the team of organizations and agencies contributing to this project and coordinate with DNR on the removal of the dam. AR has assisted in hundreds of dam removals across the country, including several in Maryland. Their experience, education and outreach skills, and coordination are very valuable to the project.

National Oceanic & Atmospheric Administration (NOAA)

The NOAA Restoration Center is the only office in NOAA solely devoted to restoring the nation's coastal marine and migratory fish habitat. NOAA has funded and provided engineering assistance to over 400 fish passage projects and dam removals across the country, including several in Maryland. They are providing technical expertise to better understand scientific models and design plans related to Bloede Dam.

U.S. Fish & Wildlife Service (USFWS)

The mission of the USFWS is working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American People. The fisheries division in the northeast region works to complete habitat restoration projects including dam removal, culvert replacement, fishway construction, and restoration of stream dynamics to benefit interjurisdictional fish and other priority aquatic species.

Inter-Fluve

Inter-Fluve is an environmental engineering firm that specializes in sustainable design, restoration, and construction of rivers and dam removals. They are recognized as one of the national leaders in dam removal. They are providing design and engineering services for the removal of Bloede Dam.

Hazen & Sawyer

Since 1951, Hazen and Sawyer has focused on two critical activities – helping clients provide safe drinking water to their customers, and controlling water pollution and its effects on the environment. They are designing and managing the relocation of a portion of the Baltimore County sanitary sewer line.

Other Partners include:

Friends of the Patapsco Valley State Park

McCormick Taylor

US Geological Service

Johns Hopkins University

University of Maryland Baltimore County

Stillwater Sciences

Why Remove the Bloede Dam?

Public Safety.

The Bloede Dam is a significant public safety hazard. People swim and play around the dam, and several deaths and injuries have occurred at or near the structure.

Improve fish passage.

The Patapsco River once supported large runs of shad, herring, and American eels, but the construction of dams has blocked historic migrations. The fish ladders constructed in the 1990's have been ineffective at passing migratory fish. The Bloede dam requires long-term maintenance and upkeep to prevent it from being breached by storm events. The fish ladder also requires significant maintenance to keep it safe for the public and to keep it functioning.

Restoration of a Free-Flowing River.

The Patapsco River Restoration Partners were successful at removing two upstream dams, Union and Simkins. Bloede Dam is the lowermost dam on the Patapsco and a key component in providing river connectivity and upstream/downstream passage.



Here's a summary of what we have done so far.

The Bloede Dam Alternatives Analysis was completed in June 2012 and a public open house was held to obtain your input on removing the dam.

Engineers, geologists and biologists have been collecting data since 2009. They have been:

- Conducting topographic surveys of the area around the dam
- Coring the sediment behind the dam to determine its chemical and physical properties
- Investigating if any infrastructure is at risk with the removal of the dam
- Electrofishing the areas around the dam to determine what kind and how many fish are present

Design plans have been drafted to outline how the dam will be removed and an assessment was completed on impacts that the dam removal will have on the environment, infrastructure and people.

DNR SEEKS PUBLIC INPUT ON THE FUTURE OF BLOEDE DAM

Open Houses to be held June 28th 4pm-8pm and June 29th 9am-2pm

Catonsville Public Library 1100 Frederick Road, Catonsville, MD



DNR will present strategies for addressing the serious problems related to Bloede Dam. A feasibility study was commissioned by DNR and partners to evaluate the dam's negative impact on the ecology of the Patapsco River and issues of public safety. The Open House will inform you of the options to address the problems, the problems, the preferred approach of dam removal as recommended by the study, and present the information that will be used to make a final decision.

Your input is important! Please stop by during our Open Houses to get additional information, provide comments, ask questions, and enjoy light refreshments. You can also provide comments and get additional information by visiting our website: www.dnr.maryland.gov/fisheries/bloededam/index.asp



The comment period will close on August 31, 2012

How will Bloede Dam be removed?

(1) First, the sewer line that runs through the Bloede Dam abutment will be relocated up slope from the flood prone channel under the existing Grist Mill Trail. The vegetation in the reservoir sediment will be cleared and grubbed and trees will be removed from the active construction site.

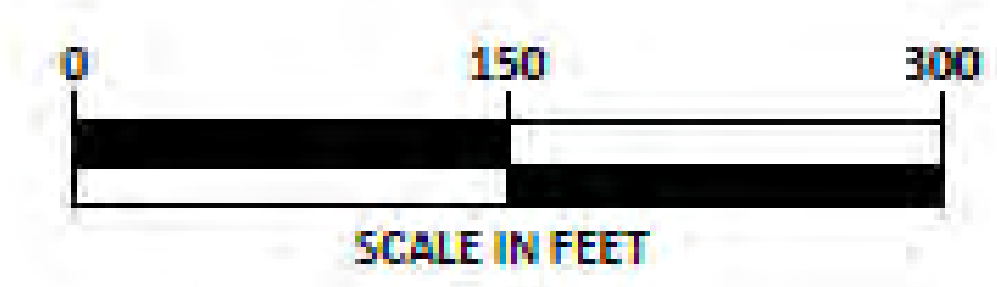
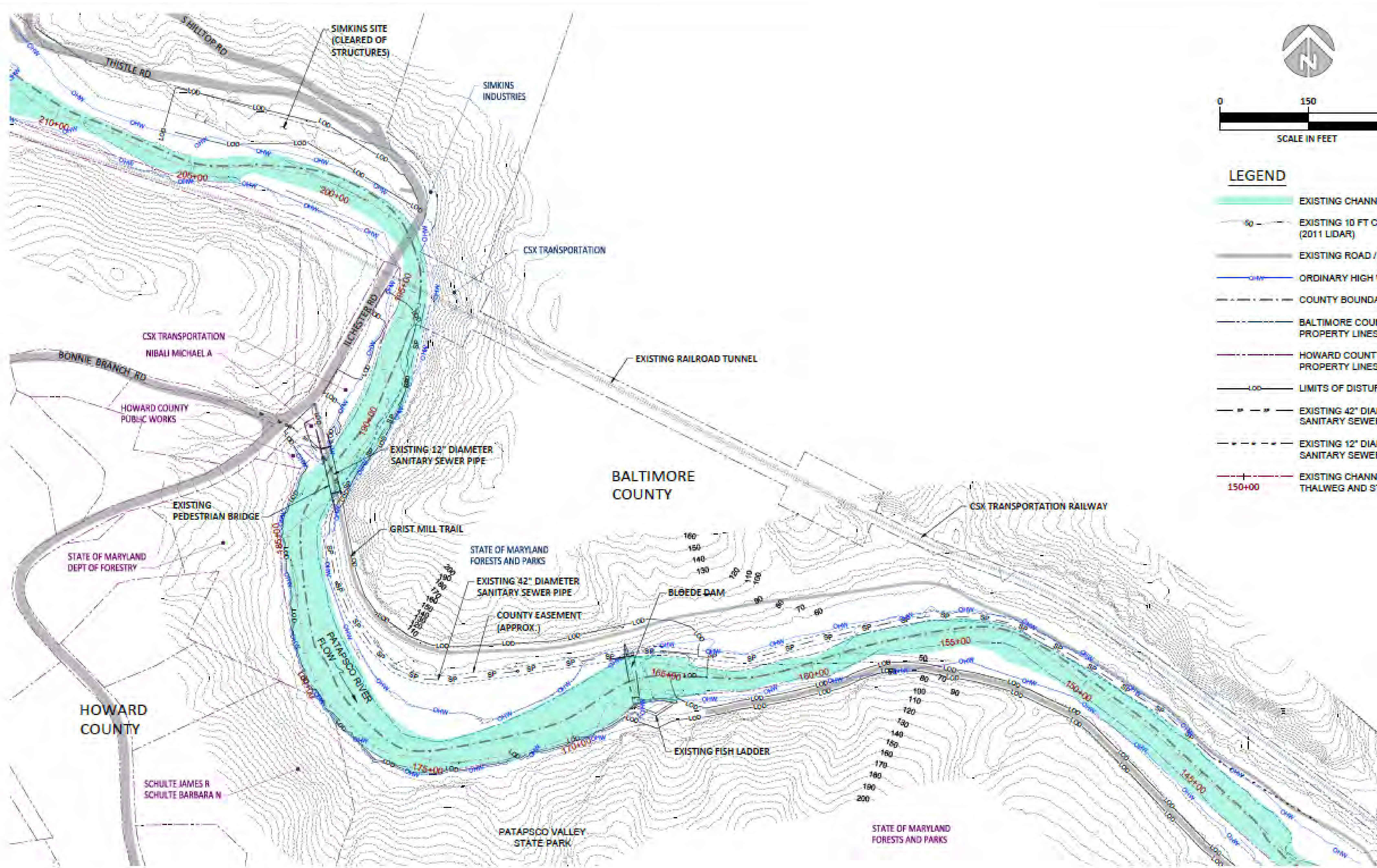
(2) We propose using a controlled detonation to breach the dam on the Baltimore County side of the river.

(3) After the initial breach, the dam remnants will be broken into pieces using conventional equipment such as an excavator with a pile hammer and removed from the river.

(4) Lastly, areas that were disturbed will be revegetated with native grasses, trees, and shrubs.

Trees in the green shaded area are part of the reservoir and will need to be removed prior to removing the dam.





