Final Environmental Assessment for Dam Modifications on the West Fork River Harrison County, West Virginia

REPORT PREPARED BY:

USDA NATURAL RESOURCES CONSERVATION SERVICE
IN COOPERATION WITH
U.S. FISH AND WILDLIFE SERVICE
FOR THE:
City of Clarksburg, WV - Clarksburg Water Board

November 2010

NRCS

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FINAL ENVIRONMENTAL ASSESSMENT
FOR
DAM MODIFICATIONS
ON THE
WEST FORK RIVER

Harrison County, West Virginia
West Virginia Second Congressional District

Responsible Federal Agency: United States Department of Agriculture
Natural Resources Conservation Service

Local Sponsor: Clarksburg Water Board

Cooperating Agency: US Fish and Wildlife Service

Project Location: Harrison County, West Virginia

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Environmental Assessment Designation: **FINAL**

Abstract: This Final Environmental Assessment describes the anticipated effects of removing three obsolete run-of-the-river water supply dams and modification of a fourth dam with an aquatic life passage structure in the West Fork River. This project proposes to restore, to the greatest extent possible, the aquatic and ecological integrity of at least forty miles of the West Fork River and many more miles of adjoining tributaries. This project has the potential to restore more suitable habitat for as many as twenty-five species of freshwater mussels including two federally listed species. Liability to the dam's owners, the Clarksburg Water Board, will be substantially reduced with implementation of the recommended alternative.

Helping People Help the Land

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PURPOSE AND NEED

Introduction – This Environmental Assessment (EA) has been prepared to identify, review and evaluate environmental impacts of a proposed action on the West Fork River in order to inform decision-makers and the public. Additionally, the environmental, social, and economic effects of any potential solutions will be identified. This document also provides documentation of the public participation process used to reach decisions regarding these structures. Because of the potential for federal funding, this project must comply with the National Environmental Policy Act (NEPA). This EA has been prepared to meet both Federal and State laws that require full public disclosure of projects that may affect resources of concern in the human environment.

Purpose and Need for Action - Action is proposed to restore the connectivity of the West Fork River in order to benefit aquatic species including native mussels and their host fish while improving the habitat of the native fishery. There is also a need to reduce the liability associated with these structures that is currently being borne by the owners – the Clarksburg Water Board (CWB).

Background – In February 2000, three canoeists drowned in the hydraulic roller effect of the Highland Dam, one of the four low-head dams on the West Fork River. As a result of this tragic event, the CWB commissioned an engineering firm, Gannett Fleming, to evaluate alternatives that would eliminate or decrease their liability associated with these structures. Because of public comment, the CWB elected to modify the structures with rock on the downstream face rather than to remove the dams. Unfortunately, although the intent was to reduce or eliminate the owners' liability, the placement of rock increased the top width of two of the dams and actually attracted more people, which potentially increased the liability. The four dams serve as barriers to aquatic organism passage up and down the West Fork River for a distance of more than 40 miles (mainstem measurement).

Federal Interest and Authority –The CWB requested that the Natural Resources Conservation Service (NRCS) participate in further evaluation of alternatives for the West Fork dams. NRCS is providing planning assistance under many different authorities including General Planning Authority Public Law 74-46, Authorized by the Soil Conservation and Domestic Allotment Act of 1936, as amended. PL 74-46 includes providing technical assistance to individuals, groups, and state and local governments in order to inventory natural resources and to plan and apply conservation practices needed to protect and enhance those resources. From the federal perspective, there is an interest in re-establishing the connectivity of the stream and removing or minimizing impediments to fish movement within the river. Restoring the aquatic habitat of the West Fork River, to the greatest extent possible, is within the mission of NRCS.

Required Decisions – Upon completion of a Draft Environmental Assessment and the NEPA process, this Final Environmental Assessment is issued which includes comments and any necessary subsequent revisions. Additionally, a Finding of No Significant Impact (FONSI) will be issued to indicate the lack of significant environmental impacts.

The recommended alternative will be the option that best meets the two-fold goals of the project – 1) to restore the connectivity of the West Fork River and provide for passage of aquatic species within the River, and 2) reduce the Clarksburg Water Board's liability associated with these structures to the greatest extent possible. In all cases, the Clarksburg Water Board must retain sufficient water supply at the Hartland Dam to meet their water supply needs.

Lead Federal Agency and Agency Roles – The Natural Resources Conservation Service (NRCS) supervised and coordinated the preparation of this environmental document. NRCS was the lead agency by virtue of the sequencing, magnitude and duration of involvement in the planning process, and requested participation of each cooperating agency. Partner agencies were included at the earliest possible time and met at their request. NRCS used any and all environmental analysis and proposals of those agencies to the maximum extent, if those agencies have special expertise and/or jurisdiction by law.

NRCS is not anticipated to provide funding of this project at this time. However, this does not preclude NRCS or other Federal, State, local units of government or others to utilize this document to obtain funding or to aid in decision-making if potential funding is identified.

PROJECT DESCRIPTION

The West Fork River flows approximately 103 miles north from southwestern Upshur County through Lewis, Harrison and Marion counties to Fairmont where it joins with the Tygart River to form the Monongahela River. The total watershed drainage is approximately 881 square miles.

The watershed is located in northern West Virginia and forms part of the Monongahela River Watershed. It includes over 880 square miles (569,000 acres) of relatively small valleys and narrow winding ridges ranging from 1,200 to 1,500 feet in elevation, with higher elevations occurring in the southern region of the watershed. The watershed encompasses Harrison County, extends into portions of Marion, Taylor, Barbour, Upshur, and Lewis Counties, and borders Doddridge and Wetzel Counties. The West Fork River flows north from its headwaters in Upshur and Lewis Counties, through the City of Weston and the City of Clarksburg, to its confluence with the Tygart River at the City of Fairmont to form the Monongahela River. The West Fork River Watershed is dominated by forest and pasture land uses.

This area is known as the north central coalfields of West Virginia. Historically, coal deposits represented the most economically valuable mineral resource in the West Fork Watershed. Coal mining played a significant role in the regional economy from the 1800's until a decline in coal production in the 1970's. As the production of coal mining declined, forestry, agriculture, oil and gas production, as well as sandstone, shale, and limestone extraction have become increasingly important economic factors.

Agriculture is an important part of the economy in the West Fork watershed. Total number of farms have increased from 2,309 to 2,396 (approximately 8.5 percent) in recent years. Farms in this region are generally 150 to 200 acres in size and comprise approximately 25 percent of the land use area in the West Fork watershed.

Currently the predominant land uses in the West Fork watershed are identified based on the USGS's GAP 2000 land use data (representative of the mid-1990s). According to the GAP 2000 data, the major land uses in the watershed are forest land, which constitutes approximately 65 percent of the watershed and pasture/grassland, which makes up 27 percent. In addition to forestland and pasture/grassland uses, other major landuses include barren and urban land. The land use distribution for the West Fork watershed is presented in Table 1.

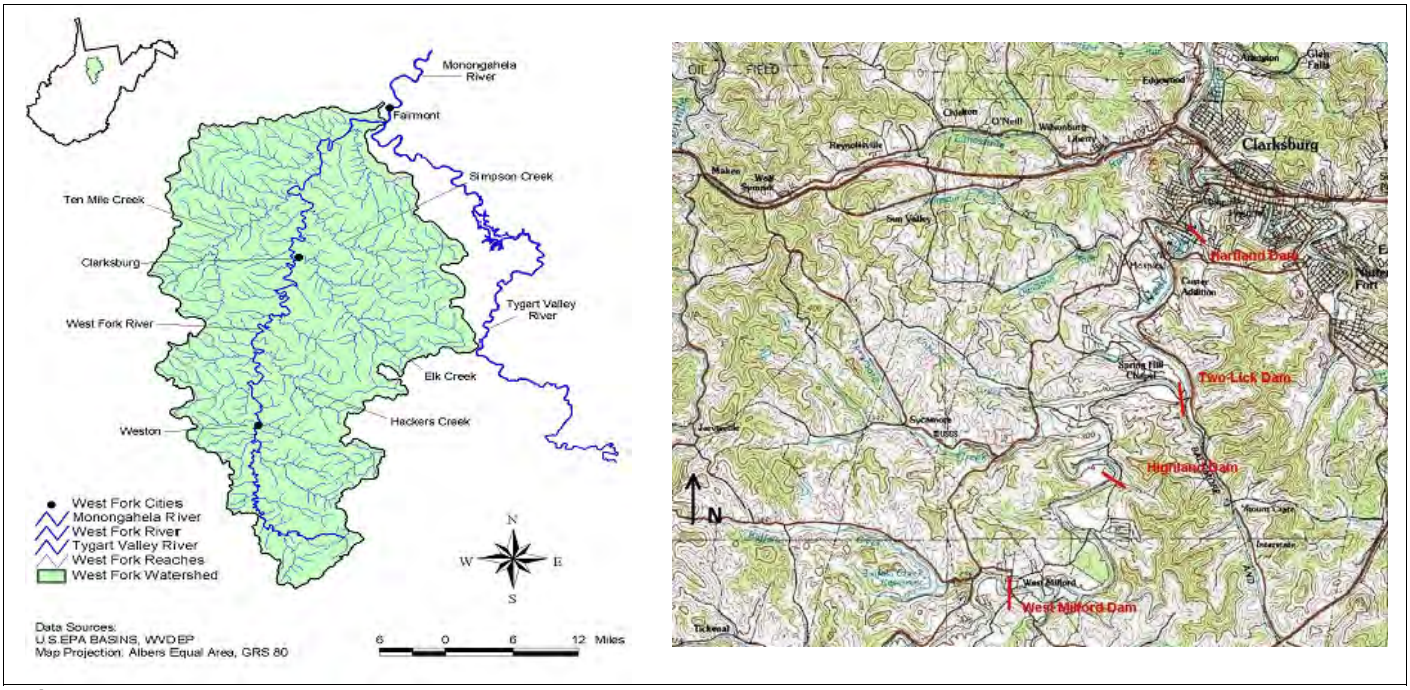


Figure 1. *Watershed location maps and USGS topographic map showing approximate locations of the four dams owned by the Clarksburg Water Board.*

Table 1. Land Use Distribution in the West Fork Watershed

Landuse Category	Area (acres)	Area (%)
Diverse / Mesophytic Hardwood Forest	179,341	32.19%
Oak Dominant Forest	154,393	27.71%
Pasture / Grassland	151,311	27.16%
Surface Water	8,029	1.44%
Barren Land - Mining / Construction	7,020	1.26%
Cove Hardwood Forest	4,153	0.75%
Floodplain Forest	2,604	0.47%
Mountain Hardwood Forest	1,644	0.30%
Herbaceous Wetland	363	0.07%
Forested Wetland	64	0.01%
Shrub Wetland	54	0.01%

Source: USGS GAP2000 Dataset after WVDEP; Metals and pH TMDLs for the West Fork River Watershed, September 2002.

During the early history of the United States, the government of Virginia attempted to maintain commercial navigability on the river, chartering a company for that purpose in 1793 and requiring that dams for milling operations provide a chute for boats to pass downstream.

Construction of a system of locks, dams, and chutes was begun by the Monongahela Navigation Company in 1817; the project was abandoned following damage by floods in 1824. The West Fork River is not navigable by commercial barge traffic. However, it is classified by the West Virginia Division of Natural Resources as "recreationally navigable" for canoes and similar craft.

Approximately three miles south of Weston, the river is dammed by the U.S. Army Corps of Engineers (USACE) to form Stonewall Jackson Lake. The project was authorized by the federal Flood Control Act of 1966 for the stated purposes of flood control, improvement of water quality and water supply, improvement of habitat for fish and wildlife, hydropower, and recreation. Construction of the dam began in the mid-1980s. The Stonewall Jackson Dam became fully operational in 1990 and is located at Brownsville, West Virginia, approximately 74 miles upstream above its confluence with the Tygart River at Fairmont, WV. The dam controls 102 square miles of the upper West Fork watershed, approximately three miles above the confluence of Stonecoal Creek with the West Fork mainstem.

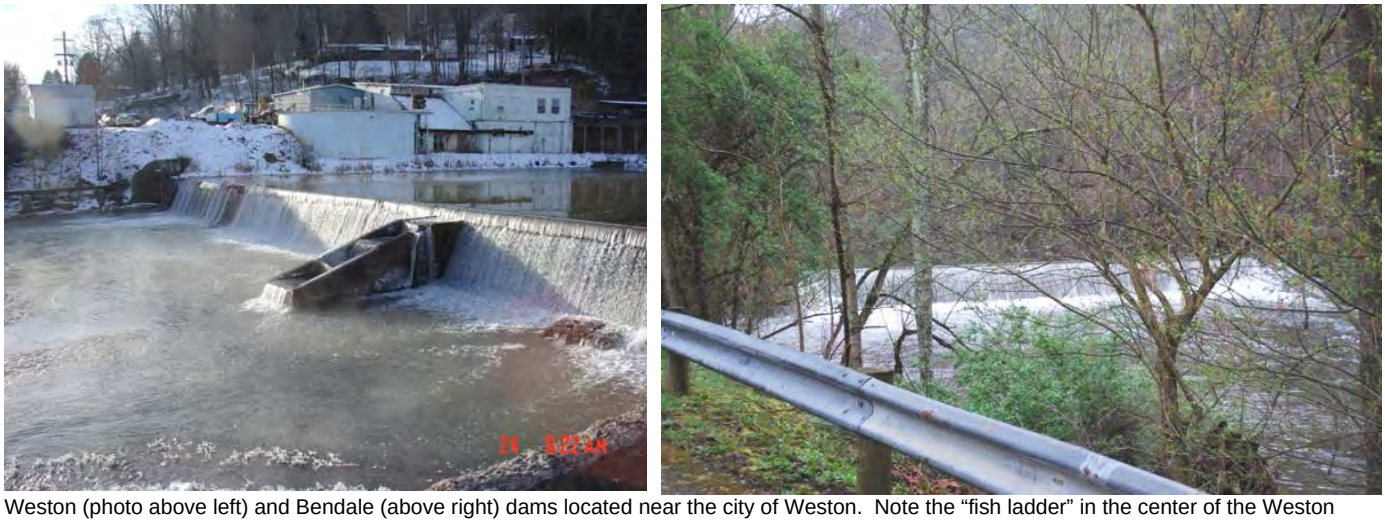
Stonewall Jackson Dam and Lake. *Source USACE*

The dam is 95 feet tall and forms a 2,650-acre lake, with a larger capacity during periods of flood. Land along the lake is leased to the State of West Virginia and is used as a wildlife management area and State Park. This lake operated by the USACE now greatly influences the flow of the West Fork River.

The river segment discussed in this document is approximately 40 miles in length. This distance is measured from Clarksburg (Route 50) to the Stonewall Jackson Dam. Between the years of 1905 and 1931, four small run-of-the-river dams were constructed by the CWB on the river upstream (south) of Clarksburg, for the provision of local drinking water. (A run-of-the-river dam means that the amount of water flowing over the dam is the same amount flowing into the impoundment from the river upstream. Run-of-the-river dams have no way to control the level of the impoundment and do not provide flood control.) The four dams discussed in this document are spaced approximately 5 to 7 miles apart along the West Fork River starting from the City of Clarksburg and ending at the City of Weston (not including the Weston and Bendale dams located in the City of Weston).

There are two other low-head run-of-the-river dams on the West Fork River located in the city of Weston. These dams are approximately the same size and were constructed during the same era as the four dams discussed above. They either currently or historically served as water supply dams for the City of Weston. The first dam, called "Weston Dam" (WVDEP ID#04110) is located in downtown Weston across from the old mental hospital. This dam historically provided water supply for the city. It was constructed with a fish passage structure; however, it

appears as if it has not been maintained regularly and it is unclear whether this passage structure functions as intended. This dam was the city of Weston's main water supply dam prior to the construction of the new treatment plant located next to the second dam, called the "Bendale Dam". The Bendale Dam (WVDEP ID#04111) is located approximately 1.6 miles downstream of the Stonewall Jackson Dam and is now the primary water supply for the City of Weston. This dam has no aquatic life passage structure. There are no plans to remove or alter of these dams. Both dams are owned and operated by the WV-American Water Company. Both dams have Certificates of Approval from Dam Safety, issued 2/1/1995, as Class "4" (Run-of-River) structures. Specifics are listed in Table 2.



Weston (photo above left) and Bendale (above right) dams located near the city of Weston. Note the "fish ladder" in the center of the Weston dam. *Photo: J. McClure.* Source WVDEP Dam Safety, courtesy D. Shriver

Table 2. Summary of Features for the Unaffected Weston Dams

Structure	Year Constructed	Dam Length	Dam Height	Maximum Storage	Pool Storage Surface Area	Watershed Area	Aquatic Passage Present
Weston Dam	1924	188 ft	15 ft	180 ac-ft	26 acres	120 sq mi	YES
Bendale Dam	1924	158 ft	14 ft	180 ac-ft	28 acres	104 sq m	NO

Table 3 provides general information about the four dams discussed in this document. For more information, a copy of the source referenced report can be obtained from the CWB. Refer to the appended map in that document for more location information.

Table 3. Summary of Features for the CWB West Fork Dams

		Hartland Dam	Two-Lick Dam (Brown's Creek Dam)	Highland Dam	West Milford Dam
Constructed		1905	1911 (Raised in 1922)	1931	1922
Height		8 ft	10.5 ft	13.5 ft	8 ft
Length		201ft	175 ft	165 ft	165 ft
Storage		276 acre-ft	138 acre-ft	276 acre-ft	337 acre-ft
Hazard Class		4 (Low*)	4 (Low*)	4 (Low*)	4 (Low*)
Drainage Area		384 mi^2	<384 mi^2	<384 mi^2	<384 mi^2
Recognized Current Use		Water Supply	None	None	None
Location	**Latitude**	39.269	39.239	39.221	39.198
	Longitude	-80.356	-80.358	-80.377	-80.406

Source: Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam, and West Milford Dam on the West Fork River. Gannett Fleming, September 2003.

* WVDEP Classification stating the potential for loss of human life resulting from a dam failure is unlikely

SCOPING ISSUES OF CONCERN

Prior to requesting assistance from NRCS, the CWB held an initial public meeting on Tuesday, May 25, 2004 for the purpose of hearing concerns related to the West Fork Dams. Based on the public interest expressed at that meeting in West Milford, the CWB decided not to remove the dams at that time and eventually opted for a compromising measure to temporarily alleviate the concerns of liability. (Refer to the section entitled Alternatives Considered, Alternative #5).

A second scoping meeting was held on January 31, 2008 in Clarksburg, WV. This scoping meeting was necessary to ensure that the public has adequate access to project information. Table 4 shows the concerns noted by public and participating agencies. Impacts of the "Recommended Alternative" on these resources of concern will be fully described in the "Effects of Recommended Alternatives" section of this report. Issues brought about by agencies and the public are also identified in this table. Issues and concerns noted by the public that were previously identified by agency personnel, policy or legislation are not listed under the public column.

Table 4. Issues of Concern Identified During Scoping

ISSUES			
AGENCY		**PUBLIC**	
1	**Aesthetics**	**1**	**Public Sentiment**
2	**Biological Environment**	**2**	**Visible Debris After Dam Removal**
3	**Cultural Resources**	**3**	**Drought**
4	**Environmental Compliance/Permitting**		
5	**Health & Public Safety**		
6	**Hydrology**		
7	**Invasive Species**		
8	**Property Values**		
9	**Recreation**		
10	**Riparian Areas**		
11	**Sediment**		
12	**Threatened, Endangered, Rare & Declining Species**		
13	**Water Quality**		
14	**Water Supply**		
15	**Other Considerations** (Prime Farmland, Wild & Scenic Rivers, FAWCA, MBTA, BAGEPA, Environmental Justice, etc.)		

ALTERNATIVES CONSIDERED

Several alternatives were considered and are described in detail in the 2003 Gannett Fleming report entitled *Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam and West Milford Dam on the West Fork River*. The alternatives are briefly discussed here.