LEGEND

- EXISTING CHANNEL
- EXISTING 10 FT CONTOURS (2011 LIDAR)
- EXISTING ROAD / TRAIL
- ORDINARY HIGH WATER
- COUNTY BOUNDARY
- BALTIMORE COUNTY PROPERTY LINES
- HOWARD COUNTY PROPERTY LINES
- LIMITS OF DISTURBANCE
- EXISTING 42" DIAMETER SANITARY SEWER PIPE
- EXISTING 12" DIAMETER SANITARY SEWER PIPE
- EXISTING CHANNEL THALWEG AND STATIONING

RESERVED FOR ENGINEER'S STAMP

60% CD
Not for Construction

NO.	DATE	REVISION DESCRIPTION

RP,DF	BN	JK,BN
DRAWN	DESIGNED	CHECKED
BN	12/12/14	11-04-30
APPROVED	DATE	PROJECT

BLOEDE DAM REMOVAL
 DEPARTMENT OF NATURAL RESOURCES
 AMERICAN RIVERS
 BALTIMORE AND HOWARD COUNTY, MD

PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

S. NORIS
 EXPIRATION DATE: 09/05/2017 LICENSE NO. 36987



501 Portway Ave, Suite 101
 Hood River, OR 97031
 541.386.9003
 www.interfluve.com

**EXISTING CONDITIONS AND
 PROPERTY OWNERSHIP**

SHEET
 DG1

What will happen to the sediment behind the dam?

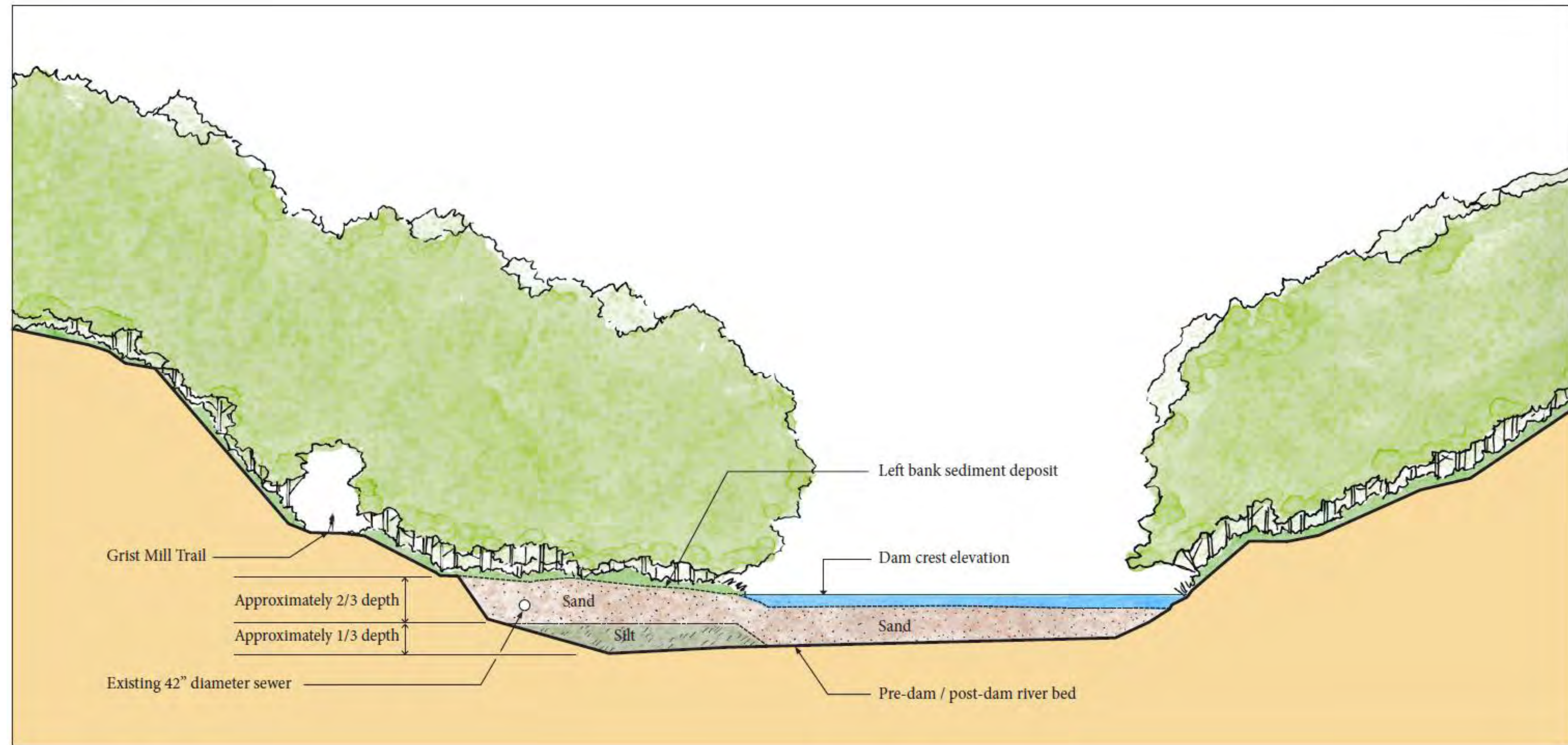
The Bloede Dam will be removed using a **passive sediment management approach**. Dam removal with passive sediment management allows most of the sediment to naturally transport downstream. This is similar to how the Simkins Dam was removed in 2011. If the Bloede and Simkins Dams had not been in place, this sediment would have naturally moved downstream during high flow events and rainstorms. The sediment accumulation has occurred since the dam was built with one confirmed account of the reservoir being dredged shortly after the dam came online.



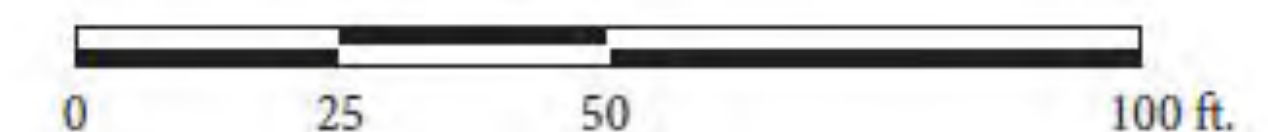
Excavators remove the Simkins Dam (left). Sediment along river right remained for several months following the dam removal (above).

How much sediment is behind Bloede Dam and is it contaminated?

There is about 312,000 cubic yards of sediment stored behind the dam. As a comparison, Simkins Dam released approximately 88,000 cubic yards. Much of the sediment behind Bloede Dam is coarse sand and gravel with about 87,000 cubic yards of silt. A total of 29 sediment cores and borings were analyzed throughout the reservoir, including 14 sediment core samples analyzed for contaminants. The metals found in the samples were all within normal concentrations for the area. No mercury or PCBs were detected.



BLOEDE DAM - IMPOUNDED SEDIMENT
Typical Cross-Section: Sediment Type & Stratigraphy



Why not dredge the sediment behind Bloede Dam?

Many active sediment removal options (such as dredging) were considered and diligently investigated over the past two years.

- Actively dredging the sediment from the site added an additional 1-1.5 years to the project timeline. This means the Grist Mill Trail and park roads would be closed for an additional 1-1.5 years. This was unacceptable to the park and its users.
- Additional haul roads would need to be constructed and numerous construction trucks would snarl traffic in the park and along local roads. Construction activities would need to run 24 hours a day for one year to remove the sediment.
- Dredging the sediment behind the dam would increase project costs by \$20 million dollars.
- The Patapsco River is subject to unpredictable high flow events and is continually cycling sediment through the system from sources upstream. There is a high probability that (1) new sediment would inundate newly dredged areas during the dredging activities and/or (2) sediment waiting to be dredged would be washed downstream during rain events. There is no reasonable alternative that guarantees sediment will not be released downstream when working in an active river channel.

What analysis have you done to show sediment release is an acceptable impact?

- Experts from around the Chesapeake Bay met to discuss options in January 2014 at the “Bloede Dam Sediment Management Workshop.” The overall consensus by the group after reviewing the sediment and nutrient data was that passive release was the preferred alternative for sediment management.
- Stillwater Sciences completed a technical memorandum called “Sediment Transport in the Patapsco River, Maryland after the Bloede Dam Removal.” This report summarized the expected impacts to the downstream reaches of the river due to sediment release. The analysis said:
 - Although there is about twice the amount of sand in the Bloede impoundment compared to the Simkins impoundment, the higher volume of sediment does not result in twice the deposition depths downstream.
 - Silt released from the impoundment matches background “high” flow conditions in the river.
 - Maximum impounded silt release equals background suspended sediment transported in the river over a one day period during an 8-year recurrence flow (storm) event.
 - Dam removal concurrent with high flow mitigates silt impacts.
 - Initial erosion of the impoundment is expected to be complete within 1 to 6.5 months.
- A technical memo entitled “Bloede Dam Biogeochemical Impacts – An Analysis Based on Patapsco River Nutrient Balances” was completed. The experts on nutrient analysis concluded that the sediment releases would be moderate and not expected to add to low dissolved oxygen or encourage algal blooms in the Chesapeake Bay or tidal Patapsco River.

Why are two sewer lines being relocated as part of a dam removal?

Currently there is a 42-inch sewer line that runs through the dam and is unsupported through the reservoir sediment.

There is also a 12-inch sewer line that crosses the river through the reservoir deposit in the Bonnie Branch area.