1. **No Action** – Under this alternative, no further modifications would be made to the existing dams. The West Fork River would continue to be impounded at multiple locations throughout its entire 103 mile length. Fish passage and aquatic habitat would continue to be restricted by manmade structures and impoundments. Restoration of aquatic species of concern would not occur. The dams would continue to require maintenance by the CWB and inspection by the WVDEP Dam Safety Division under the West Virginia Dam Safety Act. Costs for future maintenance and inspection would continue. The Clarksburg Water Board (CWB) would continue to bear the liability costs and risks associated with the structures.

   As of June 2007, the CWB incurs approximately $137,000 in annual insurance premiums for coverage of the dams. There are only a handful of insurance carriers willing to write dam coverage.

   If this alternative is selected, the Water Board will be required to maintain the dam according to requirements set forth by the West Virginia Division of Environmental Protection (WVDEP) Dam Safety Division and the Dam Safety Act. Pursuing this “No Action” alternative would create a long-term financial liability for the CWB which could potentially be passed on to customers.

   During the public scoping process, several groups voiced their opinion that this alternative was preferential. They observed that removal of the dams would cause the river to “dry up” downstream. Additionally the fishermen were concerned that muskellunge would no longer be present and other recreational fishing would become unavailable.

[The effects of any proposed actions will be compared to the "no action" alternative.]

2. **Installing signs, buoys, cables, fences, portages and rescue facilities** – It is extremely important and essential, from a public safety standpoint, that the dams be marked to warn members of the public of their existence and potential hazard in order to protect the public from physical harm. The CWB should post appropriate signs or other structures to warn of the existence of the dams. The intent of this alternative is to increase public awareness and reduce risk; however this has proven relatively ineffective. Signs and upstream markers have already been placed at each structure and the CWB retains full liability with regard to the structures. Signs have been vandalized and buoys and signs have been removed. Signs and structures require constant maintenance and monitoring to be effective. Furthermore, this alternative does not meet the aquatic restoration goal.

   It should be noted that if the CWB does not select the recommended alternative, installations of warning devices remain in place indefinitely and are upgraded when available. This action does not meet the aquatic restoration and has been eliminated from further consideration.

3. **Portage Facilities around Dams -** Once signs have been posted warning of the dangers at the nearby low-head dam, consideration should be made to provide safe bypass or portage around each dam. This is especially important upstream of the dam where the channel banks are steep and exiting the river is difficult. During high water conditions when the current is faster than normal, an inexperienced canoeist or kayaker may not be able to paddle upstream. For motorized boats, an equipment failure may make upstream travel impossible. Upstream and downstream warning signs can direct approaching boaters to the portage ramp. The portage ramps and pathways around the dams can be equipped with guide rails spaced to accommodate canoes and row boats so that they could be pulled along on the guide rails without emptying the contents. Portage ramps can also serve as access points for launching rescue watercraft. Based on the July 8, 2003 site reconnaissance by Gannett Fleming, construction of portages would appear to be feasible only around the left abutment (looking downstream) of Hartland, Highland, and West Milford Dam. Portages could be constructed around either abutment at Two-Lick Dam. Based on a review of the available record drawings, it appears that the CWB may need to obtain sufficient property rights before constructing portage ramps around each of its dams. Refer to GNF 2003 report. This alternative does not meet the aquatic restoration goal or the liability issue and has been removed from further consideration.

4. **Dam Removal/Modification** – This alternative consists of removal of three dams and modification of the Hartland Dam to preserve the water supply storage. This alternative would restore, to the greatest extent possible, the connectivity and aquatic integrity of the West Fork River. The Hartland Dam would be fitted with an aquatic life passage structure (ALPS) to allow freer movement of fish and other aquatic life to an approximately forty mile segment of the West Fork River and many more miles of tributary. The liability and continued maintenance costs associated with three of the structures would be totally eliminated. This alternative meets the aquatic restoration and eliminates, to the greatest extent practicable, liability concerns.

5. **Raising the Dams** – By raising the dam crest, it is possible to eliminate submergence of the hydraulic jump and hence the hydraulic roller at the downstream face of the dam. This alternative would reduce the hydraulic roller effect, but it would involve raising the crest of the dams more than 10 feet in height. This alternative also assumes that the dams are required to be maintained for a particular purpose or use (i.e. water supply, industrial use, etc.) and would include the cost of repair and maintenance. This alternative is unclear in terms of its effect on flooding and floodplain management and would further exacerbate aquatic life impediments. The CWB may need to obtain additional property rights before raising dams. In addition this could pose additional inspection requirements on the CWB in terms of hazard classification and additional storage. This alternative lacks necessity, cost efficiency or feasibility and has been dropped from further consideration.

   See Gannet Fleming Report entitled Gannett Fleming Inc.; Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam and West Milford Dam on the West Fork River; September 2003.

6. **Reshaping Downstream Face of the Dam** – This alternative involves placement of rock on the downstream side of each dam at sufficient spacing to break up the hydraulic roller effect. This alternative has been partially implemented. Two of the four dams (Hartland and Two-Lick) have been retrofitted by the placement of rock on the downstream face of each dam creating a relatively level area along the top of the dams. This solution has

had some unintended consequences. Instead of reducing the public safety concern, it has actually increased public exposure to risk. While the roller effect has been reduced, there has been increased use of both areas due to increased accessibility, more vandalism (removal of warning signs), more litter at the sites, theft of the rock materials, and sightings of automobiles being driven onto the dam face. Furthermore, this alternative is more detrimental to restoration of the river and the natural aquatic habitat by creating additional barriers to aquatic passage. Plans for completion of this alternative have been placed on hold. This alternative does not accomplish the restoration goals of the project and the CWB still retains liability and has been removed from consideration.

7. **Stepped Series of Downstream Dams** – The power of the downstream hydraulic at a dam can be reduced by constructing a series of dams downstream of the existing dam. The crest heights and locations of the downstream dams would be set with the intent of reducing the net crest height of the dam located immediately upstream. For this alternative to be effective, several new dams would have to be constructed downstream of each of the existing four dams. This alternative would be extremely expensive in contrast to other options including complete removal or replacement**.** This alternative would require that landrights be obtained from additional entities to construct additional dams. It would also require that the new dams be covered under additional insurance policies which increases cost; and quite possibly increase the CWB liability. This alternative would also have considerable environmental and social consequences and would further minimize the natural habitat and aquatic characteristics of the West Fork River. It has been dropped from further consideration.

   See Gannet Fleming Report entitled Gannett Fleming Inc.; Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam and West Milford Dam on the West Fork River; September 2003.

8. **Canoe Chutes** – Canoe chutes combine elements of the stepped series of downstream dams and crest reshaping alternatives. A boat chute would transform the dam from being a boating hazard to a recreational asset by directing canoeists and kayakers approaching the dam to a man-made white-water channel. The channel would feature a series of artificial rapids and still pools that boaters could use to progress from upstream of the dam to the downstream channel without encountering a hydraulic roller. Such channels would also facilitate the migration of some species of fish. A canoe chute project would include significant design effort, including hydraulic model(s), modifications to the dam overflow crest, installation of navigation aids and significant earthwork and modification of the river downstream of the dam. While a canoe chute could partially restore the aquatic passage of the West Fork, it still does not significantly reduce the liability of an in-stream structure. During periods of high flows, the remaining structure in the river may exhibit the same hydraulic roller effect in addition to increased velocities. The canoe chute may also prove to increase the number of people exposed to the risk and provide a false sense of security associated with the dams. This alternative does not fully accomplish either goal of the project and has been dropped from further consideration.

9. **Moveable Crest Dam Concept –** By definition moveable crest dams have the ability to vary the crest elevation of the dam from a fully down position to replicate natural river flow conditions to a partial or fully up position to raise upstream water levels. Moveable crest dams can also be operated to change the hydraulic conditions downstream *of* the dam and reduce or eliminate the dangerous hydraulic roller. Three types of dams with controlled crests have been widely used for controlling water levels and creating temporary low-head impoundments. Each of these types can be used to replace existing low-head dams and include: (1) a hydraulically operated steel bascule gate dam, (2) an inflatable rubber dam and (3) a bascule gate dam operated with an inflatable rubber bladder. This alternative assumes that the dams must remain in place to provide a specific function. Three of the four dams have no current purpose. All dams considered within the scope of this document were once utilized as a public water supply. However, only the Hartland Dam is currently serving this purpose. Leaving a dam upstream from the Hartland Dam (moveable or otherwise) serves no useful purpose and does not remove the liability associated with these structures. Implementing this concept on the Hartland dam would be extremely expensive and complex and the feasibility is questionable. This alternative would also require additional operation and maintenance expense not currently incurred; and does not satisfy the aquatic restoration goal nor relieve the CWB of liability associated with in-stream structures. This alternative has been removed from further consideration.

   See Gannet Fleming Report entitled Gannett Fleming Inc.; Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam and West Milford Dam on the West Fork River; September 2003.

10. **Divesting Ownership** – Divestiture involves selling the dams and the surrounding property to interested parties who might include the State of West Virginia, local governing bodies such as the Town of West Milford, or real estate developers. It is noted that the Board has had recent success in a similar venture with Buffalo Creek Dam. According to published newspaper accounts, the Board was able to sell the dam with the stipulation that the new owner would be responsible for obtaining a Certificate of Approval from WV Department of Environmental Protection (WVDEP) Water Engineering Section. It is recommended that a similar stipulation be attached to any sale of the West Fork River dams. Divestiture appears to be the least costly method to reduce the Board's potential liability associated with owning and operating any of the West Fork River Dams that do not contribute to their water supply system. Maintenance of the dams and public safety at the dams would become the responsibility of the new dam owner(s). This alternative may satisfy the purpose of eliminating the liability from the Clarksburg Water Board. However, there is question as to whether judicial scrutiny would completely absolve the CWB of liability depending on the litigative circumstances. At best, it would shift liability to other entities, but not eliminate it. This is certainly the most economical and cost effective alternative. However, it does not achieve the goals of restoration of the aquatic corridor. Therefore, this option is available, yet not under consideration at this time. It will be revisited should the need or opportunity arise.

11. **Conversion of Dams to Generate Hydroelectric Power** – This alternative was suggested by a member of the public during the scoping meeting and again in writing during the comment period. Low head hydroelectric plants are power plants which utilize heads of only a few meters or less. Power generators of this type may utilize a low dam or weir to channel water, or no dam and simply use the "run of the river". Run-of-the-river generating stations cannot store water, thus their electric output varies with seasonal flows of water in a river. One of the keys to the usefulness of such units is their ability to generate power near where it is needed, reducing the power inevitably lost during transmission. Another important factor to the usefulness of these facilities is how much electricity can be produced and how much it will cost to produce that energy. The amount of electricity produced depends on head, discharge, time of available flow and efficiency. The cost of a Federal Energy Regulatory Commission (FERC) license, upgrading the dams to FERC standards, equipment such as turbines and many other considerations will significantly affect the cost.

    The CWB is not in the business of providing or generating power. Therefore, the dams would need to change ownership (or at least convey the rights to modify the dam to generate power) to an individual or firm willing to maintain and operate a hydroelectric facility. It should be noted that all of the dams are at or nearing the end of their life expectancy. Therefore, a complete feasibility study would need to be performed to determine cost benefit ratios, feasibility of upgrading the dams to current WVDEP and FERC specifications, modifying the dams to generate power, maintaining the dams and installing power components and enforcing security around the dams. In addition, there would need to be a determination based on demand in the immediate areas of the structures for electricity. The new owners will require additional trained staff to operate and maintain the dams and any subsequent facilities. Substations and facilitating structures would need to be constructed for delivery of generated power including new transmission lines for power transfer onto the power grid. Flows within the river as maintained by Stonewall Jackson Lake may or may not provide the needed flow requirements to provide enough power to offset the costs of these modifications. A complete hydrologic analysis with respect to hydroelectric production would need to be performed to determine this. Such a feasibility study is beyond the environmental scope of this document. Liability for the new owners would continue (and possibly be increased) as the dams and any additional structures will remain in the river.

    In addition, this alternative provides no improvement to aquatic life passage unless it is eventually required as mitigation for a FERC license. There is greater potential for fish impingement and mortality from the installation of turbines. Although this alternative would provide a useful purpose for the dams, it would not achieve the purpose or need as outlined in this document. This alternative does not satisfy the aquatic restoration component of the project; and unless ownership is changed, it also does not satisfy the liability aspect of the purpose and need statement. In lieu of a complete hydroelectric feasibility study this alternative has been removed from further consideration.

RATIONALE FOR RECOMMENDED ALTERNATIVE

Alternative number 4 from the above list, **Dam Removal/Modification**, best meets the two goals of this project – habitat/aquatic restoration, the ecological integrity and reduction in liability for the CWB. No other alternative meets these goals as efficiently and effectively as this option.

EFFECTS OF RECOMMENDED ALTERNATIVE

The effects of removing three obsolete low-head water supply dams and modifying the Hartland Dam for aquatic life passage will be fully described in this section. Based on extensive experience with similar projects throughout the country, the effects of dam removals are predictable. Pre-dam hydrology and stream morphology will be restored to the greatest extent possible. The impacts on resources of concern identified in the scoping process will be described below. These effects will be compared to the No Action alternative.

6.1 Aesthetics

Existing Conditions – Parts of The West Fork River winds through rural land, small communities and the City of Clarksburg. Much of the River parallels the Harrison County Rail Trail, adding a water feature to the landscape and recreational experience to trail users. Some areas of the river exhibit characteristics of a natural flowing stream. Water quality is relatively good, adding to the aesthetic appeal of the river. Litter is largely confined to gathering spots near the impoundments. Warning signs and in-stream buoys have been installed at all four impoundments in an attempt to reduce the public safety hazard. These signs may detract from the natural beauty of the stream.

The flow of the river is a series of large, long pools with little break in the natural flow that rivers typically exhibit in West Virginia. Even flat, highly sinuous streams have a complex of natural riffles and pools that gradually flow from one into another. The West Fork's natural complex has been modified into a series of pools where the pool from one dam starts the next long pool begins and very few unaffected reaches remaining in-between the pools.

While aesthetics are subjective, it should be noted that long pools are visually pleasing to some individuals. It has been suggested that the presence of dams may even appear as waterfalls to some individuals.

No Action - If this alternative is selected there will be no change in the current aesthetics of the sites.

Dam Removal/Modification Alternative– This alternative will remove three of the four dams. Aesthetics are often very difficult to quantify and differentiate. While the aesthetics of flowing verses still water may be subjective, and based solely on the opinion of the observer, the change in the quality of the scenery and subsequent appeal will only slightly vary from one group to another. At these locations, the West Fork River will revert back to a free-flowing stream. Aesthetics associated with free-flowing rivers will be restored. Warning signs will be removed, improving the visual qualities in the vicinity of the former impounded sites.

Current signage and buoys at the Two-Lick dam site near Clarksburg.

There is a possibility of hidden debris becoming visible along the edges and inside the lowered pool behind each dam. During deconstruction every attempt will be made to remove any large visible debris and restore the areas around the dams to as natural a state as feasible. Debris that is removed will be disposed of properly.

6.2 Biological Environment

Existing Conditions - The existing condition of the river segments behind the dams reflects those conditions found in lentic (pond-like) situations and is therefore not conducive to a lotic (river-like) condition. Because nutrients and organic matter have longer retention times in impoundments, as well as increased sunlight and higher

temperatures, algae and aquatic plants tend to flourish. If large numbers of fish and aquatic invertebrates are not present and flows are not frequently sufficient to sustain movement or flush the impoundments these pools have the potential to become eutrophic.

The slower moving water behind the dams allows most plants to grow easily, without the need to be strongly rooted. At some times of the year aquatic plants found in these impoundments are even free floating. The construction of dams eliminates the riverine types of plants and invertebrates, especially insects and mussels, replacing them with those commonly found in lakes and ponds. (Refer to the section entitled Threatened and Endangered, Rare and Declining Species).

The types and abundance of fish found behind dams depends on the characteristics of water found in the impoundments. The West Fork River in its natural condition is a moving stream with currents that are not overly swift, yet will form areas of riffle and pool complexes. The tailwater areas below each dam provide a combination of both deep and shallow areas that support most species of fish found in the West Fork.

Different types of fish prefer different temperatures of water, especially for spawning. Within the West Fork River, this area is natural habitat for many species of fish with currents and temperatures conducive to warm-water species for foraging and spawning. Many native fish species have very narrow ranges of water temperature at which spawning occurs. Because these dams have warmer temperatures behind them, warm-water species tend to dominate within the impoundments.

Under times of high flow conditions, the dams become inundated and some degree of fish movement may occur. Many fish seek refuge in calm areas during high flows and movement is limited until more normal flows resume. However, this inundation is highly unpredictable. Thus, the dam still is an impediment to fish movement and dispersal to locally migrant fish. Restriction of free movement is detrimental to populations in many ways. Genetic diversity is limited and restricted due to the barriers imposed by the dams. Habitat competition is intensified by this restriction.

The WVDNR has periodically surveyed the fisheries in the West Fork River for various reasons. This data has been sampled from at least 21 locations along the mainstem of the river. These samples occurred sporadically from 1949 through 2002. The samples occur upstream of the current location of the Stonewall Jackson Dam as well as up and downstream of the four low head dams encompassing Lewis and Harrison counties. These samples were taken using different methodologies including: parallel wire shocking, boat shocking, rotenone, nets and seines. Refer to Appendix IV for more details concerning this data.

The sampling data over this period shows that there are at least: seven (7) species of darters, fourteen (14) species of game fish, sixteen (16) species of minnows, seven (7) species of suckers and nine (9) other various fish species. These include two critically imperiled (S2) species and two species listed as vulnerable. Notations within the fish survey data, suggest that the benthic organisms consist of a wide range of orders including *Decopoda, Diptera* and *Plecoptera* listed as “abundant”; while *Ephemeroptera* and *Trichoptera* were listed as “few”.

No Action – If this alternative is selected fishing and the character of the fishery will remain unchanged. Diversity of the river is very good as it currently exists. However, fish and aquatic life movement patterns will also remain unchanged and species that exist below and above the dam will still have limited dispersal opportunities. The impoundments will remain unchanged barriers to aquatic movement with limited connectivity of the aquatic corridor. River thermal regimes will not be reflective of the fishery that was native to this system and historically existed. Mussels and the host fish species may not have opportunities to expand.

Dam Removal/Modification Alternative – The removal of the dams will fully reconnect the upstream and downstream river lengths, significantly expanding the area and quality fisheries habitat. While the presence of additional dams upstream or downstream may limit the extent of restoration to some degree, removal of the existing dams will still provide multiple positive biological benefits to a large segment of this river.

If this alternative is selected, a return to a more free flowing system will be achieved. Sections of the river should contain a more diverse composition of phytoplankton and therefore support stronger rooted aquatic plants that are not uprooted by the flow of water. Aquatic invertebrates, such as insects and crustaceans will feed on those

phytoplankton and plants; the composition of which will be more representative of the fishery that once existed in the West Fork.

Free-flowing sections of most rivers tend to be cooler than impounded sections. Therefore, free-flowing sections may support a variety of fish species desiring differing temperature regimes along a given segment. Through natural seasonal fish movement, segments of a river may support fish preferring all ranges of temperatures at different times of the year or at various stages of development. These different habitats are needed for optimal spawning, rearing, feeding or other factors. It is true that not all currently existing fish species will benefit from dam removal. Some species that prefer deep lentic conditions may have diminished habitat opportunities; yet will not be extirpated by removal. Figure 2 illustrates the amount of upstream and downstream passage allowed by removing barriers associated with the CWB dams. Note that the definition of a barrier within the context of this computer model is not defined by the USFWS. Therefore not all obstructions may be listed or classified as barriers by the definition of the USFWS.

Table 5 represents some expected impacts to the habitat of representative game fish that currently exist in the West Fork River. None of these species of fish currently depend on the dams for their continued existence, life cycle or reproductive cycle; nor will these species become locally extirpated by the dam removal alternative.