When the dam is removed, the sediment will erode and the sewer lines will be compromised and potentially fail, if no action is taken.

We propose moving the sewer lines to safer locations. The 42-inch line will be relocated under the Grist Mill Trail, and the 12-inch line will be lowered into bedrock along the restored river channel. Impacts associated with this relocation are discussed in a poster titled “Impacts associated with the removal of the Bloede Dam – Utilities”



Impacts associated with the removal of Bloede Dam –

Historical & Cultural

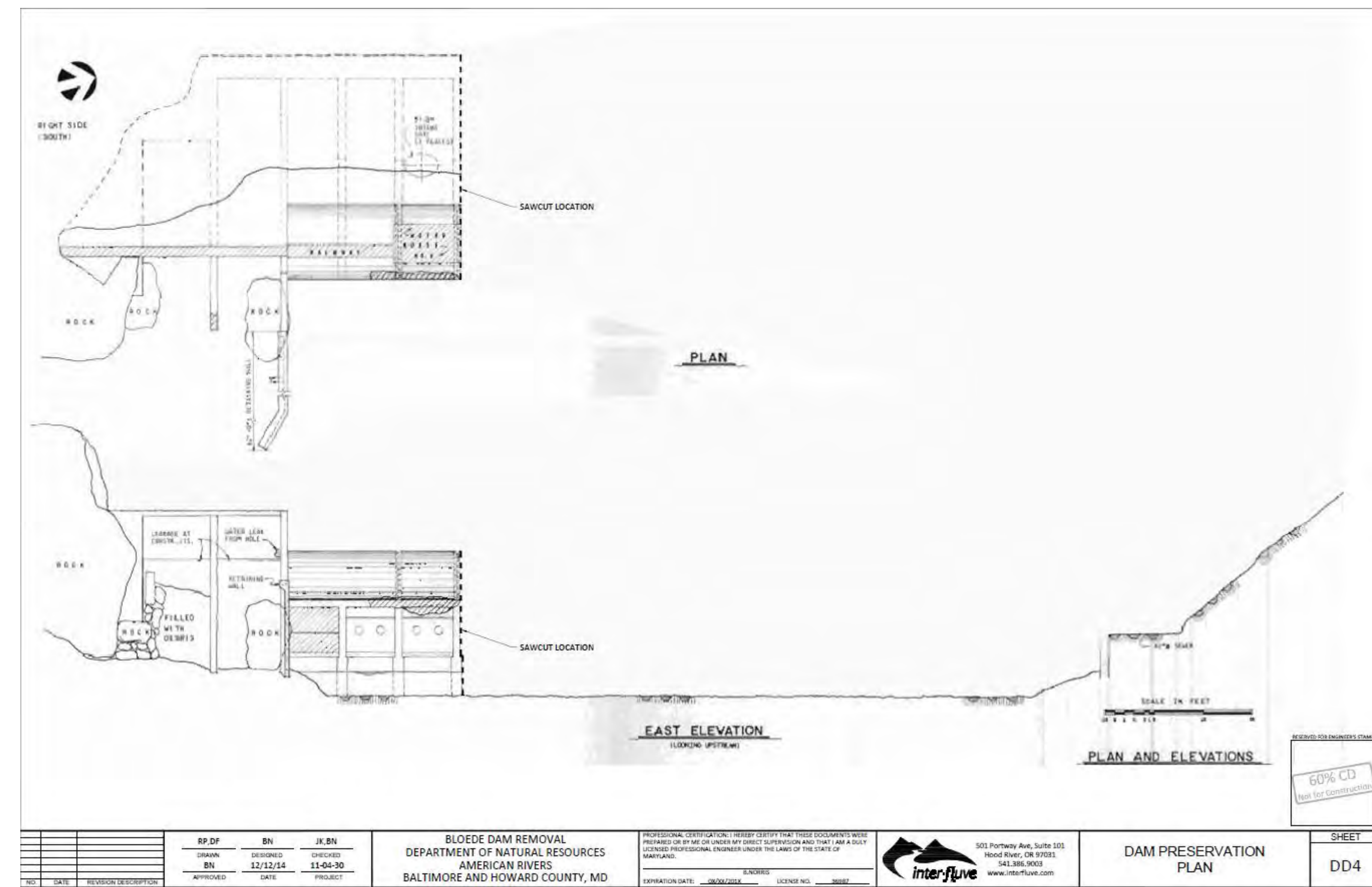
What we know:

- The dam was built in 1907 and is an original Ambursen Dam
- It is the first known instance of a submerged hydroelectric generating plant
- All of the original equipment has been removed, but the dam is a historic remnant of the past
- Actions will need to be taken to properly address and document the historical significance of the dam through a collaborative process with interested parties and Maryland Historical Trust

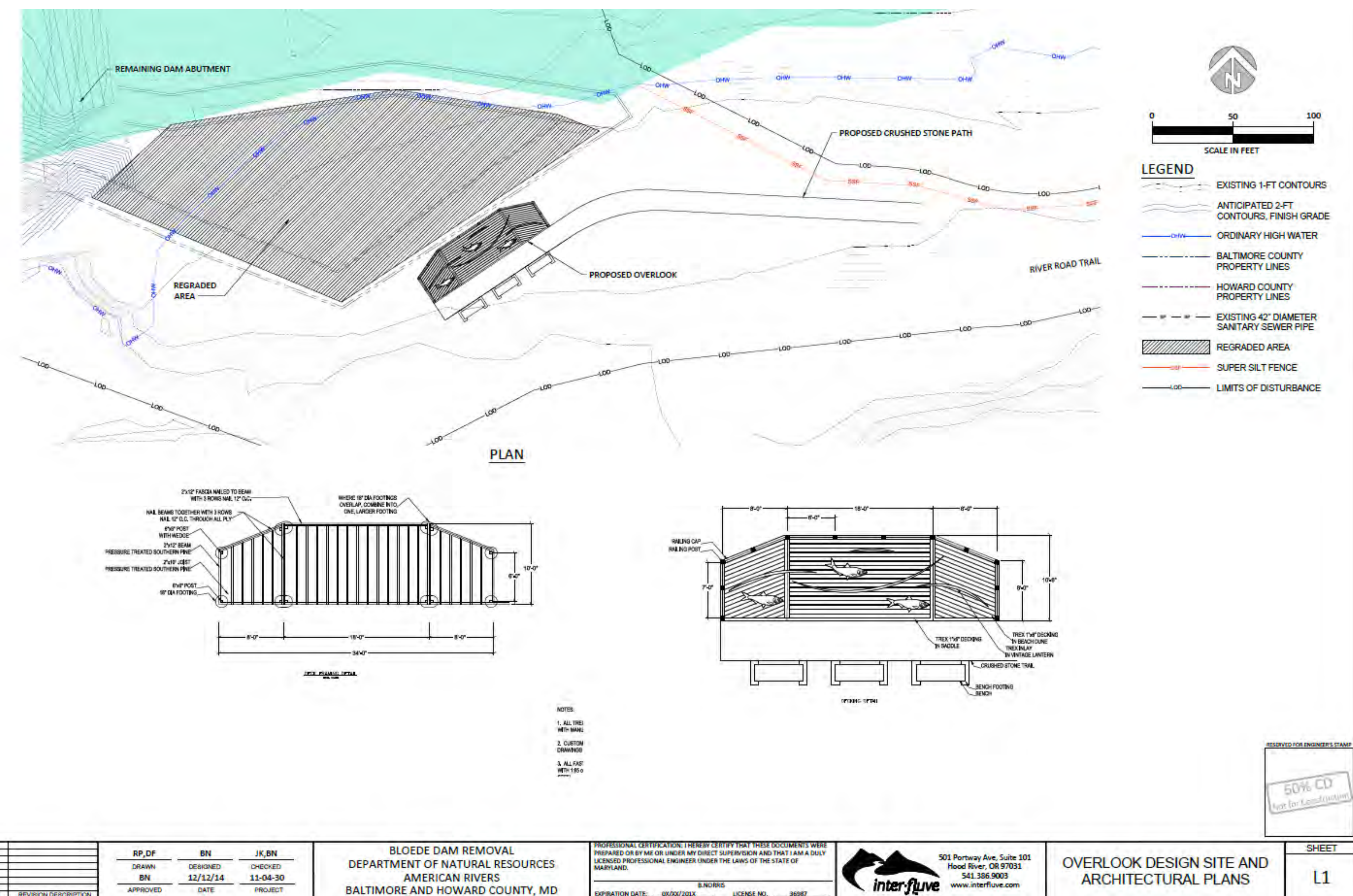
Potential Actions:

- Preserve portion of the dam
- Create 2 viewing platforms. One each on the Howard and Baltimore County sides of the river
- Install interpretive signage
- Include the Native American in interpretation/documentation
- Complete written, graphic and photographic documentation for the Bloede Dam in accordance with the National Park Service – Historical American Engineering Record (HAER) Guidelines

Drawing showing the possible preservation of a piece of the dam on the Howard County side.



Example drawing showing one planned overlook which will include decorative rails and benches.