Benthic community structure and ecosystem processes are likely to respond to dam removal in either a complete (categorical effect) or a gradual manner depending on the type of organism examined and the relationship between sizes of the dam and river (Casper, A.F. 2006). A major impact of any dam removal is the shift from a deeper, impoundment to a shallower lotic environment. This decrease in water level and increase in habitat complexity will not only alter the habitat, but may lead to changes to the type of primary production which ultimately provides fuel for riverine food webs. Thus a shift may strongly influence benthic invertebrates and the food chain dependent on them. Unfortunately, the literature on the effects of dam removal has focused on either changes in the alluvial geomorphology or effects to fish species with less mention of impacts on lower food web components (Casper, A.F., et al. 2006). Since many other external factors affect and influence populations of benthics and macroinvertebrates, it is highly variable how individual species will respond to dam removal. The types and abundances of macroinvertebrates and benthic communities will depend on the species and the lifecycle requirements of that species. In the case of the West Fork River, removal is not expected to cause significant change to prevalence, abundance or total loss of important communities.

Although dam removal is preferred for aquatic restoration, it is not always a feasible alternative. Biological connections above and below a dam can be improved while still retaining the dam. Fish passage will be installed at the Hartland Dam to aid the upstream and downstream movement of fish. This may enable some fish species to access natural habitats that were once not available. However, successful fish passage will vary depending on many factors including, species, flow, design and placement. The CWB will be responsible for maintaining any fish passage structure implemented on the Hartland Dam.

Figure 2. US Fish and Wildlife Service Fish Passage Decision Support System Results

LEGEND			
UNREMOVED BARRIER		REACH OPENED FOR BOTH UPSTREAM AND DOWNSTREAM PASSAGE	
REACH OF STREAM OPENED FOR UPSTREAM PASSAGE		REACH OF STREAM OPENED FOR DOWNSTREAM PASSAGE	
METRIC		**KM**	**MILES**
Total length of stream & tributaries opened for upstream passage		557.55	346.46
Total length of stream & tributaries opened for downstream passage		995.07	618.34
TOTAL LENGTH OF STREAM & TRIBUTARIES AFFECTED		**1,552.62**	**964.80**

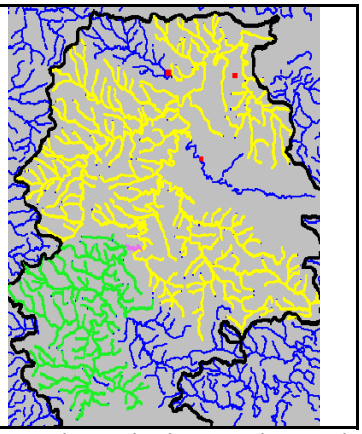


Figure 2. *The map above was created by removing barriers at Clarksburg, WV by allowing fish passage at the Hartland Dam and removal of the other three low-head dams. Source: USFWS, Fish Passage Decision Support System for HUC 05020002.*

Table 5. Summary of Effects to Representative Fish Habitat in Immediate Vicinity of Removed Dams

Game Fish Common Name	Local Migrant	Typical Stream Type Preference	Habitat Type Preference *		Dam Removal Option Impact to Habitat	Comments
			Juvenile	Adult		
Bass, Largemouth	NO	Low gradient sand/silt substrate	Deep pool sand or gravel bottom	Deep pool sand or gravel debris-littered bottom	↓ Significant decrease in habitat	Elimination of pond-like habitat immediately surrounding dam sites may result in loss of some deep water habitat
Bass, Rock	NO	Clear, low turbidity, rocky bottom	Shallow areas and gravel shoals	Moderate gradient pools. Small, cool, weedy lakes or littoral regions of lakes	↗ Slight increase in habitat	Slight increase in riffle pool complexes surrounding dam sites and formation of complexes upon reformation of channel. Especially juvenile habitat
Bass, Smallmouth	YES	Clear, low turbidity, rocky bottom w/ abundant cover	Shallow areas and gravel shoals	Pools with access to riffle pool complexes	↑ Significant increase in habitat	Increase in riffle pool complexes surrounding dam sites and formation of complexes upon reformation of channel
Bass, Spotted	YES	Medium rivers, moderate gradient; moderate size substrate; also clear, low gradient sections of rivers with gravel substrate	Near shore; usually in schools in backwater or coves near cover	Pool dweller in streams; adults mostly in deeper water	↘ Slight decrease in habitat	Elimination of habitat immediately surrounding dam sites may result in some loss of deep water habitat for adults
Bluegill	NO	Sluggish warm streams; tolerates both clear and turbid water	Shallow pools often on fine gravel or sandy silt near cover in shallow water	Pools	↓ Significant decrease in habitat	Elimination of pond-like habitat immediately surrounding dam sites may result in some loss of deep water habitat
Catfish, Channel	YES	Medium river, moderate gradient clear, rapidly flowing, firm-bottomed ones to turbid, mud-bottomed ones; avoids upland streams	Young-of-year live fulltime in riffles	Pools or under log jams or cut banks by day, move into riffles at night	→ No significant increase or decrease in habitat	-----
Crappie, Black	NO	Medium river pools. Most abundant in clear river backwaters; usually associated with large beds of aquatic plants and sandy to mucky bottoms	Shallow water (1 m depth) with submerged aquatic plant beds	Deep pools, slower moving water	↘ Slight decrease in habitat	More abundant juvenile habitat in areas surrounding dams is offset by loss of adult habitat and return to riffle-pool complex system.
Drum, Freshwater	NO	Prefers large to medium silty rivers but occur in wide variety of habitats	Eggs float at surface;; Eggs hatch in 1-2 days	Usually found in open water over mud bottom. Spawns in open water	↑ Significant increase in habitat	Range is anticipated to extend with addition of aquatic life passage structure
Muskellunge	YES	Low gradient, medium river, pools with abundant vegetation often in large lakes with deep and shallow basins	Shallow water (1 m depth) with access to deeper water	Both deep and shallow pools and tributary streams; solitary	→ No significant increase or decrease in habitat	May migrate up to at least 40 km between spawning areas and non-spawning areas; seasonal changes in habitat
Sauger	YES	Medium river, moderate gradient, pool; sand and gravel runs, sandy and muddy pools and backwaters, of small to large rivers	In rivers, spawns in deep rocky runs	Typical of large, cool or warm, often turbid, slow-flowing rivers	↗ Slight increase in habitat	More spawning and migrant habitat opportunities will be available
Walleye	YES	Pools, backwaters, and runs of medium to large rivers; Greatest population densities under moderately turbid conditions	Eggs are broadcast and abandoned, may drift great distances; bottom dwellers	Slower moving water. Often in beds of aquatic vegetation, found near cover by day. Adults return to formerly used habitats	↗ Slight increase in habitat	May migrate as much as 160 km between spawning habitat and non-spawning habitat Summer wanderings are usually limited to 3-5 miles but occasionally move much farther

*Generalized habitat descriptions for juveniles and adults

Source: WVDNR and NatureServe Database

6.3 Cultural Resources

Existing Conditions - Cultural Resources, as used by NRCS, are considered equivalent to "historic properties" as defined by the National Historic Preservation Act (NHPA, 16 U.S.C. Sec. 470 et seq.) and regulations for compliance with Section 106 of the NHPA (36 CFR Part 800). They include any prehistoric or historic district, site, building, structure or object listed in or eligible for listing in the National Register of Historic Places (NRHP). They also include all records, artifacts and physical remains associated with the NRHP eligible historic properties.

No Action – If the "No-Action" alternative is selected there would be no impact to any historical properties within the project area. There will be no need to document or register these structures with the State Historic Preservation Officer.

Dam Removal/Modification Alternative – There will be an impact to culturally and historically significant properties if the recommended alternative is selected.

The State Historic Protection Officer (SHPO) determined that the dams and the associated structural complexes have historic significance. The SHPO requested an historic analysis be performed to document their significance. This evaluation was performed and submitted to the SHPO on September 3, 2008. A response was provided that requested the CWB and the lead Federal agency enter into a Memorandum of Agreement (MOA) with the SHPO and Advisory Council for Historical Preservation (ACHP). The items listed in the MOA were signed and completed on April 29, 2009 to serve as documentation and remediation for removal. Signatories on the MOA are required to coordinate the implementation activities with the SHPO; and provide bound copies of historical documentation to local public libraries and one to the SHPO. No further analysis was required. See Appendix III.

At some dam removal sites, communities honor a dam's past contributions with interpretive displays and other information. Although this is not required, this could be a worthwhile endeavor. These could be established as close to the original dam site as feasible or located along existing rails-to-trails routes with descriptions of the dams alluding to their locations. This would be an opportunity to provide communities a sense of accomplishment and significance if dam removal is selected. Mitigation was accomplished for dam removal by collecting copies of historic documentation and/or photography, and providing a historic description which describe their historical significance of the dams.

6.4 Health and Public Safety

Existing Conditions - Public health and safety is threatened by the existence of low-head dams on the West Fork. This is evidenced by the drowning of three canoeists at the Hartland Dam in February, 2000 due to entrapment by the hydraulic roller effect of the Highland Dam. In addition, there are no formal portage facilities around the dams and, until recently, no warning signs to alert boaters to the existence of the dams. The dams are easily accessible by vehicle, located in remote areas away from densely populated centers and unfenced. They are also not visible from upstream. Refer to the Gannett Fleming report entitled *Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam & West Milford Dam on the West Fork River, September 2003*; #3 Assessment of Public Safety and Liability.

A formal inspection of the West Milford dams was completed by Gannett Fleming in September 2003 and the Highland Dam was inspected in May 2007. Since these dams are considered low-head dams with low hazard classes, they have not been required to be inspected by the WVDEP. Requests to modify these dams with rock prompted inspection by the CWB for Hartland and Two-Lick. A summary of these reports is listed in Table 6.

Table 6. Summary of Public Safety Observations of CWB Dams

OBSERVATION		HARTLAND DAM	TWO-LICK DAM	HIGHLAND DAM	WEST MILFORD DAM
Potential For Hydraulic Roller at Downstream Face of Dam		YES (Downstream face modified to reduce effect)	YES (Downstream face modified to reduce effect)	YES Previous drowning incident	YES
Strong Unpredictable Currents Above and Below the Dam		Observed at toe and crest of dam	Observed at toe and crest of dam	Observed at toe and crest of dam	Observed at toe and crest of dam
Strainers or Excessive Seepage		None observed	None observed	None observed	Upstream floating debris
Slippery Surfaces		Left abutment covered in vegetation	None observed	None observed	None observed
Open Spillway not Visible From Above the Dam		Piers mark spillway crest	Not Visible	Not Visible	Not Visible
Submerged Hazards		None observed	None observed	None observed	None observed
Warning Signs And Buoys					
a.	**Signs Upstream of Dam**	Small Signs; Upgraded 2007	Small Signs; Upgraded 2007	Small Signs; Upgraded 2007	------ Upgraded 2007
b.	**Signs at Dam Abutments**	None 2003 Upgraded 2007 & 2009	None 2003 Upgraded 2007	None 2003 Upgraded 2007	None 2003 Upgraded 2007
c.	**Signs Downstream of Dam**	Small Signs 2003 Upgraded 2007	Small Signs 2003 Upgraded 2007	Small Signs 2003 Upgraded 2007	------ Upgraded 2007
d.	**Signs at Bridges**	None	None	None	None
e.	**Buoys**	None 2003 Upgraded 2007	None 2003 Upgraded 2007	None 2003 Upgraded 2007	None 2003 Upgraded 2007
Public Access & Fencing		Chain link fence at one abutment; Modified 2009	None observed	None observed	None observed
Damage from Dam Failure		Minor	Minor	Minor	Minor

After Gannett Fleming; *Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam, and West Milford Dam on the West Fork River*. Gannett Fleming, September 2003.

No Action – This alternative will perpetuate the health and safety hazards associated with the low-head dams and those outlined in the Table 6 will continue to deteriorate.

Dam Removal/Modification Alternative - The recommended alternative will remove three of the four dams, thereby removing the health and safety concern to boaters and other recreationists at these locations. At the Hartland Dam, the hydraulic roller effect has been eliminated with the placement of rock along the downstream face. Additionally, signs now warn boaters of the dam.

There are very few insurance carriers willing to write policies for dam coverage. As of June 2007, the CWB incurs approximately $137,000 in annual insurance premiums for liability coverage of the dams. The cost of annual insurance premiums over a five year period exceeds the estimated cost of dam removal and modification for aquatic life passage.

At the Hartland Dam, signage will need to remain in place. Additional signage may need to be installed with the additional of the aquatic life passage structure depending upon the design and placement of the structure. The design should incorporate and account for fishing access, recreational boating and other incidental use to minimize hazards.

6.5 Hydrology

Existing Conditions– The landuse adjacent to the floodplain is mostly rural (forestry, agriculture and mine lands). There are also some scattered urban and suburban settings. Dams do not affect the adjacent landuses within the floodplain in any discernable way. (Refer to recreation, riparian areas and/or aesthetics sections). Existing floodplain maps are included in this document in Appendix VI.

Table 7. Flood Stages and Historic Crests of the West Fork River

Flood Categories (ft.)					
	Major Flood Stage		19 ft		
	Moderate Flood Stage		17 ft		
	Flood Stage		14 ft		
	Action Stage		11 ft		
Rank	**Historical Crests (ft)**	**Date**	**Rank**	**Low Water Records (ft)**	**Date**
1	27.60 ft	11/05/1985	1	0 ft	10/02/1988
2	22.00 ft	03/07/1967	2	0.2 ft	01/01/1987
3	18.30 ft	12/09/1972			
3	18.30 ft	06/25/1950			

Source USGS 2008

Flood Stages of the West Fork River are shown in Table 7. Historical records indicate the record high and low flows of the West Fork River are also shown. Note that all historical flows (high and low) occurred previous to the fully operational Stonewall Jackson Dam. The CWB owned dams were in place during this timeframe and did not exacerbate nor prevent any known additional flooding subsequent to the events.

The dams discussed within this document were not constructed for flood protection or flood control. They do not provide flood storage; rather, the amount of water flowing into the impoundment is the same as the amount flowing out (run-of the-river). These structures are classified by the WVDEP Office of Dam Safety as "low" hazard dams, providing no flood protection. The WVDEP defines the hazard class "low" as:

> *"… those dams located in rural or agricultural areas where failure may cause minor damage to non-residential and normally unoccupied buildings, or rural or agricultural land. Failure would cause only a loss of the dam itself and a loss of property use, such as use of related roads, with little additional damage to adjacent property. The potential for loss of human life resulting from failure of a dam must be unlikely."*

No Action – There will be no changes to the current hydrology of the river. Stonewall Jackson Lake controls the flow of the West Fork River and will continue to regulate the level of flow. The floodplain or the landuse adjacent to the floodplain will remain unchanged. If this alternative is selected there will be no foreseeable change in flooding conditions or immediate change in hazard classification. However, inspections and maintenance will be required in the future in order to retain the low hazard classification of these dams. It is likely that since the dams are approaching their life expectancy (approximately 100 years old) these dams will require considerable maintenance to keep them serviceable or be left to the erosive forces of the river.

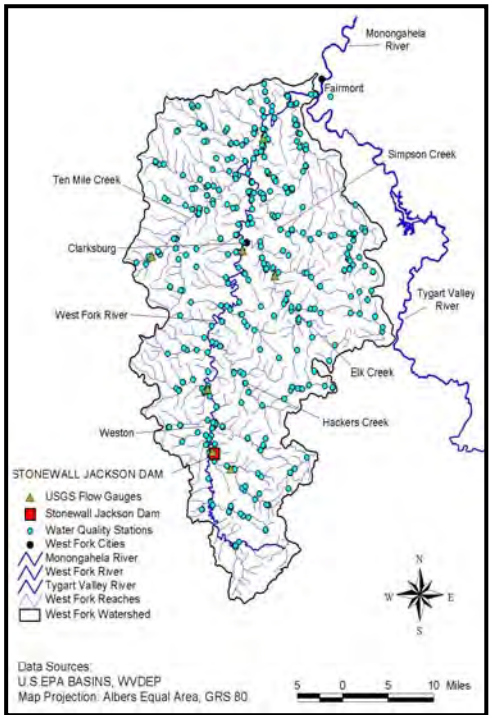


Figure 3. Locations of USGS flow and water quality gauges within the West Fork watershed. *Source WVDEP.*

Dam Removal/Modification Alternative – There will be no changes to the floodplain or the landuse adjacent to the floodplain. If this alternative is selected, there will be no need to maintain three of the four dams and therefore any further monitoring or inspection by the WVDEP. There is no need to require alteration of floodplain maps.

There will not be a change to the discharge of the West Fork River. All of the dams proposed for removal are run-of the-river dams; meaning that the dams have as much outflow as inflow at all times. Removing the dams will not alter the quantity of water flowing in the river at any given time. The discharge in the river is greatly influenced by the USACE out of Stonewall Jackson Lake and no alteration of that discharge is planned. However, the elevation of the water at normal flows will decrease especially where the pools behind the dams once existed.

There are ten (10) U.S. Geological Survey (USGS) flow gauges in the West Fork watershed. Flow data from these USGS gauges were used to support and verify the flow analysis for the watershed. Table 8 shows the ten flow gauging stations with available records of flow data and the corresponding period of record for each. Note that two stations have two periods of record which have been listed as separate datasets, increasing the number of datasets to 12. These stations were used to characterize the stream flow in the watershed. Additional stream flow data was provided by the U.S. Army Corps of Engineers (USACE) for station 03058000 after 1985. Figure 3 shows the location of these gauges in the West Fork watershed. (*Source WVDEP 2002*)

Table 8. Flow Analysis for the West Fork Watershed

Stream Station	Name	Start Date	End Date	Minimum (cfs)	Average (cfs)	Maximum (cfs)
3057300	West Fork River at Walkersville	10/02/1997	9/30/1998	8.0	65.0	506.0
3057500	Skin Creek near Brownsville	10/02/1945	9/30/1960	0.0	41.0	1,160.0
3058000	West Fork River	8/01/1946	3/28/1985	25.0	190.0	1,450.0
3058000_a	West Fork River	1/01/1970	7/2/1973	4 0.0	187.0	3,530.0
3058006	West Fork River at Bendale	10/02/1984	12/30/1989	0.0	166.0	9,040.0
3058500	West Fork River at Butcherville	10/02/1925	12/13/1953	0.0	301.0	14,200.0
3058975	West Fork River near Mount Clare	4/17/1987	9/30/1998	7.0	587.0	9,780.0
3059000	West Fork River at Clarksburg	3/04/1923	5/26/1933	0.0	599.0	10,700.0
3059500	Elk Creek at Quiet Dell	10/02/1943	1/05/1960	0.2	124.0	4,860.0
3060500	Salem Fork at Salem	1/02/1951	7/05/1958	0.0	12.0	570.0
30610001	West Fork River at Enterprise	10/02/1984	9/30/1998	14.0	237.0	37,900.0
3061000_a	West Fork River at Enterprise	10/24/1932	9/301983	4.0	1,160.0	33,300.0

Source: USGS Water Resources Division. After WVD*EP- Metals and pH TMDLs for the West Fork River Watershed September 2002.*
Note: "_a" implies the same station but has a different period of record.

USACE and USGS flow data for the West Fork River from 1991 - 2007 were examined. The actual daily outflow from Stonewall Jackson Lake released by the USACE was plotted against the planned flow curve for each year. This curve shows the minimum (55) and maximum flow (117) in cubic feet per second (cfs) planned at the Clarksburg, WV gauge station. The planned release is increased during the summer months and reduced during the spring and fall. The Clarksburg, WV gauge station no longer functions so actual flows were measured 14 miles upstream at the Mt. Clare station (# 03058975) directly above the Two-Lick Dam site. Analysis of this data shows that flows are consistently well above the minimum flow planned at Clarksburg. In addition, flows do not cease after entering the dam impoundments even in the lowest of flows. Table 9 illustrates the annual minimum and maximum flows as regulated by the USACE. Appendix VII shows this information in graph form and two example years of flows.