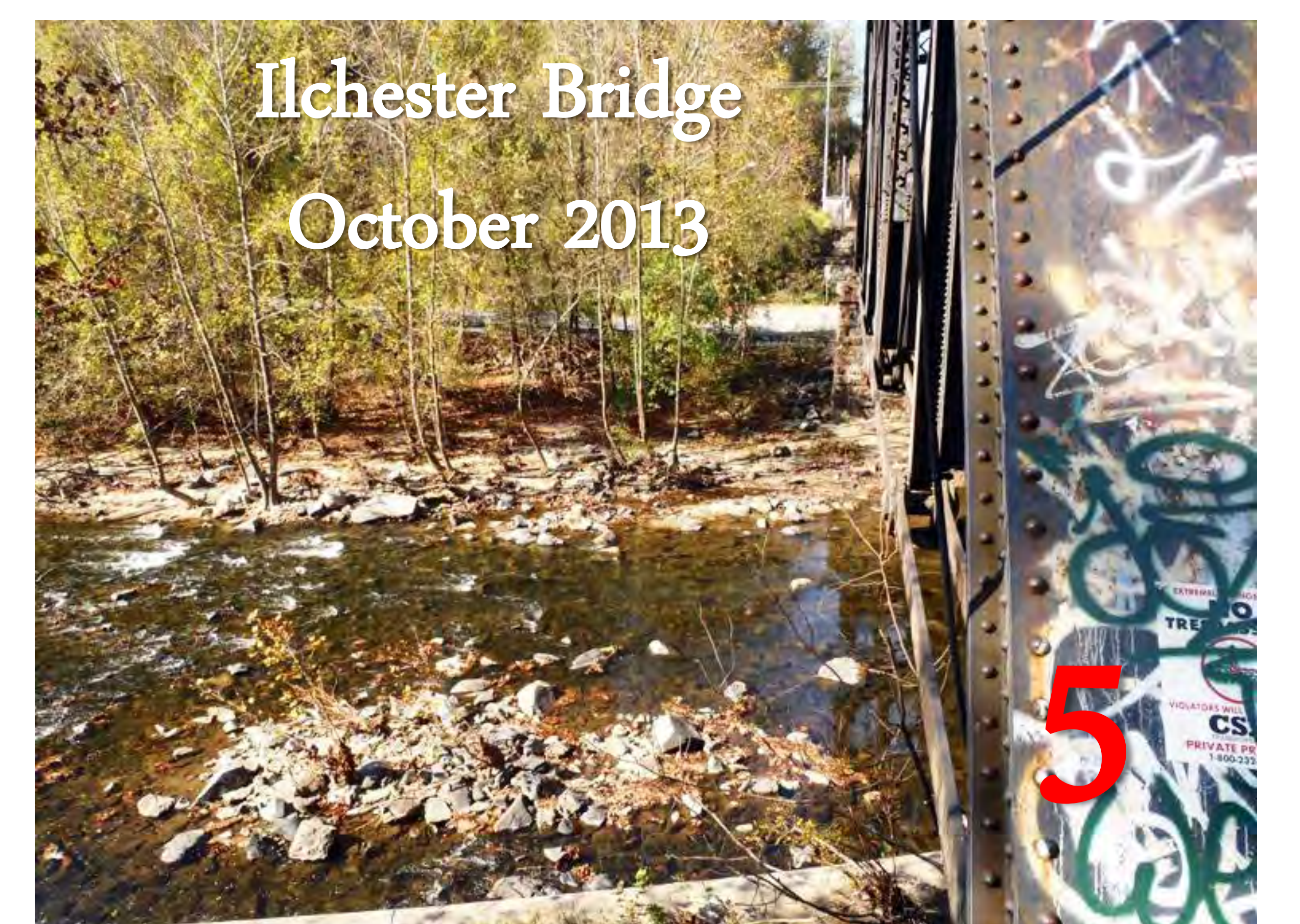
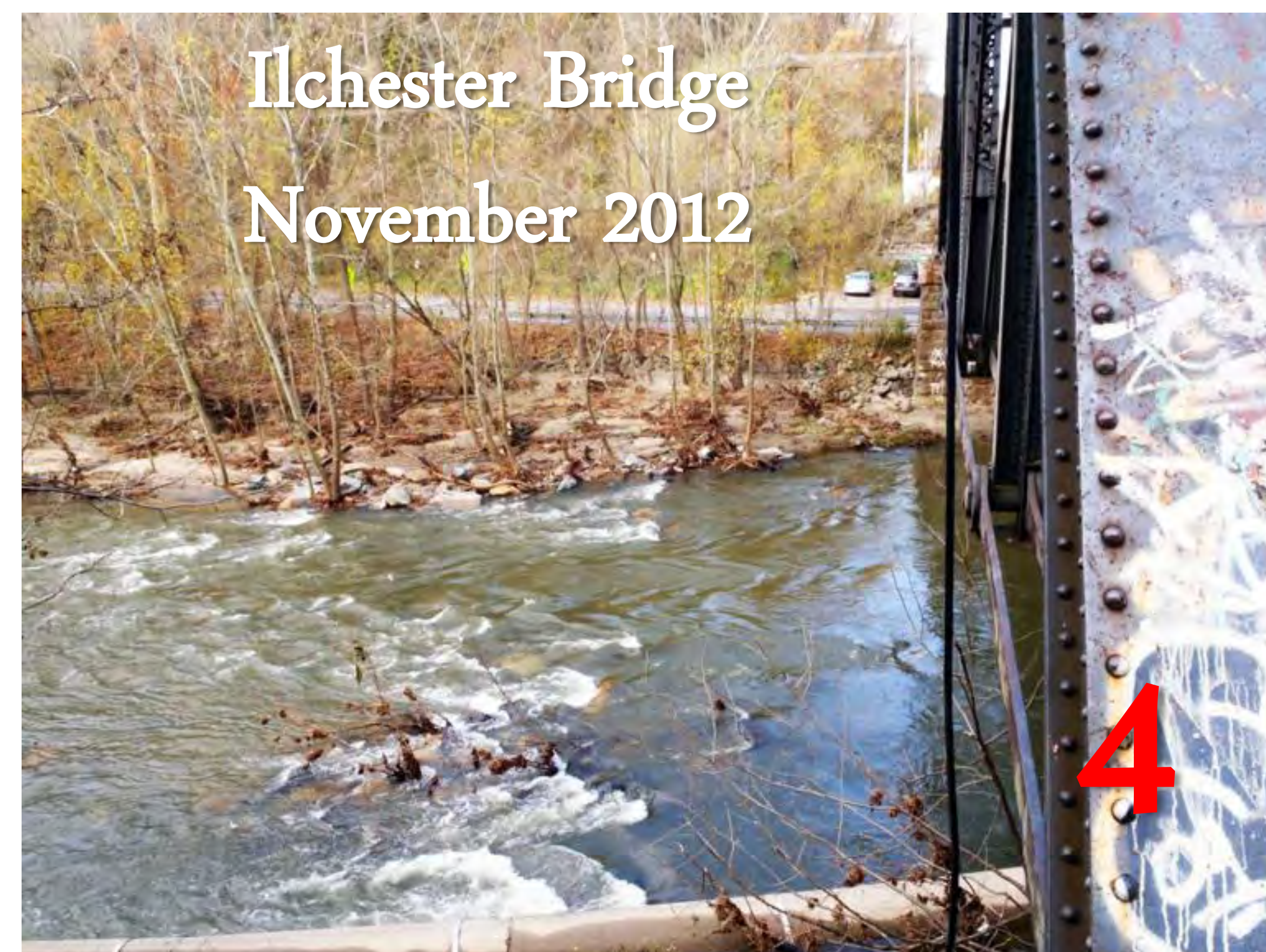
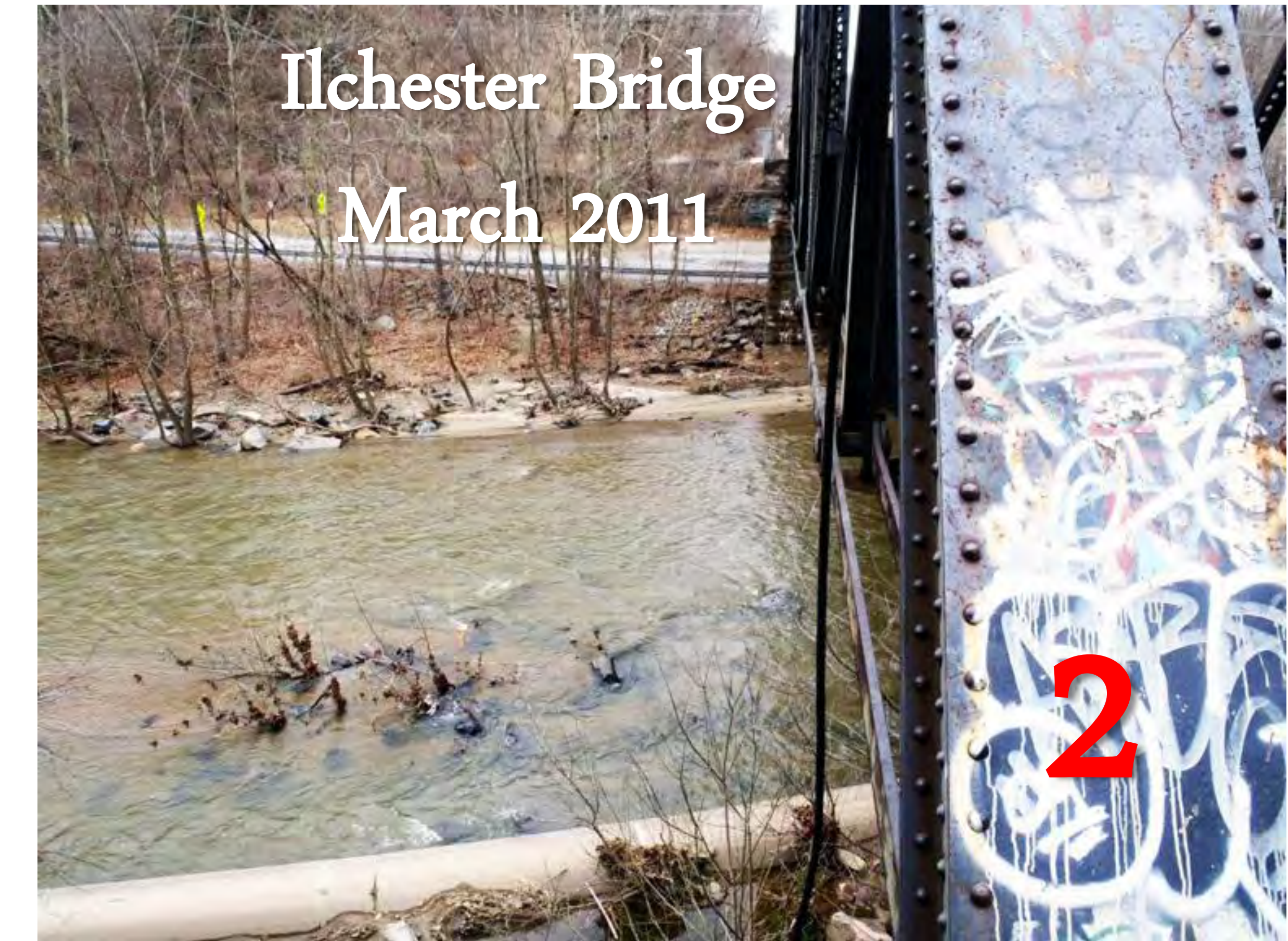
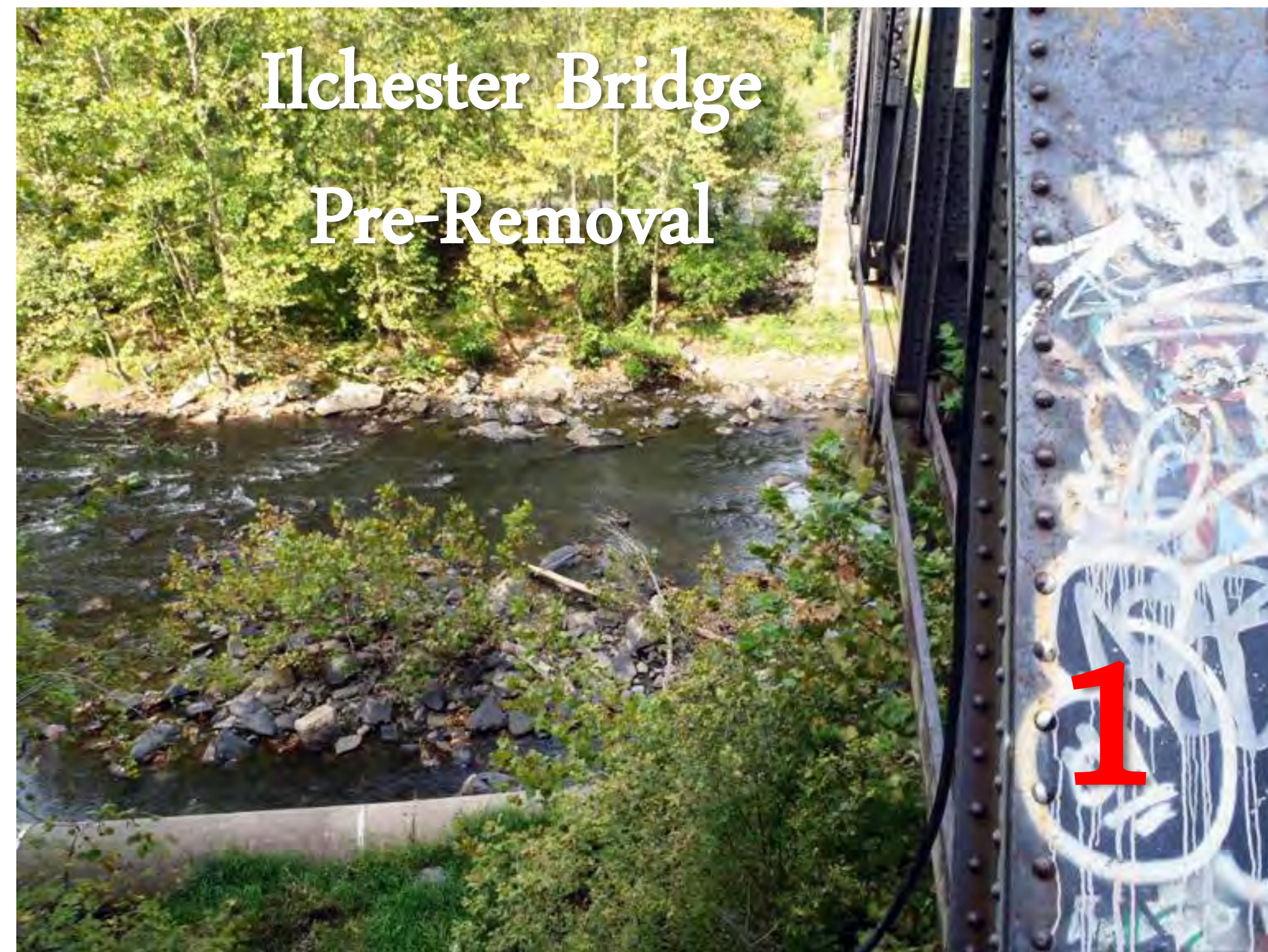
Impacts associated with the removal of Bloede Dam –

Physical

What we know:

- As discussed previously, there is approximately 312,000 cubic yards of sediment stored behind the dam.
- Much of the sediment is coarse sand and gravel, with about 87,000 cubic yards of silt.
- Once the dam is removed, the sediment held behind the dam will be transported downstream. The impounded sediment and the trees rooted in the sediment will no longer be stable. The large trees that have taken root in the reservoir sediment will need to be removed prior to dam removal so they do not impact park infrastructure downstream. This will require the removal of approximately 4 acres of trees.
- Of the 312,000 cubic yards of sediment behind the dam, we expect 250,000 cubic yards to move downstream. Most of this sediment will move quickly, between 1 and 7 months depending on rainfall following the removal.
- Short-term impacts associated with the sediment release could be severe immediately below the dam, with sediment deposits up to 7 feet high.
- The river channel behind the dam will recover more quickly than the area downstream of the dam. The downstream sections are anticipated to fully recover within approximately 6 to 10 years - depending on flow events.

These 5 pictures taken from the Ilchester Bridge, show the movement of sediment through the river following the removal of the Simkins Dam.



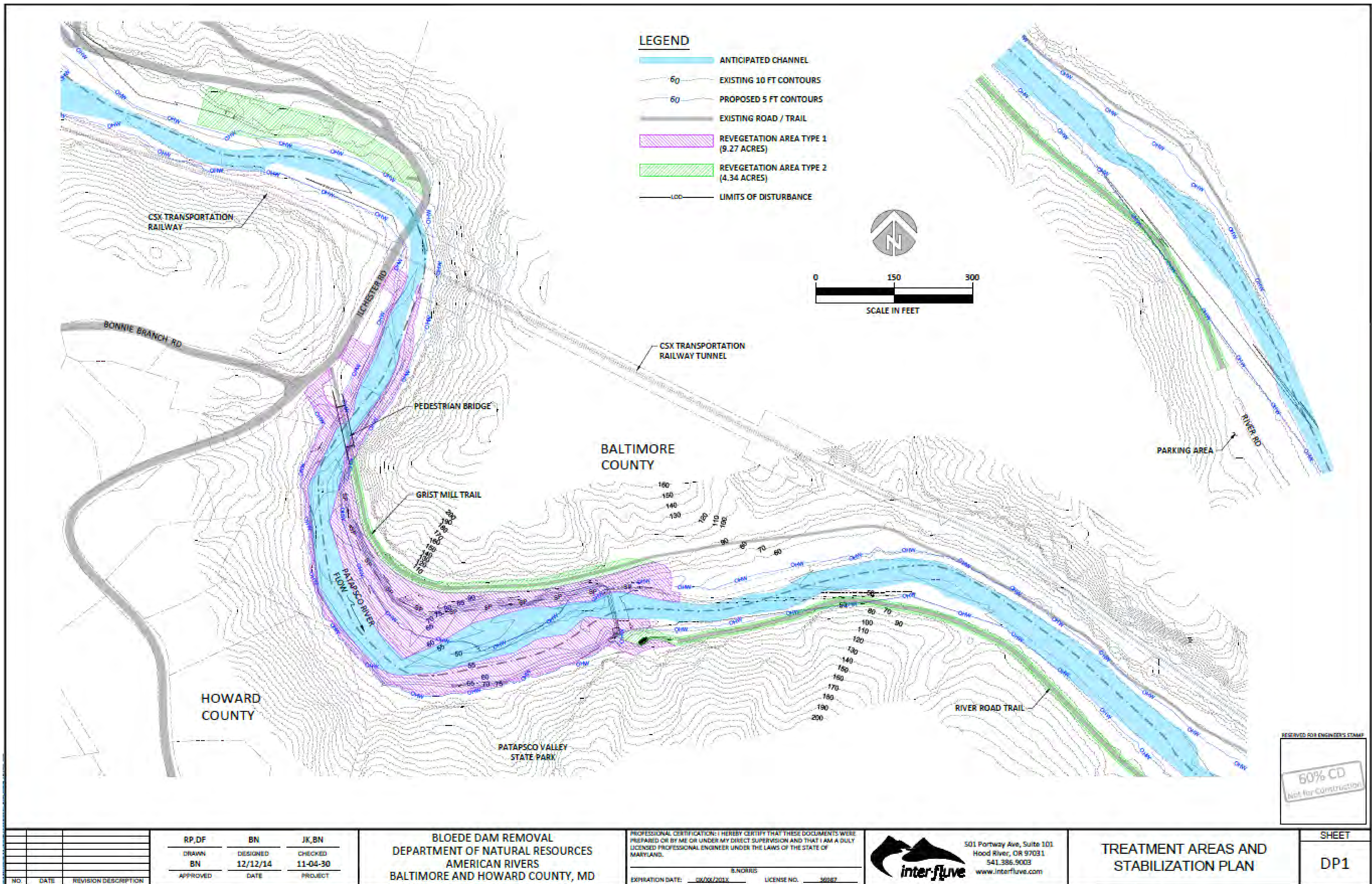
Impacts associated with the removal of Bloede Dam –