Additional stream flow data was provided by the USACE at the Stonewall Jackson Dam. USACE manages Stonewall Jackson Lake Project, which is part of the flood control system operated by them for the Monongahela and Upper Ohio River basins. For reference, this included discharge data from the 1920's. This data was examined to determine discharges prior to the construction of the Stonewall Jackson Dam. As expected, the data suggested much higher and unpredictable discharges at a more frequent rate than post-construction. An example of the data from 1923 and 1925 is included in Appendix VII.

Drought periods are not likely to be a concern as flow is regulated by the Stonewall Jackson Lake Dam. During periods of low flows over the last seventeen years the minimum mean daily discharge measured was 33 cfs in 1997. This translates to approximately 8 feet of stage measured at the Mt. Clare gauging station. Even in the driest years during this period (1999) the minimum mean daily average discharge was 57 cfs at Mount Clare (8.2 ft of stage).

Table 9. Flow Analysis of Stonewall Jackson Dam Discharge vs. Actual West Fork Discharge 1991 - 2007

Year	USACE Minimum Daily Mean Discharge for Year (ft^3/s)	USACE Peak Daily Mean Discharge for Year (ft^3/s)	USACE Mean Discharge for Year (ft^3/s)	USACE Mean Discharge for Year (stage in ft.)	USGS Actual Mean Minimum Discharge (at Mt. Clare) (ft^3/s)	USGS Actual Mean Peak Discharge for Year (at Mt. Clare) (ft^3/s)
1991	24	1,330	216	9.0	69	7,820
1992	7	791	178	8.9	88	4,640
1993	25	824	167	8.9	57	7,060
1994	26	**1,653**	264	9.2	48	**11,600**
1995	30	1,460	159	8.9	63	6,000
1996	49	1,604	295	9.3	116	10,000
1997	20	948	159	8.9	**33**	8,290
1998	9	1,157	183	9.0	71	9,530
1999	15	1,337	120	8.7	57	4,300
2000	23	1,219	162	8.9	66	10,700
2001	16	1,302	128	8.8	63	6,040
2002	16	1,201	151	8.9	83	7,190
2003	**5**	1,256	280	9.2	125	10,300
2004	15	1,371	225	9.1	87*	10,900
2005	26	1,047	178	8.9	Not Available	Not Available
2006	24	1,051	146	8.8	Not Available	Not Available
2007	23	1,326	166	8.9	Not Available	Not Available
Average	**21**	**1,228**	**187**	**9.0**	**73***	**8,169***

USACE discharge from Stonewall Jackson Lake. Figures in **red** indicate minimum and maximum releases over the period examined. A graph of this information is available in Appendix VII. ***** Indicates partial data only
Source: Data provided by USGS and USACE

As part of this environmental analysis, the downstream hydrology was assessed. This assessment included evaluation of current hydraulics and expected hydraulics upon removal. Short-term (during the actual dam removal and a few days after) and long-term (permanent hydraulic change) have been evaluated. Since these provide no flood storage or protection, the dam removal will not increase the horizontal or vertical extent of any flooding downstream.

Water storage behind the dams is characterized by long pools extending up to 3.4 miles behind the dams. This was determined by measuring distances between topographic contours based on the crest elevation of each dam proposed for removal (refer to table 10). Using twenty foot contours the valley slope of the river is approximately 0.004% over the length of the river containing the dams.

Table 10. Extent of Pools Behind Dams Proposed for Removal

Dam	Crest Elevation	Stream Distance to Next Dam	River Distance Between Contours	River Distance to Upstream Contour	Approximate Pool Length (linear feet)
Two-Lick Dam	939.0 ft	30,991 ft (Highland)	45,686 ft (920-940 contour)	15,013 ft (940 contour)	**12,729 ft**
					2.41 miles
Highland Dam	951.2 ft	23, 568 ft (West Milford)	53,529 ft (940-960 contour)	37,551 ft (960 contour)	**13,998 ft**
					2.65 miles
West Milford Dam	961.5 ft	N/A	53,529 ft (940-960 contour)	13,983 ft (960 contour)	**17,998 ft**
					3.41 miles

Source: USGS Topographic Maps (various quads)

Photos showing riffle morphology in two reaches of the West Fork River that are relatively undisturbed by the existing series of impoundments.

Upon removal, pools immediately behind the dams will drop the entire height of the dam while the headwaters of the pool will drop almost imperceptibly. The water levels will drop an average of one-half the dam's height from the dam to the approximate upstream midpoint of the pool and return to their natural flowing state of a riffle-pool complex. The appearance of the natural state can be observed by looking at undisturbed reaches upstream of the pools and immediately below the existing dams. Within the subject reach of the West Fork River, undisturbed reaches are difficult to locate.

6.6 Invasive and Exotic Species

Existing Conditions – As a result of Executive Order 13112, federal agencies are required to prevent further introduction and/or spread of invasive introduced and/or exotic species.

Dams are major obstacles to the movement of fish and other aquatic organisms, either upstream or downstream. Although the free movement of fish is necessary to sustain a healthy fishery, a dam may also be a barrier to the

movement of unwanted invasive or exotic species. Dams and the impoundment behind them may also act as traps for invasives and non-beneficial algae due to the restriction of normal current flow.

The US Geologic Survey (USGS) Nonindigenous Aquatic Species Database identifies four (4) invasive species that have been collected within the West Fork drainage (HUC05020002). Table 11 lists these species. Individual collection area, site specimen numbers and other information is contained in Appendix VIII.

Table 11. Invasive Species within the West Fork River Watershed

Common Name	Family	Scientific Name	Native Habitat	Exotic / Native Transplant
freshwater jellyfish	Olindiidae	*Craspedacusta sowerbyi*	Freshwater	Exotic
threadfin shad *	Clupeidae	*Dorosoma petenense*	Freshwater-Marine	Native Transplant
Asian clam	Corbiculidae	*Corbicula fluminea*	Freshwater	Exotic
purple loosestrife	Lythraceae	*Lythrum salicaria*	Freshwater	Exotic

**listed as extirpated (original record 1993)*

A. Animals – There are currently listed three (3) collected invasive animals that inhabit the West Fork drainage area.

1. The freshwater jellyfish is indigenous to the Yangtze River valley in China. Freshwater jellyfish appear in a range of aquatic habitats. They are most commonly found in shallow, very slow moving or stagnant artificial water bodies such as ponds, reservoirs, gravel pits, and quarries (USGS after Peard, 2002 et. al). It was apparently transported into the United States with ornamental aquatic plants, especially water hyacinth. Freshwater jellyfish apparently do not sting humans because their nematocysts cannot penetrate human skin (USGS after Peard, 2002). The records listed for the occurrences of this species indicate that it is not present in the West Fork River mainstem and present only in reservoirs such as Stonewall Jackson Lake. The species does not persist in flowing water.

2. The range of the threadfin shad is the Ohio River through Indiana and Illinois, and the Mississippi River, southern Illinois, south through the Mississippi River basin to the Gulf, the Atlantic Slope drainages of Florida and the Gulf drainages. This species is thought to have been introduced as a forage fish beginning in the early part of this century. Expansion of the range of this species during the past half century likely resulted from a combination of natural range extension and human introduction. It prefers lakes, ponds, rivers, reservoirs and estuaries, but does not endure cold water (7 - 14^{o}C). Spawning occurs often before one year of age over vegetation or logs in open water at 21^{o}C. One collection of this species from Stonecoal Lake appears in the database in 1993 and it is thought to no longer exist in the watershed (locally extirpated).

3. The Asian clams are filter feeders that remove particles from the water column. They can be found at the sediment surface or slightly buried. The ability to reproduce rapidly coupled with low tolerance of cold temperatures can produce wild swings in population sizes from year to year in northern water bodies. The first collection of Asian clams in the United States occurred in the State of Washington. It is known mostly as a bio-fouler of many electrical and nuclear power plants across the country. As water is drawn from rivers, streams and reservoirs for cooling purposes some of the mussels are also drawn into the system. Once inside the plant, they can clog condenser tubes, raw service water pipes, and firefighting equipment. Economic problems can result from the decreased efficiency of energy generation. Warm water effluents at these power plants make a hospitable environment for stabilizing populations. With man shown to be the primary agent of dispersal, no large-scale geographic features function as dispersal barriers (USGS after Counts 1986; Isom 1986). There are currently eight records listing the Asian clam as present within the West Fork drainage including one record for the West Fork mainstem near the town of West Milford (1980) and several other records for tributaries of the West Fork River. There are no known reports of this species presently causing harm to infrastructure along the West Fork River.

B. **Plants** - Potentially invasive species such as Japanese knotweed, multiflora rose, autumn olive, purple loosestrife, tree of heaven and various honeysuckles are currently known to inhabit most watersheds in West

Virginia. In most instances the populations are relatively static. The USGS database lists the following invasive plant species*:*

1. Purple loosestrife has one record listed as being collected in the Lake Floyd area of Harrison County. It is likely found in many more areas of the drainage due its aggressive nature and re-seeding ability. It is a wetland plant, growing in freshwater wet meadows, tidal and non-tidal marshes, river and stream banks, pond edges, reservoirs, and ditches. Purple loosestrife seeds are mostly dispersed by water, but wind and mud adhering to wildlife, livestock, vehicle tires, boats, and people serve also as agent. It was introduced into North America through ships' ballast and as an ornamental. The highly invasive nature of purple loosestrife allows it to form dense, homogeneous stands that restrict native wetland plant species, including some federally endangered orchids, and reduce habitat for waterfowl.

The dams are currently providing no beneficial anthropogenic barrier to any known plant or animal species. Thus, the dams are not presently providing any barriers to prevent the spread of these species. No other large populations of non-native or potentially harmful exotic plant or animal species are known to exist in the West Fork riverine system.

No Action – If this alternative is selected there will be no potential to change the animal and plant populations that are potentially invasive. The aquatic ecosystem will remain unaffected and any existing populations of alien invasives will remain unaffected. There will be no risk associated with disturbance and potential invasion.

Dam Removal/Modification Alternative - It is anticipated that there will be very limited amount of disturbance to the actual riparian areas surrounding the dams proposed for removal and should only involve ingress and egress of equipment. These areas should be replanted or repaired if necessary to avoid introduction, invasion or spread of invasive plants.

The closest identified invasive species within the area of the project are listed as being present in the Stonewall Jackson Lake (freshwater jellyfish) and mainstem of the West Fork River (Asian clam). The Asian clam is known in many watersheds in the State. Since the dams provide no current barrier to this species, their removal is not likely to significantly affect their populations within the watershed. The colder climate of the area may somewhat limit the expansion of significant populations in the West Fork as well (USGS, 2002). The same may be said for freshwater jellyfish in that this particular species does not thrive in a riverine system such as the West Fork River. It does however thrive in impoundments. There is no planned alteration of the impoundments where freshwater jellyfish currently exist. The threadfin shad is listed as extirpated and does not show up in any fish survey data listed in Appendix IV. Therefore none of these animals pose any significant risk of spread, increase in habitat distribution or increase in population as a result of dam removal or modification. However, it has been suggested that dam removal may somewhat inhibit the movement of zebra mussels (*Dreissena polymorpha*) due to the removal of slack water and lack of attachment opportunity (*personal communication J. Clayton, WVDNR*).

The proposed actions are not in an area where there are significant stands of exotic plant species, in areas where they are known to occur, or where there is a significant risk of invasion. However, as with any action, there is always a possibility of introduction of invasives by some unanticipated upstream source or unexpected occurrence. The removal of dams will expose some bare areas of stream banks upstream upon elimination of the impoundment pools. However, the invasive species mentioned do not exist or thrive in the normal fluctuating water conditions that would result in this scenario. The natural plant communities that reside adjacent to the newly exposed areas are likely to revegetate those areas. This revegetation process can be somewhat controlled by the timing of deconstruction. By removing impoundment levels during the growing season and avoiding the seed release of known noxious plants, it is far less likely to be re-established by invasives. Supplemental planting of desired species (woody or herbaceous) may be performed in areas that were of high visibility and/or deemed susceptible to invasion. Planting may be temporary or permanent.

The activity does not involve transportation, delivery or shipment of any plant species listed as a West Virginia Noxious Weed or a Federal Noxious Weed. In summary, disturbance near the dams and the resulting subsequent conditions is not likely to cause, promote the introduction or spread any known exotic or invasive species (plant or animal) in the riverine system or elsewhere.

6.7 Property Values

Existing Conditions – Property in the vicinity of the structures is rural residential. There are no structures attached to, or part of, the low-head dams themselves. These dams were not constructed for milling or power generation so there are no such facilities currently associated with them. Property values for homes, commercial buildings and other nearby structures are based on condition and age of structures, square footage, development trends, and other factors unrelated to the existence or non-existence of run-of-river dams. The dams do not effect flooding and therefore do not impact properties in that regard. Depending on the individual property owner's perspective, the dams can be viewed as an asset or liability. Additionally, restoring the river to a free-flowing state can be viewed differently depending on individual perspectives.

No Action - There will be no change in property values or changes to structures if this alternative is selected.

Dam Removal/Modification Alternative – There is no anticipated decrease in property values with this alternative. More likely, as indicated in extensive literature sources including Provencher 2008, Heinz 2002, University of Wisconsin 2000, etc. property values may actually increase along the restored free-flowing portions of the river. There will be an anticipated decrease in litter, vandalism, trespassing, and other human activities associated with these sites. Perceived liability or dangerous structures will be removed from consideration by others. The signs associated with three of the sites will be removed, resulting in a more attractive setting for residents who live close to the dams and enhancing property attractiveness.

There are structures on the banks of the river that have been constructed since the installation of the dams around the turn of the century. These structures are typically boat launching facilities or small docks constructed for recreational use by individual homeowners. The effect to these structures will depend upon their location relative to the dams. The closer the structures are to the tailwaters of the impoundment, the greater the effect in terms of differences in water elevations. Structures that were built close to the downstream end of the impoundment may be further away from the re-established water elevation. If a structure is located in the headwaters of one of the impoundments there would be almost no impact to the structure.

Fortunately there are relatively few structures within the pools affected. These structures appear to have been constructed with inexpensive materials and are relatively small. Extensions or modifications to these structures may have to be made depending on the design. Floating structures should not require any modifications, where quasi-permanent structures may require more extensive modifications.

Photos showing typical anchored and floating dock and pier- type structures constructed along a potentially affected reach of the West Fork River. Photos: C. Shrader

6.8 Recreation and Education

Existing Conditions – Free-flowing rivers and the impoundments behind dams offer differing recreational opportunities. The types of recreational activities offered by the impoundments behind dams and free flowing rivers are different from one another, and therefore the presence or absence of a dam will change the character of the recreational activities available at a particular site. Recreation on the West Fork River is mainly in the form of boating, hiking along adjacent trails, fishing, and sightseeing. The West Fork River supports a healthy fishery and is popular with local fisherman. The river was featured in an article in *Wonderful West Virginia* magazine in 1995 and cited as a sport fishery that is "relatively unknown and popular mainly with local anglers". Fisherman access to the river is available at the River Bend Park in Clarksburg, from the rail-trail that parallels parts of the river, and from several county roads. Local fishing spots are well known immediately below the West Milford, Highland and Two-Lick Dams. Unofficial access to all the dams has been established, but is difficult to find.

The West Fork River is a stream that is ideal for novice boaters. The river is classified as a recreationally navigable river by WVDNR, best suited to john boats and canoes. The WVDNR has invested extensively in boat launching facilities along this water body, identifying ten different sites between Worthington and Clarksburg.

The Harrison County Rail-Trail runs fourteen miles from Clarksburg, WV to Spelter, WV paralleling much of the river and providing wildlife viewing, hiking and biking opportunities. Most of the river is flanked by natural riparian areas that are relatively free of litter and urban development, enhancing the scenic attributes of the river. There is recently erected signage at the four low-head dams warning boaters and fishermen of the hazard. While this signage is necessary, it does seem to detract from the scenic beauty of the river.

Recreational trail along the West Fork River in Clarksburg, WV. Downstream of Hartland dam.

No Action - There will be no change in recreation if the "No Action" alternative is implemented. Currently local residents gather and fish below and above the dams. Some residents also utilize this stretch of the West Fork for canoeing and recreational boating. Although most local residents are aware of the dangers associated with the low head dams, non-local citizens will continue to be unknowingly exposed to those hazards. Since this stretch of river has been advertised, publicized and improved for recreation, this will continue to be a liability for the CWB.

Dam Removal/Modification Alternative - The recommended alternative will improve the recreational navigability of the river by removing three obstacles. Boaters' safety and recreational experience will improve if the river is returned to a more free-flowing state. Wildlife viewing and the scenic attributes of the river will be improved with the removal of three man-made structures and the associated signage at these sites. Boating is predicted to increase on the river as impoundments are removed, increasing the attractiveness and length of the float trip to boaters. However, the character of the river will change from that of one long continuous pool to a series of riffles and pools. This could make navigating the river more difficult for less experienced boaters.

No change in the public access to the river is anticipated as a result of this alternative. The fishing experience will change as low-head structures are removed and replaced with more natural river habitat. Three of the low-head dams will be removed and the demolition materials may be used to reconstruct habitat in the immediate vicinity of the old dams. Scour holes below the dams will revert to a more natural stream channel.

The removal of the dams will change the habitat to a more pool and riffle type of riverine system. The West Fork River will continue to support many different fish species throughout its length; though these areas may vary in size

and region of river. Because the removal of the dams may change the character of the fishery, this alternative may change the types of sport fish in the river and their abundance.

Fishing opportunities will be redistributed throughout the river segments and enhancement of natural suitable habitat will be provided. Upon restoration, the West Fork River will continue to provide canoeing and kayaking as well as other boating and excellent fishing. Currently there are no plans to alter the game fish species and stocking patterns (i.e. muskellunge) in the West Fork as a result of modification or removal activities; however, fishing opportunities will be redistributed throughout the reach. Places that were once very deep pools may be replaced with more shallow pools and vice versa. Current patterns will develop that will construct a different habitat than currently exists. In fact, the potential for improved fisheries and recreational access is greatly improved as a result of increased access to habitat and enhanced habitat if "natural stream restoration" techniques are utilized.

The West Fork River Rail Trail is a sixteen-mile rail trail (walking/biking trail) which parallels the West Fork River in places from Fairmont to Shinnston. There is the potential to utilize the trail to enhance recreation and educational opportunities; and showcase the functions of an aquatic life passage, riparian corridors, T&E species and numerous other environmental benefits. It is hopeful that recreational managers will work to maximize the potential for development of these resources upon removal of the dams. This may be accomplished through the use of attractive interpretive signs or other monuments. The aquatic passage life structure that will be installed at Hartland Dam should also be taken advantage of as an educational opportunity for local schools.

6.9 Riparian and Wetland Areas

Existing Conditions – A natural aquatic ecosystem is composed of a multitude of complex habitats, including microhabitats, riparian vegetation, floodplains, and hyporheic zones.

A hyporheic zone is the loosely-defined area of saturated sediments beneath and beside the active stream channel that contain some proportion of surface and ground water. Surface water often mixes with groundwater and therefore has no distinct boundary. This area functions to control water temperature, dissolved-solids and sediment transport, and influences near-channel flora and fauna. The plant community that is most commonly associated with this area is called the riparian area.

Riparian corridors are a result of the soils, plant communities, landscape and position, stream and aquatic resources, fish and wildlife resources and adjacent upland activities all along a given segment of stream.

The existing West Fork riparian corridor consists of mostly forested areas. These areas vary in width from several feet to many acres. A fairly healthy buffer currently exists between the West Fork River and adjacent landuses. The landuses consist of forest lands, recreation, agriculture, urban and suburban. These areas consist mostly of mature woody vegetation along the corridor from Clarksburg upstream to Stonewall Jackson Lake.

Photo of Two-Lick dam showing large woody debris on top of dam. Note also the healthy forested riparian areas along the corridors.