Physical

The design team held a sediment workshop with experts from the Bay area to discuss the potential impacts associated with a passive release of up to 312,000 cubic yards of sediment. The overall consensus reached by the group is the release of sediment will create some short-term impacts, but the long term-term positive impacts will outweigh them.

Potential Actions:

- We will let nature take it's course with the sediment and only intervene if necessary.
- We will follow an adaptive management approach and have funding set aside to step in when necessary. For example, if sediment is washed onto the Grist Mill trail as a result of the removal - we will have equipment ready to clean the trail. We will also intervene and remove excess sediment that may be temporarily stored near pinch points like the Gun Road crossing downstream.
- We will plant trees in and around the project area. There is the potential to plant additional trees in the community to make up for trees that were lost during the removal. The exact number and location of these trees will be determined at a later date.



Potential areas for tree planting and revegetation.

Impacts associated with the removal of the Bloede Dam –

Biological

What we know:

- As we experienced with the removal of Simkins Dam, the passive release of sediment from behind Bloede Dam will result in several negative, but relatively short-term impacts.
- Areas below the dam will become covered with sediment, some areas immediately downstream of the dam could be as high as 7 feet deep for short periods of time. Sediment will bury favorable fish and benthic organism habitats for several months to several years. The areas closest to the dam will be hit the hardest, but will also recover the quickest.
- Impacts will change as sediment moves through the river. Not all impacts will occur simultaneously, and some areas will have a chance to recover while new areas are temporarily impacted. Areas behind the dam will begin evacuating sediment immediately following the removal of the dam. The evacuation of the impounded sediment is expected to take 1 to 7 months depending on how much and how frequently we get rain events following the removal. This area will also be the first area to recover and to be recolonized by fish and benthic organisms. Areas that were previously deep water habitats with sand and mud bottoms will return to swift water habitats with more favorable cobble and boulder substrate.
- Impacts to areas downstream following dam removal may disrupt spring trout stocking, especially for the first year following removal.

Impacts associated with the removal of the Bloede Dam –

Biological

Planned Actions:

- DNR will continue biological monitoring to assess changes following the removal.
- DNR will continue stocking shad and herring to help rebuild populations. DNR began this stocking effort 2 years ago and will continue stocking in 2015. Future stocking depends on the availability of funds. Even with the sedimentation associated with the Simkins Dam removal, shad and herring have been utilizing the river areas downstream of Bloede Dam.
- DNR will look at ways to mitigate the loss of trout stocking should conditions prohibit stocking below Bloede dam.



Impacts associated with the removal of the Bloede Dam – Utilities

What we know:

- A 42-inch diameter sewer line is routed through the dam and the impounded sediments on the left bank upstream of the dam. Based on subsurface investigations and hydraulic modeling, the impounded sediments supporting portions of the 42-inch sewer will mobilize following dam removal.
- A 12-inch diameter, concrete encased sanitary sewer connection from Bonnie Branch Road to the existing 42-inch sanitary sewer is located in the project area.
- The Cable Stay Pedestrian Bridge abutments upstream of the dam were originally built in the early to mid-1800s as part of the original railroad bed. The abutments and the bridge will not be impacted by the Bloede Dam removal.

*Pre-dam photo of the Railroad Bridge
that has been converted to the Grist Mill
Trail Cable Stay pedestrian bridge.*

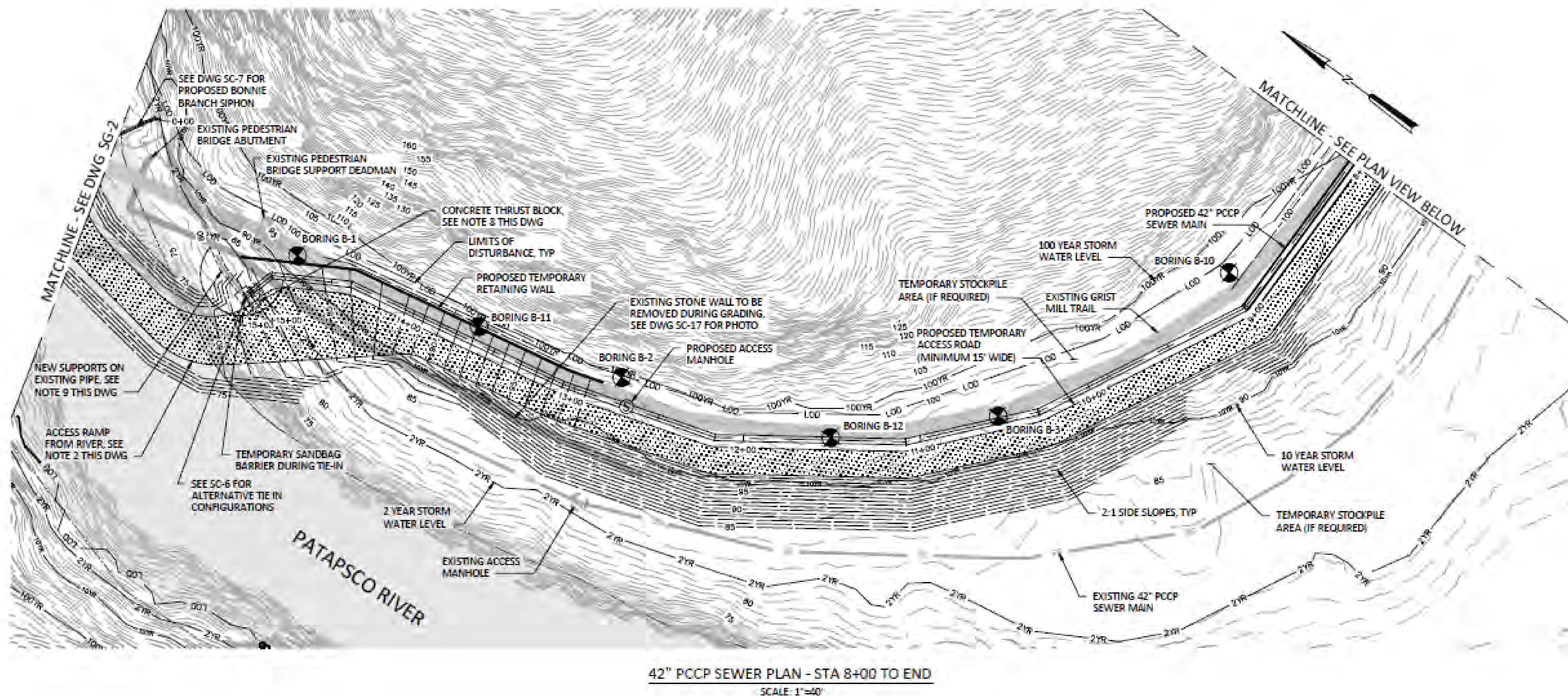


Impacts associated with the removal of the Bloede Dam –

Utilities

Necessary Actions:

- A portion of the 42-inch sewer line will be relocated prior to dam removal. Relocation of the sewer line is expected to begin in late 2015 and take up to 12 months to complete. The new line is proposed to be constructed out of pre-stressed concrete cylinder pipe and will be laid in 16-foot sections over approximately 1,200 feet. The new line will be moved further away from the stream and buried roughly under the current Grist Mill Trail. The new line will tie into the old line downstream of the dam where the line sits on concrete pillars.
- The 12-inch diameter Bonnie Branch line will be reconstructed below the anticipated restored channel bottom.



Impacts associated with the removal of the Bloede Dam –

Impacts to Park Users

What we know:

- There will be impacts to park users between Gun Road and Illchester Road.
- Exact timing, location, and duration is not yet known and may change based on inputs from permitting agencies and the construction engineer.
- At least a portion of the Grist Mill Trail will be closed from the dam up to Illchester Road (including the Patterson Footbridge at Illchester Road) for up to a year, beginning in late 2015.
- Access from Orange Grove to Bloede Dam will be closed or restricted for up to 12 months while the dam is being removed, following the relocation of the sewer line.