The existing riparian corridor is mostly in an undisturbed forested condition and exhibits good characteristics and functions throughout its length. It appears to provide large woody debris, provide good to excellent shading characteristics for temperature moderation, stabilization of the river channel and floodplain soils. The dominant tree species within the riparian corridor include American sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), river birch (*Betula nigra*), box elder (*Acer negundo*) and various oaks (*Quercus* sp.).

Within the forty mile stretch of the West Fork (measured stream distance from Clarksburg to Weston) under consideration there are undoubtedly small areas that may be classified as special aquatic sites such as vegetated mud flats or freshwater vegetated shallows, etc. Due to dam construction, the West Fork's hydrology has been altered such that some of these areas were permanently inundated or may have been periodically or permanently exposed and may be considered special aquatic sites

In addition, it is surmised that there are small areas of wetlands that have been enhanced or created as a result of artificially altering of the hyporheic zone through the construction of the dams and subsequent impoundments. These areas have not been delineated, but are likely to be randomly distributed and very small in size.

No Action – If this alternative is selected there will be no impact to the riparian corridor. Riparian vegetation will remain in place. Any wetlands that were inundated or created by artificially altering the hyporheic zone will remain unchanged.

Dam Removal/Modification Alternative– The selection of this alternative will not negatively impact the riparian corridor. The dams are situated such that substantial vegetation will not be required to be removed during deconstruction. The distribution and composition of the existing riparian corridor will not change due to implementation of this project. Muddy banks will be temporarily exposed when the pools are lowered. This zone between the existing riparian vegetation and the new water elevation will be temporary as these areas will revegetate quickly.

Enhancement of the riparian zone will occur once the impoundments have been removed and returned to a lotic condition. This can occur due to a vegetation shift along the stream corridor. Plant species dependent upon fluctuating water level will establish along the exposed bank over time. This in essence will expand the riparian corridor. If desired, supplemental planting of woody vegetation, along with natural invasion of plants will improve the quality of the riparian corridor.

It is expected that once the dams are removed and water levels return to pre-dam construction levels, areas that were originally considered special aquatic sites and were permanently inundated would become re-established. Special aquatic sites that were once covered by the impoundments would now become available again for use by shorebirds, wading birds and other species of animals dependent upon these areas.

Prediction of where adjacent wetlands may be affected is highly variable and difficult to pinpoint. There are significant variables including sediment discharge scenarios, which can be attributed to the sensitivity of erosion and transport processes to surface-water hydraulics, differences in the zone sediment characteristics and the effects of trapping/retarding sediments (Heppner and Loague 2008). Adjacent floodplain wetlands that had become enhanced or created due to alteration of the hyporheic zone would revert to pre-dam construction conditions. Inspection of the National Wetlands Inventory maps show no mapped wetland complexes that appear to be hydrologically (via surface interface) connected to the forty mile stretch under consideration.

6.10 Sediment

Existing Conditions – Sediment is important to determining the morphology of river systems. Rivers naturally evolve and change their shapes by eroding, transporting, and depositing sediment. The movement of sediment in rivers and their valleys determines the course of the river, the shape of the channel bottom, the locations of pools and riffles along the river, and the materials that make up the bed and banks of the river. One of the most important functions of rivers from a hydrological and biological standpoint is sediment transport in a watershed. In the West Fork, the area that is flooded behind the dams no longer has true river channel morphology. Instead, this part of the river has taken on the morphology of a series of impoundments. Since the dams are "run of the river" and the level of the impoundment is determined by the amount of water in the river, some sediment transport still occurs, but is severely restricted.

Heavier soil material such as sand is deposited in the headwaters of the pools while finer silt and clay suspended in the water are carried out into the impoundment and occasionally past the dams. Natural debris associated with those sediments such as large wood tends to collect behind and dams and even on them.

No Action – Sediment or turbidity will not be a long or short-term concern. Sediment deposited behind the dams is restricted yet transported to a certain degree during high water events. Therefore sediment transport functions within the riverine system will remain restricted. There will not be a need to stabilize any sediment with vegetation at the sites. Occasional debris stacking may occur that requires removal.

Dam Removal/Modification Alternative – It is likely that sediment will be exposed along riverbanks and in lowered impoundments to some degree if the dams are removed. If the dams are removed, the flow of the river will again have the energy to erode and transport sediment and is likely to erode the sediment that built up while the dam was in place (see example photo from the Baraboo River in WI). The erosion process can be minimized. After dam removal, the river channel is likely to cut down through the accumulated sediment and return to its original course. Drawing down the impoundment will expose that sediment. Depending on the time of year and type of sediments, there may be an odor of decomposing vegetation for a short period of time (typically ranging from a few days to a few weeks).

Debris and sediments left behind after draining of Oak Street Dam, Baraboo River, WI. *Photo Univ. of Wisconsin*

After dam removal, the geomorphic adjustment of the upstream channel will follow a relatively predictable sequence (Harvey and Watson 1986; Pizzuto 2002). The channel will incise through the sediment fill, and localized bank failures could occur if the channel depth increases above a critical value that depends on soil properties and channel geometry. Additional sediment injected to the stream by bank failures will be used locally to build new floodplains; and over time an equilibrium channel adjusted to the prevailing natural flow and sediment regime. The duration of this sequence is largely a function of the size and volume of sediment stored behind the dams. In the case of the West Fork River this is largely smaller sediment particles (i.e. sand, silt, non-cohesive clay). These Smaller particles that move across a wide range of flows will be readily transported and the adjustment process can occur over a relatively short time frame (Stanley et al. 2002; Doyle et al. 2003).

Post-removal downstream effects vary with respect to channel morphology, sediment composition, and ecology. Again, these effects generally scale to the height of the dam, the volume and composition of sediment stored in the former impoundment, and the geomorphic condition of the downstream channel. Further, the methods used to remove the dam affect sediment dynamics in downstream reaches. Phased approaches (as are outlined in this document) limit sediment delivery while complete breaches often cause rapid loading. The downstream channel will adjust to increased sediment load from the eroding fill inside the former reservoir and, in some cases, naturalization of the stream-flow regime. When the reservoir fill is composed of unconsolidated fines, downstream reaches usually exhibit decreases in median particle size, deposition on lateral and in-channel bars, and in some instances pool infilling (Wohl and Cenderelli 2000; Bushaw-Newton et al. 2002; Stanley et al. 2002; Doyle et al. 2003). The duration of these effects is shortened by substrate size and volume. Smaller particles such as those that appear in the West Fork system are more easily transported by lower flows; but straightforward comparisons and predictions are confounded by downstream channel geomorphic conditions, water development structures, and runoff regimes. In short, the literature shows that the response of downstream reaches to dam removal appear to be sensitive to site conditions.

In December 2008 Gannett Fleming contracted TestAmerica™ of Pittsburgh Laboratories, Inc. to determine quantity and quality of sediments behind the three dams. Sediments were scrutinized to determine if their short-term re-suspension will cause long-term detriments to water quality. In particular, the project analytical suite, identified during the proposal phase of the project, consists of the following analytes:

- Polyaromatic Chlorinated Biphenyls (PCB's)
- Metals (lead, mercury, aluminum, iron, magnesium, manganese, and zinc)
- Hexavalent Chromium
- Nitrate
- Nitrite
- Sulfate

- Chloride
- Free Cyanide

The complete report by Gannett Fleming entitled *Sediment Characterization Report Highland, West Milford and Two-Lick Dams* is available upon request from CWB. Brief summaries are described below. Additional data may be found in Appendix IX of this document.

Summary of Sediment Chemical Analysis [as per Gannett Fleming]

Rivers deposit much of their sediment when they enter an impoundment due to slowing currents. Any chemical contaminants that are present behind the dams originating from human activities may also be bound to sediments, including heavy metals, polychlorinated biphenyls (PCBs), and other organic chemicals. However, water testing analysis behind each dam has revealed that there are no potentially harmful levels of pollutants associated with any of the sediments behind the dams. As shown in the report, all analytes are below the residential soil criteria, with the exception of arsenic. The arsenic values for the samples collected range from 5.3 to 7.1 mg/kg, with an average value of 6.0 mg/kg. The deminimis concentration for residential soil for arsenic is 0.39 mg/kg. Due to the constrained range of arsenic values, the concentrations encountered in the samples collected are interpreted to represent arsenic's regional background value occurring naturally in soils/sediments. This is supported by a USGS published paper by Shacklette and Boergnen (1984) titled *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States*. This reference documents a national study of several elements, including arsenic. The reported range of arsenic values for the eastern US is <0.1 to 73 mg/kg, with an arithmetic mean of 7.4 mg/kg.

In addition, the Clarksburg Water Board regularly has sludge from their water treatment facility analyzed as a mandatory requirement by the State of West Virginia. It is logical that this sludge is analogous to the contents of the sediments contained in the West Fork River and many of the same elements discussed above are routinely analyzed to determine content. Sludge analyzed by Sturm Environmental Services on samples taken January 23, 2008 from the Clarksburg water treatment facility indicates compliance with State water quality standards. This sludge report further supports the sediment analysis findings performed by Gannett Fleming that sediments contained in the river do not contain excessive levels of pollution. A copy of the sludge analysis is found in Appendix V.

Summary of Sediment Thickness and Quantity [as per Gannett Fleming]

Sample recovery lengths (depths) ranged from 0 to 1.9 feet. However, in many cases the recovered material included 0.3 - 0.4 feet of brown sediment overlying a grey saturated silty-clay stream bed material. Sediment thickness values ranged from 0 to 1.0 feet, with a typical value of 0.3 - 0.4 feet. The sediment thickness values and their distribution are based on the data collected. The quantity of sediment present within the area samples was estimated for each dam. The report indicates that most of the actual sediment thickness values sampled are less than 0.5 feet with 0.44 feet being the highest average depth. The resulting quantities are shown in Table 12 below.

Table 12. Sediment Quantity

Location	Sediment Quantity Estimate (cubic yards)	Average Sediment Depth (feet)	Average Sediment Depth (inches)
Two-Lick Dam	416	0.24	2.8
Highland Dam	880	0.44	5.3
West Milford	599	0.31	3.7

The sampling of sediment quantities did not extend the entire length of the pools (pools were described in section 6.5 Hydrology). Due to the length of the pools this was neither practical nor feasible. Sampling indicated that sediment has been evenly dispersed and deposited throughout the length of the pool. Refer to Appendix IX for a description of sediment analysis and the sampling methodology. Spacing of the water supply dams within the West Fork has allowed flow patterns to be relatively stable throughout the river's course resulting in some sediment transport functions; thus prohibiting large areas of sediment deposition behind the dams and in headwaters of pools. In addition the Stonewall Jackson Dam has further altered the natural sediment transport mechanism of the West Fork artificially limiting the amount of naturally occurring sediment within the system. Mobilization of large

quantities of sediment is not likely nor expected to occur upon dam removal. As a result, there is no anticipated long term adverse effects to water quality, obliteration of coarse bottom substrates (mussel beds) or stream channel stability issues often associated with the release of sediment from dams.

Revegetation of Exposed Sediment

As discussed in the section 6.5 Hydrology, the water levels will drop an average of one-half the dam's height from the dam to the approximate midpoint of the pool. The pools immediately behind the dams will drop the entire height of the dam while the headwaters of the pool will drop almost imperceptibly. This will expose some areas of river bank over the affected reach. The pool areas will return to a natural free-flowing state of a riffle-pool morphology. The appearance of the natural state can be observed by looking at undisturbed reaches upstream of the pools and immediately below the existing dams.

Experience from several other states has shown that these newly exposed lands will naturally revegetate within weeks if dam deconstruction is performed during the growing season. Seeds accumulate in the rich sediment over the years and once exposed to sunlight and oxygen the plants grow very quickly.

The preferred methodology for stream channel restoration is to perform the removal in such a manner as to allow for natural stabilization and natural assimilation of any legacy sediments (i.e. slow deconstruction). However, planting vegetation may be required to stabilize the banks, reduce sedimentation, and beautify the sediments left behind when the impoundments are drained. This process also stabilizes the sediment. However, additional measures such as seeding and planting may be required to control the exposure of some bare sediment or control invasive plants. Vegetation can establish from the natural seed bank accumulated over time in the sediment, but if certain plant types are desired, the site may be seeded to those plants as discussed earlier. If necessary, temporary vegetative covers (such as perennial or annual rye grass) could be required as a "nurse crop" to prevent erosion or invasives while native species re-colonize the area.

During deconstruction, every action should be taken to avoid disturbance of sediments and avoid re-suspension unnecessarily. Upon discovery the disposal of any contaminated sediments will be performed in a manner suitable to public health and safety.

6.11 Threatened, Endangered, Rare and Declining Species

According to the National Biological Service, the decline of freshwater mussels, which began in the late 1800's, has resulted from various habitat disturbances, most significantly, modification and destruction of aquatic habitats by dams and pollution. Nearly half of the 496 animal species federally listed as threatened or endangered are freshwater species.

Existing Conditions - The West Fork River is listed as a stream that is known to have mussel populations which are established as a protected "no take" species by the State of West Virginia. Based on a review of the WVDNR Natural Heritage Database there are no known federally threatened, endangered, candidate species or species of special concern present in the immediate project areas. However, the WVDNR Natural Heritage Database, the US Fish and Wildlife Service and the NatureServe Database indicate two federally listed mussel species records in the West Fork River and two candidate species.

a) A historical record for the Northern Riffleshell (*Epioblasma torulosa rangiana*), a mussel listed as Globally Imperiled (G2T2) and Federally Threatened is listed for the West Fork River. The historical record is listed as "from the West Fork River (Ortmann, 1913), a tributary of the Monongahela River, Harrison Co., West Virginia" (Parmalee and Bogan, 1998; USFWS, 1994). It is unlikely this species still exists anywhere within the West Fork River. However, if riffleshell populations do still exist, they could be small, healthy, and reproductively active yet still be in danger of extinction if suitable habitat and host fish are not present in sufficient quantities within the range. Suitable glochideal hosts include the mottled sculpin (*Cottus bairdi*), banded darter (*Etheostoma zonale*), bluebreast darter (*Etheostoma camurum*), and even brown trout (*Salmo trutta*).

b) The clubshell mussel (*Pleurobema clava*) is present within the West Fork watershed. Historically, it was distributed across nine states. It is currently known from 12 streams in six states including Hackers Creek of the West Fork River in West Virginia. This mussel is listed as Globally Imperiled (G2) and Federally Threatened.

Existing clubshell populations are relatively small, healthy, and reproductively active; yet they still may be in danger of extirpation if all habitat conditions are not suitable including: food, predation, water quality and host fishes are not present in sufficient quantities within the range. Potential hosts include: the striped shiner (*Luxilus chrysocephalus*), blackside darter (*Percina maculata*), central stoneroller (*Campostoma anomalum*) and logperch (*Percina caprodes*).

The clubshell mussel has been found to exist in Hackers Creek. The confluence of Hackers Creek and the West Fork River is approximately 6 miles upstream from the town of West Milford and the West Milford Dam. There are also two other tributaries, Duck Creek and Lost Creek, that enter West Fork River between Hackers Creek and West Milford. These drainages are not listed as having known populations of mussels; however, the streams have the potential to provide habitat for the host species and the mollusks themselves. Appendix IV shows collection data from the West Fork River and fish host species within the river system.

Clubshell mussel (*Pleurobema clava*)
Photo Courtesy USFWS

c) The USFWS has identified the Rayed Bean (*Villosa fabalis*) as a "Candidate" species for listing in 2008. A candidate species is defined as any species being considered by the Secretary (of Commerce or Interior) for listing under the ESA as an endangered or a threatened species, but not yet the subject of a proposed rule (50 CFR 424.02). A second species, the Snuffbox (*Epioblasma triquetra*) is being proposed for immediate listing as endangered, entirely bypassing candidate status. Both species are listed as historically present within the watershed.

Mussels are among the most endangered aquatic organisms in North America, partly due to the fact that the greatest mussel diversity is found in flowing water habitats, not impoundments. The *USFWS Clubshell and Northern Riffleshell Recovery Plan* - 1994 outlines the effects of dams and impoundments on the habitat and lifecycle of these mussels. The recovery plan states that:

> ***"****Impoundment drastically changes the biotic makeup of the impounded region, as well as the area immediately downstream.* [Mussel] *species and their hosts that require oxygenated, faster-flowing water quickly are eliminated. This includes most of the presently endangered mussel species, and nearly all of those that have become extinct. Most mussel species normally occur in shallow water, not in impoundment depths. Impoundment reduces the growth and reproductive effort of mussels.*
>
> *Impoundment also leads to an increased silt load by reducing water's capacity to carry sediments. The eutrophication that often accompanies impoundment has been suggested as a major source of mortality in mussels. Changes in the fish fauna, and therefore the availability of hosts, also occur with impoundment.*
>
> *Dams represent distributional barriers to fish hosts, and therefore to the mussels themselves. The zoogeographic patterns of several species suggest a dam-limited range. Dams also act as sediment traps, often having many feet of silt and debris caught on their upstream side. These areas generally are without mussels. The tailwaters on the other hand often have dense beds. This is mistakenly believed by many to be a benefit of the dam. Actually, these beds represent the last remaining portions of the river in general prior to impoundment. The tailwaters are the only areas left that still have oxygenated, fast moving water. "*
>
> -G.T. Watters, Ohio DNR for USFWS (*USFWS Clubshell and Northern Riffleshell Recovery Plan* – 1994)

No Action – If this alternative is chosen existing mussel populations will remain static and could potentially decline due to a number of factors. This alternative would prove contrary to the efforts of conservation and recovery objectives outlined in the USFWS *Clubshell and N. Riffleshell Recovery Plan* 1994. These strategies are outlined in the Recovery Objectives 1.2 and 4.0.

Three dams would continue to act as barriers to host fish species and mussel habitat. Movement toward de-listing of the clubshell and Northern riffleshell would not occur. Re-opening of at least 40 mainstem river miles of mussel habitat would not occur. There will remain the potential of elevated listing actions for candidate species mentioned previously.

Dam Removal/Modification Alternative – This alternative could enhance populations of currently existing native, freshwater mussel species, or could contribute to the restoration of populations of mussel species that were historically known to occur in the watershed but may now be extirpated. Specifically, this project has the potential to contribute to the recovery of endangered species and other non-listed mussel species by allowing host fish infested with glochidea to be able to freely move between source populations (e.g. *P. clava* in Hackers Creek) and an expanded reach of the West Fork. Additionally, removing the dams would create more natural free-flowing conditions and would increase the amount of potentially suitable mussel habitat. This will result in the increased probability of range expansion of any existing populations of mussels in the immediate vicinity and adjacent drainages. The removal of any eutrophied areas, restoration of natural current complexes, flows to oxygenate and disperse sediments, decreased siltation mortalities, etc. will also aid in possible expansion. This alternative follows the recovery objectives and strategies outlined within the USFWS *Clubshell and N. Riffleshell Recovery Plan* 1994 mentioned above. In addition, the opportunity exists for education and information outreach to be performed due to the high visibility and proximity to recreational facilities either existing or planned. Movement toward delisting may occur.

There have been a number of surveys for freshwater mussels conducted in the watershed within recent years. However, the WVDNR and USFWS have compiled a list of species found within the West Fork River as a result of spot surveys conducted since 1980. These are listed as "*current species*". During surveys conducted in the West Fork River circa 1911-1912, Ortmann documented several other species. These are listed as "*historic species*". It would be expected that populations of current species may expand as a result of the project and historic species could potentially be restored into suitable habitat within the watershed.

Table 13 identifies twenty five (25) species of mollusks that could potentially exist in the restored reach of the West Fork River. Out of those 25 species, removal of the dams may benefit fourteen (14) state-listed rare species (56% of the total). These rare species are listed as having fewer than twenty occurrences within the State and are "extremely rare and critically imperiled" (S2 or S1). While it is doubtful whether all of these species are actually present within this reach of stream, the restoration of potential habitat is critical to recovery. Removal of the dams and restoration of the river to a more natural condition will provide suitable habitat to those species.

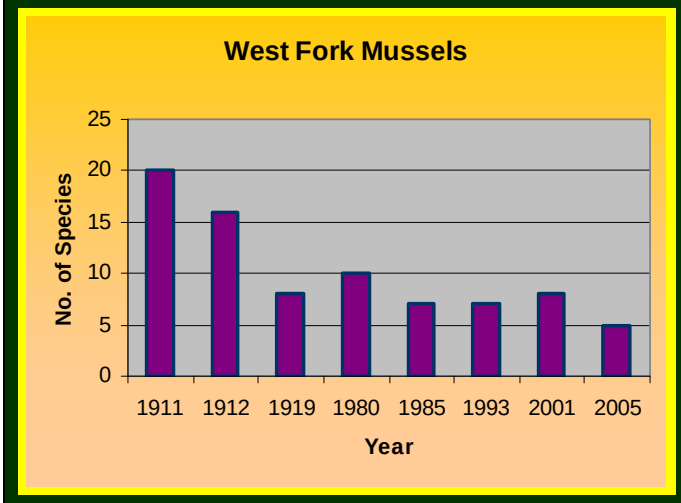
The four CWB dams were constructed during the period of 1905 – 1931. Data in Appendix IV shows that in 1911through circa 1919 there were at least twenty-three (23) different species of mussels present in four different surveys. Post-dam construction shows that in the period of 1980 – 2005 only eleven (11) species occurred over nine surveys. Using only the most recent data (2005) for two different surveys, only five (5) species are present. See the chart embedded in Table 13.

It should be noted that EI 981 (2003) near Gypsy, WV and EI 1758 (2005) near Shinnston, WV, both of which are located downstream of Hartland Dam, show no mussels. These sites are not shown on the map in Appendix IV.

The CWB must continue to work closely with the WVDNR and USFWS to determine any potential threats to existing mussel populations that are discovered during deconstruction and implement avoidance measures. Any habitat modifications necessary to achieve one or more of the recovery strategies outlined by the USFWS could possibly be implemented as additional information is obtained. Any opportunities to promote or enhance or replace mussel habitat and conditions and promote mussel population growth should be pursued.

Table 13. Mainstem West Fork Mussel Species

KNOWN CURRENT MUSSEL SPECIES				HISTORIC MUSSEL SPECIES			
Scientific Name	**Common Name**	**State Ranking**	**Global Rank**	**Scientific Name**	**Common Name**	**State Ranking**	**Global Rank**
Amblema plicata	Threeridge	S3	G5	*Alasmidonta marginata*	Elktoe	S2	G4
Elliptio dilatata	Spike	S2	G5	***Amblema plicata***	Threeridge	S3	G5
Fusconaia flava	Wabash Pigtoe	S3	G5	*Cyclonaias tuberculata*	Purple wartyback	S1	G5
Lampsilis cardium	Plain Pocketbook	S2	G5	***Elliptio dilatata***	Spike	S2	G5
Lampsilis siliquoidea	Fat mucket	S3	G5	*Epioblasma torulosa rangiana*	Northern Riffleshell	S1	G2
						ENDANGERED	
Lasmigona costata	Fluted-shell	S3	G5	*Epioblasma triquetra* #	Snuffbox	S2	G3
Obovaria subrotunda	Round Hickorynut	S3	G4	*Fusconaia subrotunda*	Long-Solid	S2	G3
Ptychobranchus fasciolaris	Kidneyshell	S3	G4	***Lampsilis cardium***	Plain Pocketbook	S2	G5
Pyganodon grandis	Giant Floater	S3	G5	*Lampsilis fasciola*	Wavy-rayed Lampmussel	S2	G4
Strophitus undulatus	Creeper	S3	G5	***Lampsilis siliquoidea***	Fat mucket	S3	G5
Utterbackia imbecillis	Paper Pondshell	S2	G5	***Lasmigona costata***	Fluted-shell	S3	G5
				Obovaria subrotunda	Round Hickorynut	S3	G4
				Pleurobema clava	Clubshell	S1	G2
						ENDANGERED	
				Pleurobema sintoxia	Round Pigtoe	S2	G4
				Ptychobranchus fasciolaris	Kidneyshell	S3	G4
				Pyganodon grandis	Giant Floater	S3	G5
				Quadrula cylindrica	Rabbitsfoot	SX	G3
				Quadrula metanevra	Monkeyface	S1	G4
				Simpsonaias ambigua	Salamander mussel	S1	G3
				Strophitus undulatus	Creeper	S3	G5
				Tritogonia verrucosa	Pistolgrip	S2	G4
				*Villosa fabalis**	Rayed Bean	SH	G1
				Villosa iris	Rainbow	S2	G5



* The USFWS has listed this species as a "Candidate" to be included in the Federal listing of species that are threatened or endangered.
\# This species is proposed for Endangered status.
Species listed in **bold** are still extant within the West Fork River – as shown in the current list. Data is courtesy of Janet Clayton, (WVDNR) Barb Douglas (USFWS) and NatureServe Database.

EXPLANATION

STATE RANK		GLOBAL RANK	
S1	Five or fewer documented occurrences or very few remaining individuals within the state. Extremely rare and critically imperiled.	**G1**	Five or fewer documented occurrences, or very few remaining individuals globally. Extremely rare and critically imperiled.
S2	Six to 20 documented occurrences, or few remaining individuals within the state. Very rare and imperiled.	**G2**	Six to 20 documented occurrences or few remaining individuals globally. Very rare and imperiled.
S3	Twenty-one to 100 documented occurrences.	**G3**	Twenty-one to 100 documented occurrences. Either very rare and local throughout its range or found locally in a restricted range.
SH	Historical. Species which have not been relocated within the last 20 years. May be rediscovered.	**G4**	Common and apparently secure globally, though it may be rare in parts of its range, especially at the periphery.
SX	State populations are presumed extirpated.	**G5**	Very common and demonstrably secure, though it may be rare in parts of its range, especially at the periphery.

6.12 Water Quality

Existing Conditions - The West Fork watershed (8-digit HUC# 05020002) contains twenty-four (24) streams consisting of over 158 miles and one lake approximately 2,650 acres. Water quality is important to the river's ability to support aquatic life, provide clean drinking water, and enable the desired recreational opportunities. Characteristics that determine water quality include temperature, dissolved oxygen, minerals, metals, nutrients, organics, pathogens and sediment. The water quality in a river system, free-flowing or impounded, greatly depends on the types of activities that people undertake within the watershed, and the methods by which those activities are carried out.

High concentrations of sediment can cause water quality problems and increase the turbidity of the water. This may be a problem for fish and other aquatic life, such as sight-feeding fish. If fish spawning beds or mussel beds are covered with sediment, populations usually suffer. Turbidity also promotes undesirable fish species, such as carp, which can tolerate lower dissolved oxygen conditions and exacerbate turbidity problems themselves by stirring up the bottom sediments.

Data obtained from the U.S. Army Corps of Engineers was provided to look at any trends of potentially harmful water quality contaminants. These were looked at to specifically identify any potential pollutants that could be stored and then reintroduced by release of sediment. Generally speaking, the overall water quality of the river is excellent. The evaluated data shows several encouraging trends including decreasing aluminum, zinc, magnesium, phosphorus and iron. Table 14 provides a summary of the water quality data and a general trend as suggested by that data over a specified time period. Due to gaps in the data, certain timeframes were selected to represent the most consistent data over the longest timeframe possible.

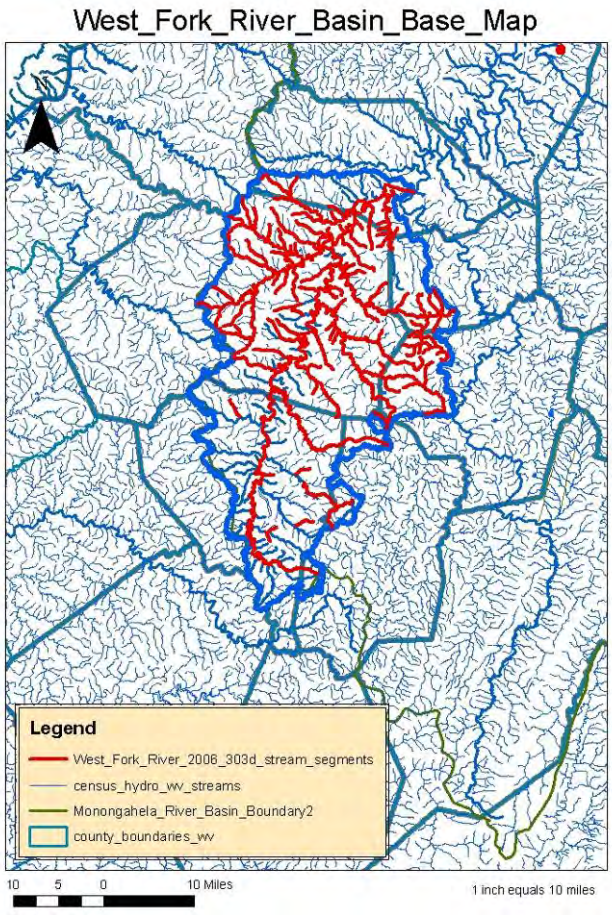


Figure 4. WVDEP map showing in red those waters in the West Fork River watershed that have been designated as impaired. Note that the West Fork River has been listed as impaired.

Table 14. Summary of U.S. Army Corps of Engineers Water Quality Data for the West Fork River

Water Quality Concern	General Trend *	Summary Comment
Color (Pt-Co Units)	→	Trend is relatively static/stable at 40-50 units from 1970 - 1999
Dissolved Oxygen (Do**)**	↓	Decreasing trend from 1977 - 1998 (9.1 to 7.0)
Lead (Pb)	-----	Data is insufficient or unavailable
Mercury (Hg)	-----	Data is insufficient or unavailable
Ph	↗	Data shows increasing trend in ph (7.1 – 7.4) from 1972 - 1996
Specific Conductivity	→	Trend is relatively static/stable from 1970 - 1999
Total Aluminum (Al)	↓	Data shows decreasing trend from 1978 - 1996
Total Arsenic (As)	→	Only periodic sampling; most of which are below detectable levels. Trend is relatively static/stable from 1988 - 1995.
Total Iron (Fe)	↓	Data shows decreasing trend from 1970 - 1998
Total Magnesium (Mg)	↓	Data shows decreasing trend 1979 - 1996
Total Manganese (Mn)	↗	Data shows slight increase. Mostly stable trend from 1970 - 1995
Total Nitrites ($N0_3^+$) as N	↓	Data shows decreasing trend 2000 - 2002
Total Phosphorus (P)	↘	Data shows slight decreasing trend 2000 - 2002
Total Solids	↘	Data shows slight decreasing trend 1978 - 1992
Total Zinc (Zn)	↓	Data shows decrease in concentrations from 1978 - 1999
Water Temperature (^OC)	↑	Data shows consistent increasing trend from 1970 - 1999

* Red arrows illustrate a detrimental trend in the direction indicated, green arrows indicate a beneficial trend in the indicated direction and black arrows indicate stability. Examined time period was indicative of consistent data available during the shown time period.

Water quality impairments due to manufacturing, mining and other upland associated practices within the West Fork River watershed have likely impaired the abundance and distribution of aquatic life historically. Mine drainage streams are impaired by low pH and/or elevated concentrations of metals, including iron and aluminum.

Total Maximum Daily Loads (TMDL's) have been developed and are planned for mine drainage-impaired streams within the watershed. Table 15 shows the list of planned and implemented TMDL's for the West Fork River. Fecal coliform impairment has also been identified in the West Fork River (from the mouth to Stonewall Jackson Lake tailwaters). The same segment of the West Fork River also is biologically impaired, has dissolved zinc water quality criteria impairment, and a consumption advisory related to elevated fish tissue concentrations of Polychlorinated Biphenyls (PCBs). Note that recent findings suggest that the mainstem of the West Fork River is not impaired for dissolved zinc and therefore TMDL development for this pollutant is not necessary. Stonewall Jackson Lake is one lake that is listed as impaired for mercury because of consumption advisories related to elevated fish tissue concentrations of mercury according to WVDEP.

Table 15. WVDEP 303(d) Listing Criteria and Proposed TMDL

Stream Name	Stream Code	WV Category Waters	Criteria Affected	Cause	Impaired Length	Reach Description	Projected TMDL Year (No Later Than)	On 2002 List
West Fork River	**WVMW**	**3**	Iron (Fe^{+})	Unknown	74.4	Mouth to Stonewall Jackson Dam (RM 74.4)	2002	YES
			Total Aluminum (Al^{+})	Unknown	74.4	Mouth to Stonewall Jackson Dam (RM 74.4)	2002	YES
			(CNA)-Biological	Unknown	74.4	Mouth to Stonewall Jackson Dam (RM 74.4)	2018	YES
			Fecal Coliform	Unknown	74.4	Mouth to Stonewall Jackson Dam (RM 74.4)	2018	YES
			Zinc (dissolved)	Unknown	74.4	Mouth to Stonewall Jackson Dam (RM 74.4)	2018	NO #
			PCBs	Unknown	74.4	Mouth to Stonewall Jackson Dam (RM 74.4)	2018	NO

*Source WVDEP 303(d) List & West Virginia Integrated Water Quality Monitoring & Assessment Report 2006
CNA - Conditions Not Allowable #-Recent findings suggest that TMDL development for this pollutant is unnecessary.

No Action – If this action is chosen there will be no change to the water quality of the West Fork River. Sediment and any bound chemicals may continue to accumulate to some degree. Dissolved oxygen and turbidity will continue to be more indicative of lentic conditions in certain reaches. There will be a very limited possibility of the re-suspension of contaminated sediment.

Dam Removal/Modification Alternative – There will be no long-term adverse changes to water quality as a result of this alternative. Short term changes may include single event flushes of sediment immediately following deconstruction. Any water used for intake into the Clarksburg water supply will be treated by standard operating procedures to deal with short term turbidity issues. If small sediment flushes occur, they will be withdrawn, treated and filtered through the CWB water supply system prior to customer use as through standard operating procedures. The remainder will be assimilated through natural sediment transport functions.

Sediment testing was performed to determine if any potential contamination was bound to the sediment (refer to the section of this document entitled 6.10 Sediment). This was performed specifically to determine if re-suspension of sediments during this short-term period would be irreversibly detrimental to water quality and ascertain whether any pollutants have been buried within those sediments. Special consideration was given to those contaminants listed in Tables 14 and 15 above. Based on the amount of sediment, the quality of those sediments and expected duration of re-suspension, removal is not anticipated to affect any long term increase or decrease in suspended contaminants; nor add to the long term concentration of any pollutants.

Dam removal may slightly improve thermal regimes by restoring natural current and stream-flow characteristics. Impoundments increase summer water temperatures significantly by creating larger, slower moving water surface areas exposed to sunlight. Warmer temperatures decrease the dissolved oxygen content of the water both in the impoundment and for some distance downstream of the dam. Dam removal may alleviate some of the associated water quality problems along several miles of the resource area.

In a free-flowing state the West Fork is constantly flushing sediment, pollutants, etc. but the existing impoundments limit this system. As detriments to water quality occur, they are normally flushed through the system by the flow of the river. Any chemical or biological pollutants that occur, such as excessive nutrients, pesticides, pathogens, and contaminated sediments will not have the potential to accumulate within the sediments.

Dissolved oxygen (DO) is an important water quality parameter, especially for fish. Upon restoration to a more natural state, the river should exhibit higher amounts of dissolved oxygen compared with the segments that were impounded. The increase will be directly proportional to the turbulent flow of rivers through riffles. This action will increase the amount of DO by mixing air into the water. Removal of the three dams will improve water quality by restoring natural riverine thermal regimes. Data in Appendix V shows that since the early 1970's water temperatures in this stretch of the West Fork have elevated from an average of 16.9^{o} C to 22^{o} C. This temperature regime favors the lentic species and conditions described previously in this document. Also, the data concerning dissolved oxygen levels show a declining trend. DO levels average 9.1 mg/L in the late 1970's and approximately 7.0 mg/L in the late 1990's. Although many factors contribute to these conditions (most notably the water quality in Stonewall Jackson Lake) dam removal should neither exacerbate nor contribute toward these continuing trends. While removal of the dams may not totally reverse these conditions, it could be argued that dam removal may improve these conditions over time.

Although removing the dams will flush out warmer, less oxygenated, high nutrient water from the impoundments, the initial drawdown of the impoundment may cause short-term turbidity issues and create a short-term DO drop downstream until this process is complete. This will depend greatly on the amount and the speed of sediments released from the impoundments.

6.13 Water Use and Supply

Existing Conditions – All the dams discussed in this document were originally constructed for community water supply. Currently only one of the dams is being utilized for this purpose (Hartland Dam) and is not being proposed for removal. The reservoir behind the Hartland Dam is used for water supply to the city of Clarksburg and surrounding communities. The reservoir and dam is managed by the CWB. Monitoring water levels and water quality tests are routinely performed by the CWB. According to the US Army Corps of Engineers and the CWB there are no known official agreements with entities downstream of Stonewall Jackson Dam to maintain a minimum flow in the West Fork River. Refer to Table 16.

The Clarksburg Country Club Golf Course currently utilizes the reservoir behind the dam to irrigate their course from two intakes located approximately 0.25 miles upstream from the Two-Lick Dam. The intakes are located on the north and south bank of the river and accessed by a golf cart bridge spanning the river. There is no known official agreement with the Country Club and the CWB to maintain the reservoir to a specific minimum water level for irrigation. Intakes appear to be raised and lowered to water level manually and are operated from two pump houses also located on either side of the river. The intakes are on the banks above the immediate pool of Two-Lick Dam.

The Greater Harrison County PSD operates a waste water treatment facility located in West Milford. This facility serves several small communities including West Milford, Good Hope, and North Lost Creek. This facility is permitted under Greater Harrison Co. PSD, NPDES permit number WV0084301. The plant uses the West Fork River for discharge of waste water post-treatment.

Table 16. Known Water Supply Agreements

	Hartland Dam	Two-Lick Dam	Highland Dam	West Milford Dam
Agreement	Provides Community Water Supply	Clarksburg Country Club Golf Course Irrigation *	None	None

***** No official written agreement exists.

No Action – No change in current use of the water behind the structures will be affected. Use by the golf course to irrigate will remain unchanged. The Greater Harrison County PSD will notice no changes in normal water level fluctuation.

Dam Removal/Modification Alternative- The USACE and the U.S. Geologic Survey (USGS), indicate removal of the low-head dams could impact river gage capabilities. Upon discussion with the USGS only one gauge will be affected. This gauge is the Mount Clare gauge located approximately 0.1 mile above the Two-Lick Dam. The USGS could recalibrate or abandon the gauge depending upon the effect after removal. This gauge currently is used for USACE Stonewall Jackson Dam operations and the National Weather Service uses the gauge for flood forecasting. This gauge does not provide water quality data. Dam removal would be a temporary impact on the gauge and poses no significant problems for either USGS or the CWB.

Photo of USGS stream gauge located approximately 0.1 miles above Two-Lick Dam. Photo: C. Shrader

The Clarksburg Country Club's use of the West Fork River water will still be able to occur. Currently, flexible hoses are connected to an intake line and water is pumped from stationary pumping plants on either bank. Intake lines are buried above water line and will be physically unaffected. It is estimated that the water level will lower in the vicinity of the intake and water withdrawal will still be able to occur. However, depending upon the amount of water level drop, the country club may require upgrading of their pumps to increase the lift capacity or other modification to extend the reach of the system.

In order to minimize the effect to the Country Club and their ability to use the river for irrigation purposes, it is recommended that the CWB coordinate with the Clarksburg Country Club prior to implementation to minimize the impact to their water use.

Photo showing the Clarksburg Country Club irrigation intake on the West Fork River. Note the inlet pipe and gate used to hoist the flexible pipe. Inset shows opposite bank with adjacent pump house. Photo: J. McClure

The West Milford Waste Water Treatment Facility operates by permit from the State of West Virginia which requires that all wastewater be treated to certain acceptable levels prior to discharge to waters of the State. This level of acceptability is irrespective of the water levels within the impoundments behind the dams. There will be no change to current discharge of the river. However, removal of the impoundment behind the Highland Dam will change the water elevations upstream and therefore may alter the elevation at which the discharge is released from the plant.