Impacts associated with the removal of the Bloede Dam –

Impacts to Park Users

Potential Actions:

-Given the nature of the of the Patapsco River Valley, access points for the relocation of the sewer line and the removal of the dam are limited. The Design Team will do what we can to minimize impacts and shorten the duration of the project. We ask for patience from Park users while we complete this project.

-Exact timing, location, and duration of any trail restrictions and closures will be provided to the public at least 30 days in advance of any activity. Information will be posted in the Park, as well as on DNR's website.



Bloede Dam Removal timeline

February/March 2015 - Apply for permits

Fall 2015 - Receive permits

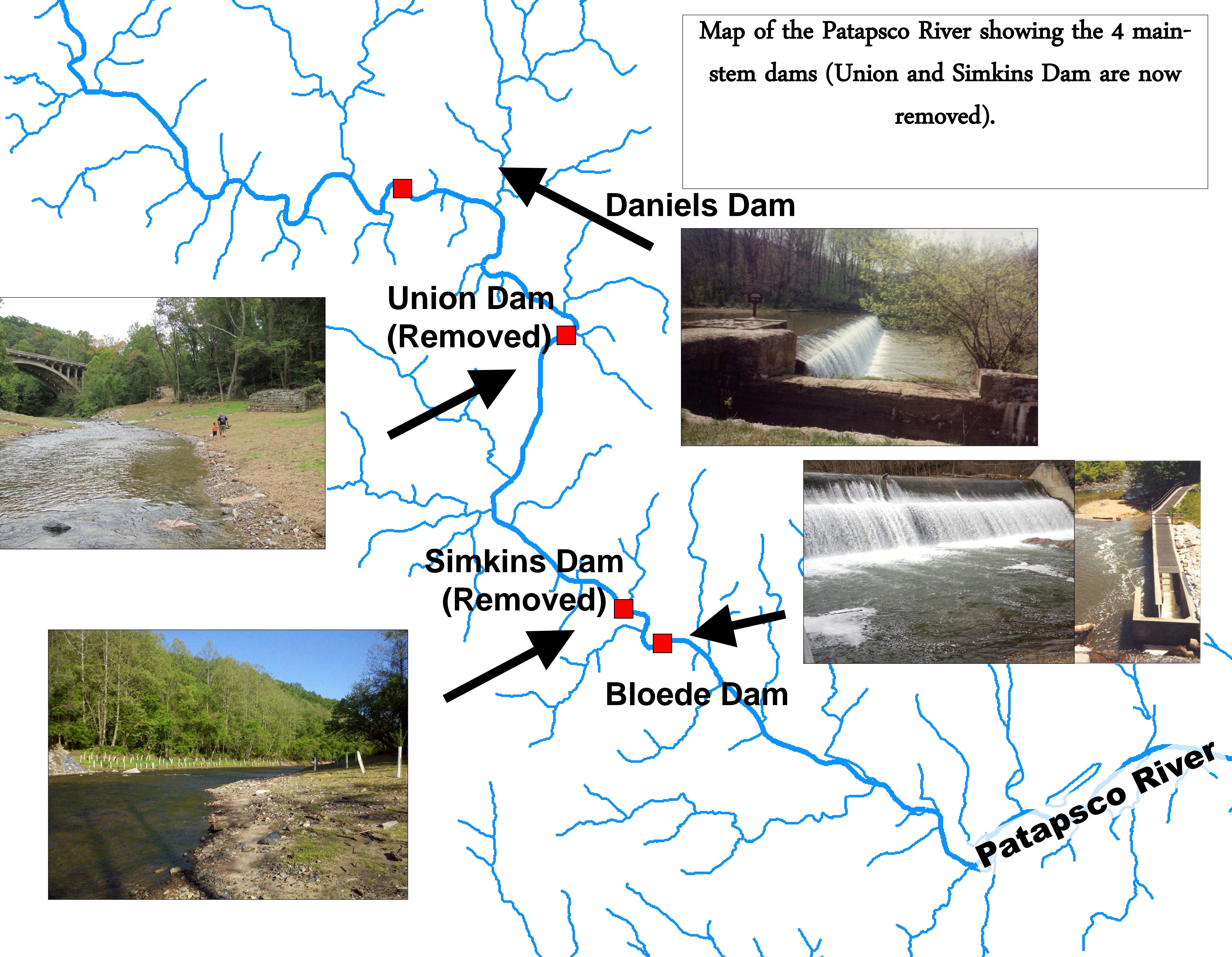
Winter 2015 - Begin relocation of sewer line - Duration: 11-13 months

Winter 2016 - Remove the dam - Duration: 6-10 months

Spring 2017 - Tree and shrub planting



Map of the Patapsco River showing the 4 main-stem dams (Union and Simkins Dam are now removed).



Daniels Dam



**Union Dam
(Removed)**



**Simkins Dam
(Removed)**



Bloede Dam



Patapsco River

The Simkins Dam Removal

- Undertaken to restore passage and improve habitat for resident and migratory fish, improve water quality, and restore natural riverine functions.
- The dam removal cost about \$872,000 and took about 4 months to complete (Winter 2010)
- MDE issued a demonstration permit for passive sediment management.
- Project partners initiated large-scale monitoring project to document the physical and biological changes that result from the restoration.



The Union Dam Removal

- Breached by Tropical Storm Agnes in 1972
- First dam removed on the Patapsco River - 2009
- Project initiated due to threat to main sewer line.
- Project involved a more mechanical, active approach. MDE approved the removal with stream diversions and channel restoration using heavy equipment.
- Construction lasted 11 months and cost about \$1.5 million
- Largest dam removal project in Maryland.
- No sediment was removed or released (sediment flushed out during breach, 1972)