Since the plant is located at the headwaters of the pool of the Highland Dam, this elevation difference will be minimal. In fact, in the photo taken in 2008 it is possible to see the riffles indicative of a relatively undisturbed reach of the West Fork. The outfall of the water treatment facility is a few yards upstream. The facility is also downstream of the West Milford Dam. Therefore, this reach of stream would be relatively unaffected by either dam's removal. Refer to figure 5. Therefore removal of the West Milford or Highland dams should not affect the discharge capacity of the plant in any discernable way; nor significantly impact either the plant or its operation.

Figure 5. This aerial photo shows the approximate location of the headwaters of the Highland Dam pool and the outfall of West Milford Wastewater Treatment Facility. The West Milford dam is less than one mile upstream from the outfall; while the Highland dam is approximately 2.5 miles downstream. The outfall lies within a mostly unaffected river reach between the pools of the West Milford Dam (upstream) and the Highland Dam (downstream).

6.14 Other Considerations

In preparation of this document, there are other special environmental concerns or executive orders and laws required to be considered under NEPA. These environmental concerns are usually not affected during normal planning operations, but under certain circumstances may require minimizing or mitigating actions. These special environmental concerns include: Scenic Beauty, Natural Areas, Fish & Wildlife Coordination Act (FWCA), Migratory Birds, Bald & Golden Eagle Protection Act and Environmental Justice. These special environmental concerns have been considered and are either not present in the project area or the alternatives will not impact them.

DESCRIPTION OF DAM REMOVAL/MODIFICATION ALTERNATIVE

Removal of Highland Dam, Two-Lick Dam, and West Milford Dam - Three of the four low-head structures owned by the CWB are no longer needed for water supply. These structures will be completely removed over a specified period of time. The timeframe for removal will depend on funding, the timing of that funding and the contracting requirements of the agency(s) responsible for implementation.

Deconstruction activity at the proposed project sites would require access by heavy construction equipment, laborers and associated personnel. Rights of entry are currently held by the Clarksburg Water Board for each dam. Access by contractors is not anticipated to be a limitation; however, research into access and logistical issues is recommended prior to implementation. Access to some dams on certain sides of the river may be limited by topography or structures. *Refer to Gannet Fleming Drawing Safety Modifications to Low Head Dams Sheet Number 3, dated August 2005. (Refer to detail drawings "Two-Lick Dam Removal" by Gannett Fleming.)*

Construction specifications for the removal of each site will be developed during the implementation phase. Removal and deconstruction of the upstream dams will be done in such a manner as to ensure, to the extent possible, stabilization of the associated pool sediments and streambanks. This is accomplished by slowly lowering small sections of the dam and releasing the pool water slowly. This process is repeated several times until the pool elevation has stabilized and the remainder of the structure is removed. Dam removal may also include the removal of complementary structures such as concrete wings that reach upstream, spillways, powerhouses, and any similar structures which impede flow.

The preferred and recommended methodology for stream channel restoration is to perform the removal in such a manner as to allow for natural stabilization and assimilation of legacy sediments (i.e. slow deconstruction). However, if required, sediment disposal will be done in accordance with all state and local laws, specifications outlined by the West Virginia Department of Environmental Protection or other responsible regulatory agency. Other costs could be associated with sediment that has been trapped behind the dam if unforeseen conditions occur or there are requirements specified by permit. When the dams are removed, every care shall be taken to minimize the re-suspension and mobilization of sediment

Clean rubble from deconstruction may be used for placement within the river reach to provide fish sheltering areas, attractive aquatic habitat and create desirable areas for fish concentration. Removed materials may be used as construction fill if needed. Rock riprap can be used to stabilize the banks if needed. Since the dam is made of concrete, the concrete can be re-used as a base layer for riprap or habitat structure, also reducing or eliminating the need to dispose of the concrete. The base layer should be covered with natural stone to improve aesthetics and habitat value.

Sediment impounded behind the dam was tested and found not to contain harmful levels of pollution (refer to section 6.10 Sediment). If upon deconstruction, it is discovered that toxic sediment exists elsewhere, it will need to be isolated, removed, and disposed of before the dam(s) can be removed.

Finally, there can be costs associated with restoration in the newly exposed impoundment basin. It may be necessary to plant some types of vegetation to stabilize any exposed soil. However, if the impoundment is left alone, it will "green up" surprisingly quickly from seeds stored in the sediment. Planting will only be necessary if certain types of vegetation and/or land use are desired. The newly formed stream channel on the old impoundment bed may also need some type of restoration work. If the new stream banks are highly erodible, bank-stabilization measures may need to be implemented. Alternatively or in conjunction with adding structural measures (i.e. riprap) the banks may need to be graded to lessen their slopes to prevent large scale erosion and cutting of the banks. The action agency(s) and the Clarksburg Water Board (CWB) should utilize technical organizations and other State and Federal Agencies knowledgeable in natural stream restoration techniques, dam removal and aquatic habitat restoration in accordance with specifications outlined in the permit(s).

If deemed necessary, to prevent the sediment from being mobilized, part of the dam may be left in place to hold the sediment while vegetation establishes itself and acts to anchor the sediment. When the vegetation is well established, the rest of the dam could then be removed.

Modification to Hartland Dam (ALPS): During the final project phase, an aquatic passage structure will be installed at the Hartland Dam to facilitate aquatic movement throughout the river. Design of the aquatic life passage structure (ALPS) at the Hartland Dam will be produced at the time of funding. Most aquatic passage structures customary to this area of the US are either Denil or vertical slot structures. However there are other passage options that may be considered including bypass channels, rock ramps, spiral-side baffle ladder and others. In addition, the consideration of an alternative that is somewhat "flexible is recommended that may be adjusted, slightly manipulated or enhanced to increase the efficiency of the passage.

The final design of the ALPS should also take into account the structures adjacent to the dam that have historic significance as identified by the WV State Historic Preservation Officer and coordinated with WV Culture and History office prior to implementation.

The West Virginia Division of Natural Resources (WVDNR) should be consulted and given final approval of design specifications based on the following:

- What type of structures can be evaluated for fish passage in the West Fork River watershed?
- What species should be able to pass?
- What are the target size classes?
- What seasonal period is targeted for fish passage?
- What are the targeted velocities (i.e. species swimming performance vs. water velocities)?
    - Burst speeds
    - Prolonged speeds
    - Sustained speeds
- What is the target vertical drop per step of fish passage?
- What criteria are needed to attract fish to the structure?
- What steps can be taken to ensure a successful exit from the structure?
- What are operation and maintenance requirements including monitoring and evaluation?
- What is the financial cost of construction, operation and maintenance?

Designs for Dam Removal: Final designs will need to be provided if the recommended alternative of removal is selected. Plat drawings of the three dams proposed for removal are on the following pages (Figures 6-8). Final designs, drawings and site specifications will need to be developed outlining such items as:

- site ingress and egress including rights of way
- locations of utilities
- adjacent ownership
- dam dimensions and elevations
- planting and seeding specifications
- requirements for any sediment /debris disposal
- required habitat/stabilization structures and placement
- specifications outlining detailed method of removal
- removal of any visible large debris within immediate pool
- sediment abatement strategy
- any necessary site dewatering
- any permit requirements/stipulations incorporated into final designs
- other relevant information relating to removal

Designs may need to be finalized prior to issuance of some permits relating to dam removal or installation of the aquatic life passage structure. Refer to the section of this document entitled Environmental Compliance with Statutes, Executive Orders and Required Permitting.

In-Stream Habitat Restoration: Although not required, measures such as placement of rock and dam debris may be constructed in the immediate area of the dam sites to replace and enhance stream habitat. This may be important if there is a chance of potential head-cutting into the sediment beds or other erodible feature. Such structures include rock veins, rock piles, re-use of debris, etc. This activity could replace some of the localized

habitat lost in the immediate area of the dams. Any structures installed should be placed, sized and designed for the West Fork by individuals knowledgeable in natural stream design techniques and restoration principles.

Re-use of materials currently in place at two of the dams is highly recommended to maintain and enhance habitat. Rock and clean material from dam demolition would be cost efficient; and the natural variation in the rock would provide a natural appearing medium for construction of habitat structures, riffle-pool enhancements or grade and any required bank stabilization. Designs proposing the re-use of material will be required to be reviewed and approved by agencies regulating the placement of fill in “Waters of the US”. (Refer to the section of this document entitled *Environmental Compliance with Statutes, Executive Orders and Required Permitting.*)

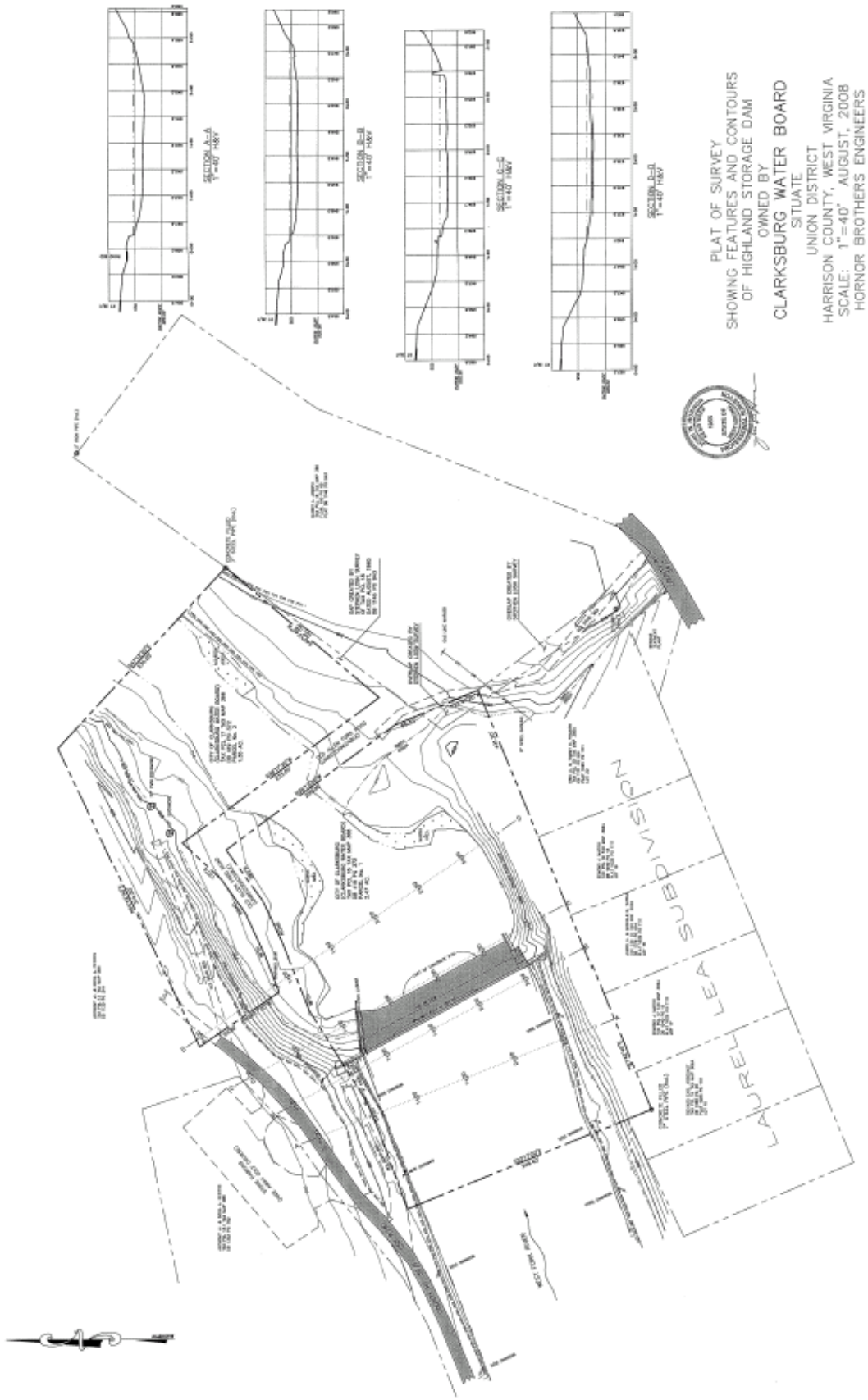


Figure 6. Highland Dam survey and plat drawing. Source: Gannett Fleming

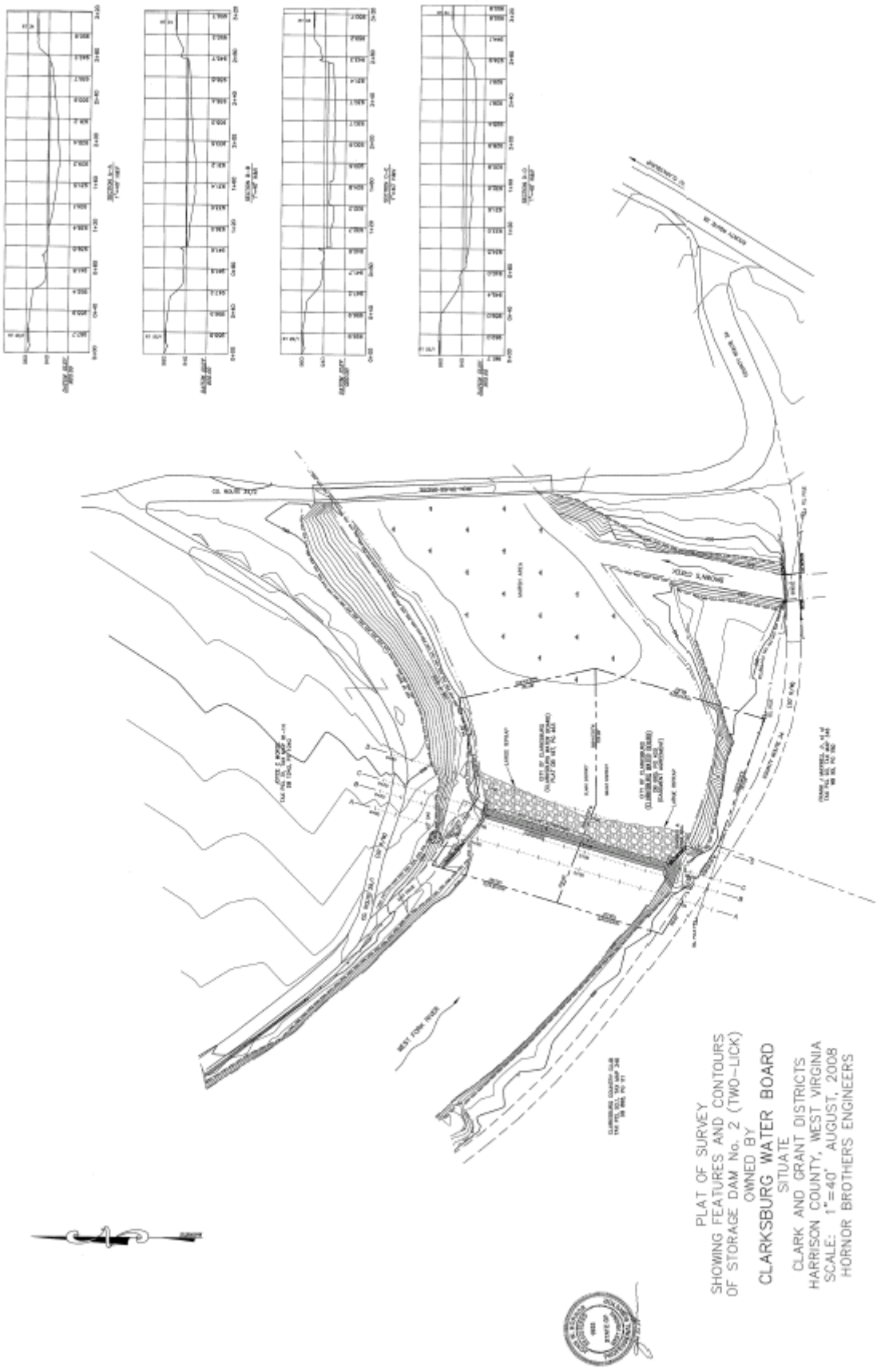


Figure 7. Two-Lick Dam survey and plat drawing. Source: Gannett Fleming

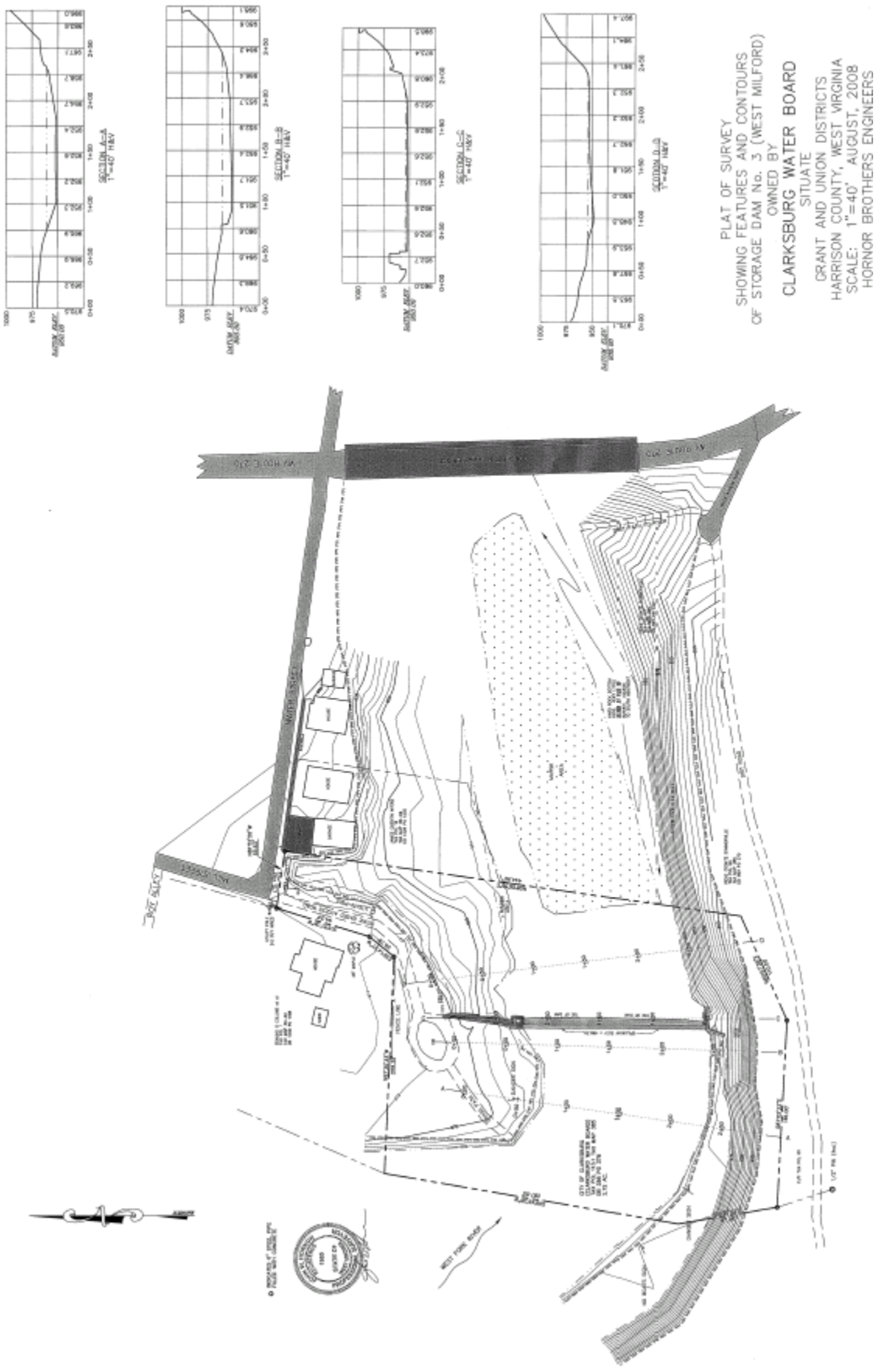


Figure 8. West Milford Dam survey and plat drawing. Source: Gannett Fleming

PROJECT COSTS

Costs - Planning costs have been borne by the Natural Resources Conservation Service. Funding for implementation of the removal alternative may be obtained from numerous sources including Federal funds.