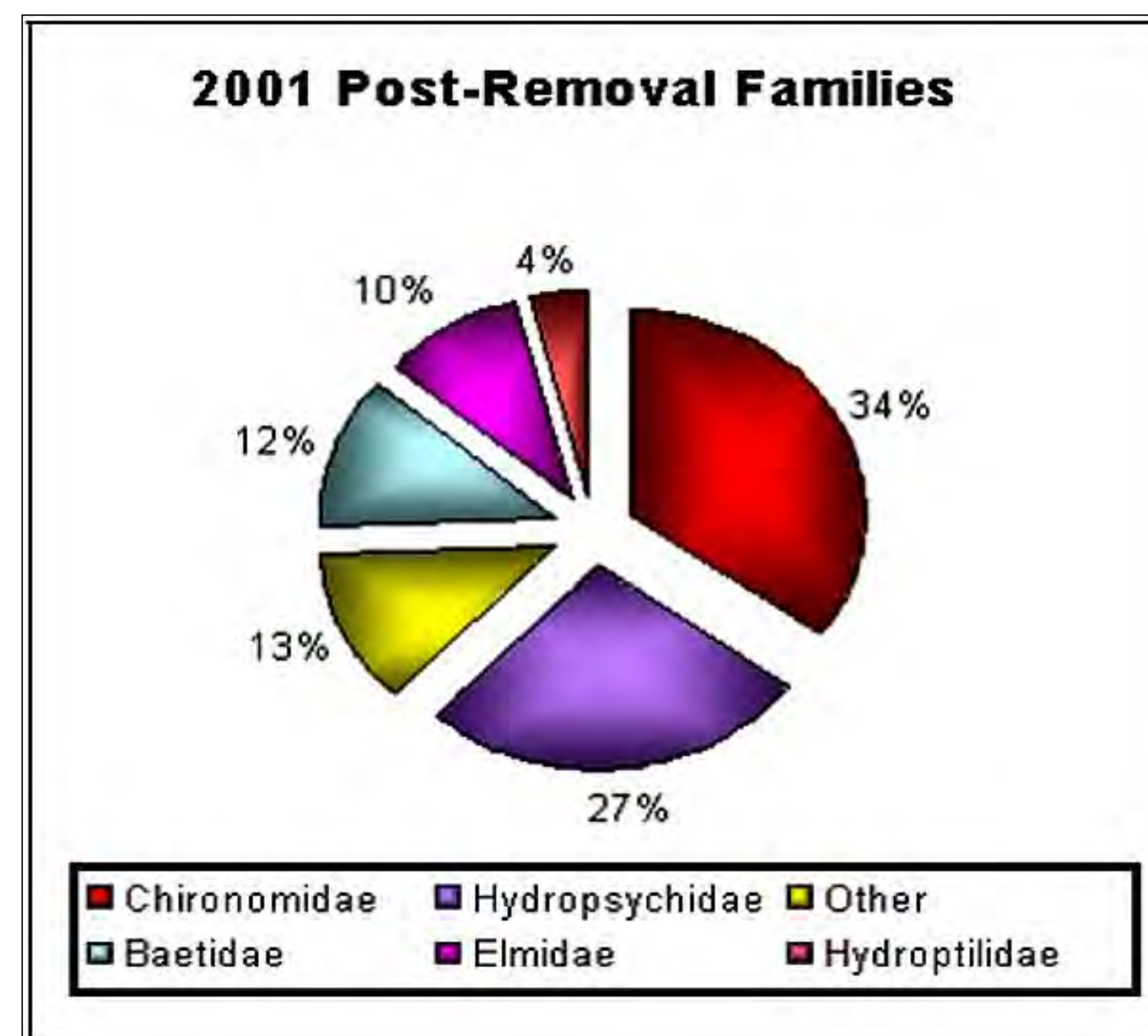
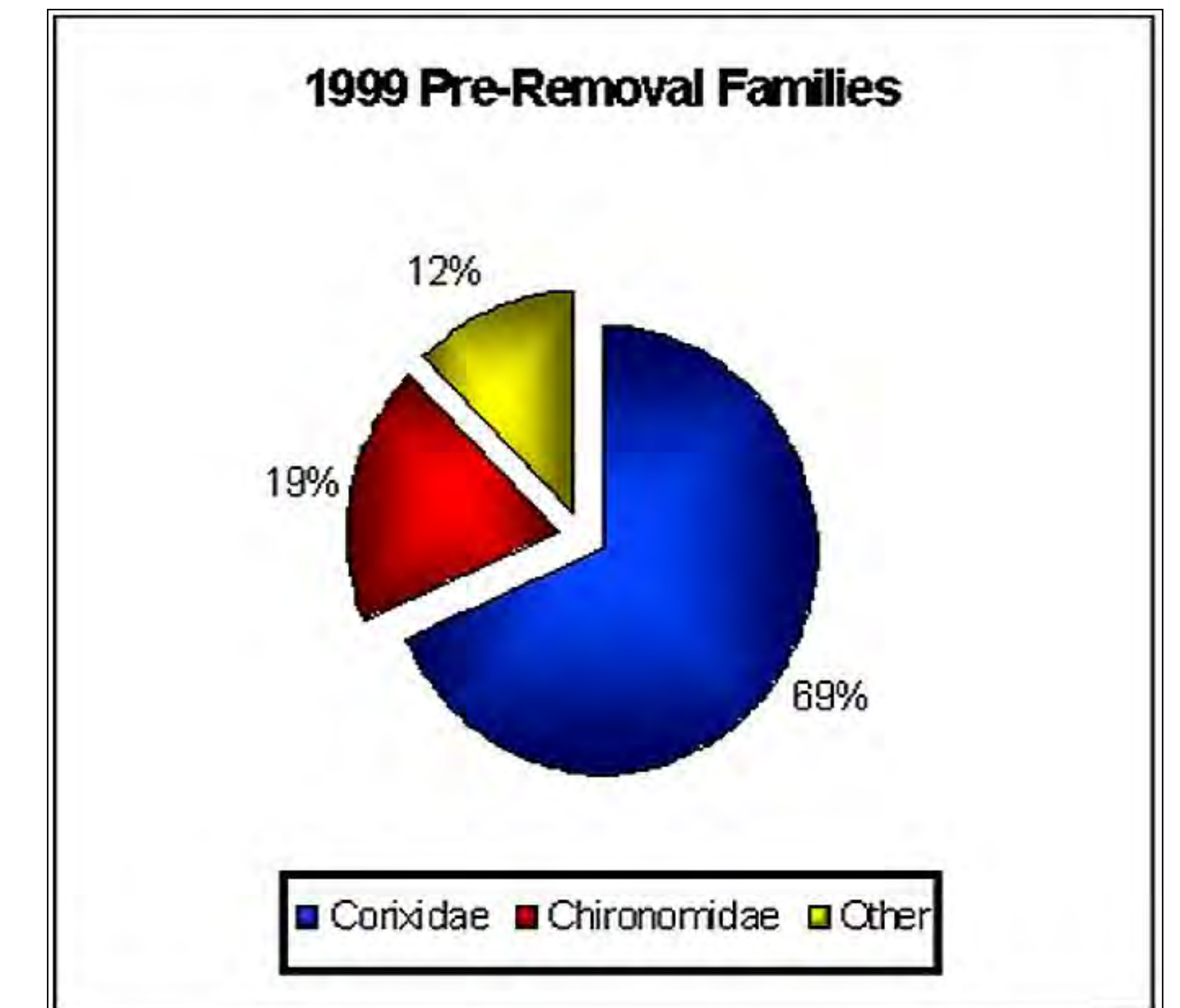


What to expect when Bloede Dam is removed...

Positive Impacts

When removing a dam, there are many long-term positive benefits that you can expect to see, they include:

- Healthier populations of native fish species.
- Increase in the diversity of aquatic insects.
- Cooler, oxygen rich waters that fish thrive in.
- Safer recreational opportunities.
- A more scenic, natural setting.

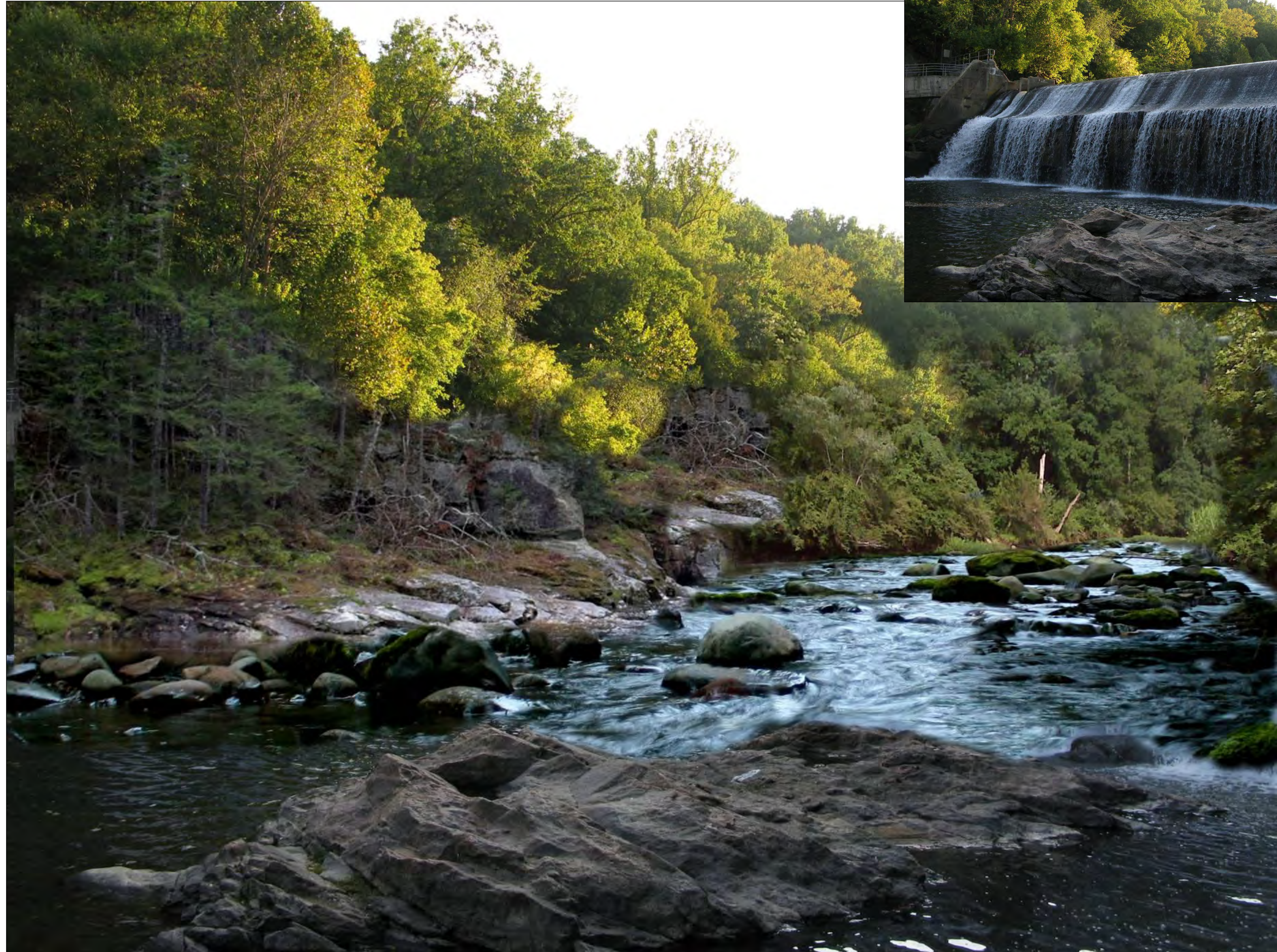


The 1999 **pre-removal** showed two major families of aquatic insects: Corixidae and Chironomidae.

The 2001 **post-removal** samples were more evenly distributed among several families of aquatic insects: Chironomidae, Hydropsychidae, Baetidae, Elmidae, and Hydroptilidae.

Source: Penn State

Artist rendition of what the area might look like
after removal...



What to expect if the Bloede Dam is removed...

Patapsco River shad and herring restoration project

Bloede Dam removal will reopen historic spawning habitat for American shad, hickory shad, blueback herring and alewife herring. This tributary historically supported spawning stocks and the reintroduction of fish through hatchery efforts could have positive impacts.

How do we do this?

- 1. Produce, mark and stock American shad, hickory shad and herring in the Patapsco River.*
- 2. Monitor the abundance and survival of larval and juvenile shad and herring using marked, hatchery-produced fish.*
- 3. Assess the contribution of hatchery fish to the adult hickory shad and herring spawning population.*

Hatchery raised fish are intended to provide adult spawning stock that could produce self-sustaining populations in the target tributary. These hatchery fish have tremendous value for assessing the stock since all stocked fish receive an identification mark.



Larval American shad



Alewife herring



Blueback herring



Adult American shad & hickory shad