Implementation costs for this project will be shared by the local, state, and federal entities. During the planning phase, several entities have provided substantial in-kind contributions for this environmental assessment. It is uncertain the funding source for this project currently. It is likely that multiple sources of funding will be utilized from various entities. Federal, State, and private sources may contribute to the total cost of the project in separate phased approaches or in a combined single project. This will be determined by the timeframe in which the project is implemented and available resources. The associated costs of dam removal have been estimated based on the average costs for dam removal projects across the United States. Estimated costs are shown in Table 17. These costs may significantly differ from actual costs depending on many variables including variation in design, time of implementation, funding, permit requirements, etc.

Table 17. Estimated Costs for Dam Removal and Modification

ITEM		ESTIMATED COST	TOTAL COST
DAM REMOVAL	**West Milford**	$89,100	**$363,487.00**
	Highland	$150,356	
	Two-Lick	$124,031	
IN-STREAM HABITAT RESTORATION MEASURES *	**West Milford**	$3,128	**$9,384.00**
	Highland	$3,128	
	Two-Lick	$3,128	
STREAMBANK & RIPARIAN CORRIDOR RESTORATION # **	**West Milford**	$8,910	**$36,349.00**
	Highland	$15,036	
	Two-Lick	$12,403	
INSTALLATION OF AQUATIC LIFE PASSAGE & RETRO-FIT OF HARTLAND DAM	**Structure At Hartland Dam** (aquatic channel or other similar passage)	$35,000	**$35,000.00**
		TOTAL	**$444,220.00**

* These figures are subject to change upon completion of design and needs. Costs were estimated at single structure per dam proposed for removal (if applicable).

** **Estimated** optional structures.

Includes optional erosion/stabilization costs if needed.

Associated operation and maintenance costs for aquatic life passage structures are estimated at 2% of the total cost of construction as per US Bureau of Reclamation (Hudson, D.R.). This figure will vary depending on the type of structure and final design, proximity to the facility, etc.

PHASING OF PROJECT/ADAPTIVE MANAGEMENT

Although the preferred method of corridor restoration is removal of all three dams simultaneously, the project could be implemented in a phased approach. This option of restoration may be dependent upon the timing and sources of funding. Any phasing should initiate from the most upstream dam and progressively work downstream if possible. Timing of dam removals should coordinate with times of low water and low turbidity (i.e. not immediately after storm events or periods of runoff and high flow). Timing of removal should be in accordance with all permit specifications as outlined by the various agencies regulating work in waters of the U.S. and the State. The action Agency(s) are highly recommended to coordinate with these agencies to determine the best timing for deconstruction. When a dam is removed, the impounded sediments are exposed and may become unstable and subject to erosion. Some of these sediments will move downstream; what remains may require stabilization to limit

erosion depending upon the amount of accumulated sediments behind the dams. The upstream banks of the former stream channel may reappear and, while historically these banks were held in place by vegetation, upon re-emergence, that vegetation will not exist. The most important aspect of bank stabilization is having a channel configuration that is appropriate for the stream flow and sediment load of the stream. If the stream-slope, cross section size, shape and meander pattern fits the river system, then only minimal bank stabilization may be necessary. More extensive bank stabilization or bank reconfiguring through bioengineering techniques and grade control may be required in the short term or where the exposed channel configuration does not match natural conditions.

Once one of the dams is removed, the affected channel characteristics will likely undergo change due to the reintroduction of the sediment-carrying functions of the stream. Immediate channel reconfiguration will likely be limited to the extent of impounded sediments, but may cut into the original substrate. If channel cuts extend beyond the historic bank substrate, there may be a need for a grade control. There are many methods for providing grade control (e.g. cross vanes) however, it is most important that the method used is appropriate for the specific characteristics of the West Fork. As part of the dam removal project, subsequent riparian restoration, aquatic habitat enhancements should be considered. These enhancements may include creating riffle and pool complexes, adding boulders, logs or other measures to enhance and promote favorable currents to create fish habitat.

Due to the anticipated realignment of channel morphology and tributary adjustment described above, it would be more beneficial to remove each dam successively. This should occur as quickly as possible and allow the channel to realign with any meander migration occurring only once. This avoids the situation where a period of time occurs after the first removal and following the next removal the previous channel must then readjust to correct for dimension, pattern and profile.

ENVIRONMENTAL COMPLIANCE WITH STATUTES AND REQUIRED PERMITTING

I. Statutes and Executive Orders

National Historic Preservation Act (Cultural Resources)
Information was sent to the State Historic Preservation Officer (SHPO) concerning all listed sites within three miles of the dams. The West Virginia Historic Property Inventory Form was completed for each dam and forwarded to the SHPO. Response was received from the SHPO stating that there were no archeologically significant properties located in the project area (Appendix III). However, there were architecturally significant structures located near the Hartland Dam (sic “Highland Dam”). The SHPO required that a qualified historian document the structures. In addition the three low head dams upstream are eligible for listing on the National Register of Historic Places (see documents in Appendix III). Refer to the section of this document entitled 6.3 Cultural Resources.

Threatened and Endangered Species Act
Endangered Species Act of 1973 authorized the Secretaries of Interior to classify, based on best science and commercial data… those plants or animals, which the Secretary of the Interior deems as "endangered" or "threatened” based on the best available scientific and commercial data. Section 7a(1) of the Act requires NRCS, in consultation with and with the assistance of the Secretary of the Interior, to utilize the departments' and agencies' authorities to advance the purposes of the Act by implementing programs for the conservation of endangered and threatened species.

It is not anticipated that formal consultation with USFWS will be required. Informal consultation has been ongoing throughout the development of this document. The NRCS will continue to work closely with the USFWS and WVDNR to avoid and minimize impacts to known populations of sensitive species. Additional avoidance measures may be required when deconstruction commences.

II. Required Permits

The selected alternative will require the CWB to apply for multiple permits and coordination with various State and Federal agencies. This coordination is anticipated to include, but not limited to, the following:

1. **United States Army Corps of Engineers (USACE)** Pittsburgh District –

   Clean Water Act Section 404 - Section 404 of the CWA established a permit program to regulate the discharge of dredged and fill material into waters of the United States. Discharge of dredged or fill material into waters of the U.S. is prohibited unless the action is exempted or is authorized by a permit issued by the U.S. Army Corps of Engineers. Refer to file number 2010-1056, Joshua Shaffer for information regarding this project.

2. **West Virginia Division of Natural Resources (WVDNR)** –

   Office of Land and Streams - is included within the WVDNR and governed by a five member Board of Directors chaired by the WVDNR Director. Historically, the office (formerly the Public Lands Corporation) has issued licenses and charged annual fees for utilities, wharfs, bridges and other structures and easements in the public streambeds and banks.

   Section 401 Water Quality Certification - see WVDEP below. Field support for the 401 program is provided by the WV Division of Natural Resources' Wildlife Resources Section (WVDNR).

   The West Virginia Wildlife Diversity Program (WDP) - conserves the State's non-game wildlife and their habitats and conducts ongoing statewide ecological inventory of rare plant and animal species, wetlands and other ecological communities. The WDP works closely with the U.S. Fish and Wildlife Service (USFWS) to monitor the status of the State's rare, threatened and endangered plants. Projects that affect certain streams containing protected mussel species require notification and coordination with WDP. Detailed project information concerning location and description of projects should be submitted for review at least 30 days prior to implementation.

3. **West Virginia Department of Environmental Protection (WVDEP)** – Division of Water and Waste Management/Permitting and Engineering Branch

   Section 401 Water Quality Certification - required for each permit or license issued by a federal agency to ensure that proposed projects will not violate the state's water quality standards or stream designated uses. States are authorized to issue Certification under Section 401 of the Federal Clean Water Act. The WVDEP may grant, grant with conditions, waive, or deny 401 Water Quality Certification. The decision to issue certification is based on project compliance with West Virginia Water Quality Standards.

   The West Virginia Dam Control Act (DCA) - charges the WVDEP with regulating dams. A dam is defined as: "any artificial barrier with specific impounding capacities and height specifications". It is illegal to place, construct, enlarge, alter, repair, remove, or abandon a dam without a certificate of approval from WVDEP.

   National Pollutant Discharge Elimination System (NPDES) – National program under Section 402 of the Clean Water Act for regulation of discharges of pollutants from point sources to waters of the United States. Discharges are illegal unless authorized by an NPDES permit.

MONITORING

The CWB will provide operation, maintenance and monitoring of the project during and after implementation. Minimal costs are associated with these activities and are not expected to exceed 2% of the total cost of implementation. Funding in terms of grants, State and Federal programs may be able to completely cover these costs. There are two levels of monitoring proposed:

A. Pre/Post-Construction Hydrologic and Channel Morphology Monitoring - completed at all sites and would include periodically evaluating the project site for any risks to infrastructure such as utilities, retaining walls, bridges, and culverts, and evaluating the river channel for excessive erosion or sediment deposition. This would primarily include photographic evidence from selected photo-points, on-site surveys after storm events and at least annually.

B. Habitat Monitoring - completed to assess the development of habitat features of particular interest at the project site. These features could include measurement of changes in vegetation (particularly invasive species), sediment, stream channel geometry, hydrology, fisheries and wildlife. Photo stations should be set to document the channel realignment and recovery of the site over time.

Habitat monitoring should also include periodic monitoring by the WVDNR of usage of the aquatic life passage structure with respect to species, timing of use, flow volumes and other identified factors. This type of monitoring would lend itself to research of the use of aquatic life passage structures for non-salmonids in the east. Other habitat monitoring would vary depending on the capacity, attractive flows, viewing/counting facilities, etc.

In addition, monitoring of the movement or trends in populations of mussel species should be studied by interested agencies and institutions. Whether dam removal is active, with heavy equipment and expectant onlookers, or passive, by ignoring decrepit dams until they finally collapse, it is important to consider the ecological costs of dam removal and loss of the impoundment. Most studies that have described the biological response to dam removal have focused on fish or benthic macroinvertebrates that are highly mobile or have short life cycles and can rapidly disperse into new habitats. Dams obviously impede fish, and within days of removing a dam, fish can be documented swimming upstream. However, mussels are not so adaptable; mussels are much more glacial in their response to habitat modification. Freshwater mussels may react similarly to dam removal as dam construction, at least in the short term due to the dramatic change in habitat that they are ill-equipped to tolerate. The initial effect of dam removal on mussels may cause some mortality. The long-term effect is poorly documented because of the timeframe involved and lack of monitoring. In some cases, it might take five, ten, or even twenty years for mussels to show a positive response to dam removal. The USFWS National Fish Hatchery in White Sulphur Springs, WV is working with interested individuals to reintroduce native mussels to waters that once held them. This facility should be contacted to determine the feasibility of such a project.

Due to the proximity of the recreational trails there are many other opportunities for monitoring are available including research, education and recreation. Various non-governmental organizations will be encouraged to work closely with the CWB to fully explore these opportunities.

INTERAGENCY AND SPONSOR COORDINATION & LIST OF PREPARERS AND CONTRIBUTORS

The following are contributors this document:

Kerry Bledsoe – WVDNR, Fisheries Biologist
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Tim Ridley – NRCS, Hydraulic Engineer
John Schmidt – USFWS, Private Lands & Partners for Wildlife Biologist
Casey Shrader – NRCS, Biologist
Kristin Ling Smith – NRCS, Ecologist (Environmental Compliance Specialist)
Pamela Yost – NRCS, Economist

The following agencies/organizations have been consulted and or contacted in the preparation of this report:

FEDERAL AGENCIES
USDA Natural Resources Conservation Service
US Fish and Wildlife Service – West Virginia Field Office *
US Army Corps of Engineers – Pittsburgh/Huntington District

**The USFWS is designated as a Cooperating Agency in the development of this Environmental Assessment.*

STATE AGENCIES
West Virginia Division of Natural Resources
West Virginia Department of Environmental Protection
West Virginia Culture and History
West Virginia Conservation Agency

LOCAL GOVERNMENT
Clarksburg Water Board

NON-GOVERNMENTAL ORGANIZATIONS
Rivers Coalition
American Rivers
The Nature Conservancy
Trout Unlimited

WVDEP Public Participation Process - Each application for construction, modification, or removal of dams must be advertised as a Class 1 legal advertisement in a newspaper of general circulation in the county where the dam is located. Class1 advertisements are published once, not on sequential days. Persons opposed, and wishing to request a hearing, must write to the Dam Safety Section within 15 days of the advertisement publication. If a legitimate request for a public safety hearing is received, Dam Safety is required by law to schedule a hearing. Citizen's concerns will be taken into consideration in the Department's decision either to refuse, or to issue an approval for a certificate. If needed, the CWB will be responsible for purchasing the class 1 legal advertisement notifying the public of the hearing.

NEPA PUBLIC PARTICIPATION

The CWB published a news release for an initial scoping meeting on January 17, 24 and 30, 2008 (Appendix I). Minutes from the public scoping meeting held on January 31, 2008 is included as well. Agencies/personnel contacted directly via email on January 7, 2008 and direct mailing on January 11, 2008 via the CWB are also included in this list. The purpose of the news release was to inform the public as to the intent of the project and to invite public input as to the scope of the Environmental Assessment. The release was sent to a range of local and statewide public and private electronic and print media, in addition to interested organizations. Approximately forty people including various State, Federal and non-governmental organizations and members of the public attended the initial scoping meeting.

The public comment period following the scoping meeting ended February 15, 2008. The CWB received nine (9) written comments proposing that the dams be maintained and not removed for: fishing, aesthetics, agricultural operations, global warming, livestock exclusion, prevention of the West Nile Virus, drought prevention, irrigation, generation of electricity, maintaining the “bass culture”, stopping mountaintop removal, combating invasive species, stimulation of global economies, and naked swimming. NRCS and USFWS have evaluated these comments and found most to be beyond the purview or scope of authority of the Agencies. Table 18 summarizes these comments. Note that one local unit of government submitted a comment regarding water velocities outside the specified comment period.

Table 18. Summary of Written Public Comments and Responses from Scoping Period 1/31/08 – 2/15/08

COMMENTER	ISSUE(S) SUMMARY	AGENCY RESPONSE
Public Comment	Waste water treatment facility at West Milford low flow concern	This facility operates by permit from the State of WV (permit # WV0084301). The State requires that all wastewater be treated to certain acceptable levels prior to discharge within Waters of the State. This level of treatment acceptability is irrespective of the water levels within the impoundments. The plant is located within the headwaters of the pool of the Highland Dam and downstream of the West Milford Dam. Removal of the impoundment behind the Highland Dam may only slightly change the water elevations upstream and therefore may slightly alter the elevation at which the treated water is released from the plant. However, there will be no change to current discharge of the West Fork River. This action should not significantly impact either the plant or the operation of the facility. Refer to section 6.13 Water Use & Supply for more information.
Public Comment	Raw sewage in the West Fork	Dumping of raw sewage is beyond the scope of this document. If knowledge exists of these type activities, local regulatory authorities should be contacted. Existence or removal of run-of-the-river dams will have no affect on this issue.
	Heavy metals in sediment that could pose health problems to the public	Sediment was tested for heavy metals and other substances as described in the EA under - 6.10 Sediment and 6.12 Water Quality. No harmful levels of metals were found in the sediment.
	Seasonal and long term water level change	The amount of flow above the dam equals the outflow. In addition, the flow in the West Fork River is mostly controlled by the amount of flow released at Stonewall Jackson Lake. Seasonal and long term water level changes are addressed in the EA under - 6.5 Hydrology.
	Soil erosion	Steps to address and minimize any soil erosion are outlined in the EA under - 6.10 Sediment and 6.12 Water Quality. Water velocities will decrease after dam removal, lowering the potential for bank scour and erosion.
	Exposed trash	It is recommended that any exposed trash and debris immediately adjacent to the dam sites that becomes uncovered be included for removal in the specifications of the project by the CWB. It is also recommended that the CWB remove debris that becomes exposed in the upstream pools only on a case-by-case basis. All debris should be disposed of properly. Refer to recommended designs for dam removal under the section entitled *Description of Dam Removal/Modification Alternative.*
	Resultant low-flow will kill aquatic life (wildlife disappearing)	There are no wildlife species existing in or near the West Fork River that are dependent upon the continued existence of the dams. In fact, they are mostly an impediment to the lifecycle of most forms of aquatic and riverine species. Therefore their removal will only improve aquatic life. The dams are all run-of-the-river dams. In addition, the flow in the West Fork River is significantly controlled by the amount of flow released at Stonewall Jackson Lake. Low flows are augmented as shown in the EA. Since the establishment of the Stonewall Jackson Dam, the average annual minimum discharge in the West Fork is 37 cu. ft per second (~8.2 feet of stage). Seasonal and long term water level changes are addressed in the EA under - 6.5 Hydrology.

2 Public Comments	Concerned about muskellunge abundance and habitat after dam removal.	Muskellunge are a stocked species in the West Fork. There will be some areas of habitat loss in the areas immediately surrounding the dams. However, there will only be slight overall loss of habitat as outlined in the EA under - 6.2 Biological Environment. However, upon further review, the WVDNR has stated that there will be no significant loss of habitat. Refer to WVDNR comments dated August 27, 2010 in Appendix XII.
Public Comment	Concerned about low water levels following dam removal.	The dams are all run-of-the-river dams. In addition, the flow in the West Fork River is substantially controlled by the amount of flow released at Stonewall Jackson Lake. Low flows are augmented as shown in the EA under - 6.5 Hydrology.
3 Public Comments	Prefers no action	Concern noted.
Public Comment*	Concerned that dam removal would increase water velocities that would erode adjacent fitness trails.	Concern noted. Water velocities will not significantly be altered as a result of dam removal. It should be noted that water velocities generally decrease when dams are removed due to the reduction in head. Steps to address and minimize any soil erosion are outlined in the EA under – 6.5 Hydrology, 6.10 Sediment and 6.12 Water Quality.

* Written comment received outside the specified comment period and prior to release of Draft EA.

The Draft Environmental Assessment (DEA) was completed and issued on June 21, 2010. Notification of availability and comment period ran in the Clarksburg Exponent Telegram and the Times West Virginian in the form of a legal notice for three consecutive days including a Sunday Edition. The availability was also published in the local newspaper via various articles reporting on monthly meetings by the Clarksburg Water Board. The DEA was available for public review on the West Virginia NRCS website at: http://www.wv.nrcs.usda.gov/programs/ and on the Clarksburg Water Board's website at: http://www.clarksburgwater.com/ . The comment period ran through August 31, 2010 (72 days). NRCS mailed paper and digital copies of the DEA to many organizations and individuals. See Appendix I.

During the specified comment period, NRCS received five separate correspondences containing written comments as follows:

- one (1) correspondence from one non-profit organization
- one (1) individual member of the public
- one (1) non-governmental organization
- one (1) State Agency
- one (1) Federal Agency

A summary of the comments and the Agency response is listed in Appendix II. A copy of the written comments in their entirety is located in Appendix XII.

References and Literature Citations

1. Adams, W.M., et. al., Investigating the Feasibility of River Restoration at Argo Pond on the Huron River*, Ann Arbor, Michigan*, University of Michigan, 2004

2. Bushaw-Newton, K. L., D. D. Hart, J. E. Pizzuto, J. R. Thomson, J. E. Egan, J. T. Ashley, T. E. Johnson, R. J. Horwitz, M. Keeley, J. Lawrence, D. Charles, C. Gatenby, D. A. Kreeger, T. Nightengale, R. L. Thomas, and D. J. Velinsky. 2002. An integrative approach towards understanding ecological responses to dam removal: the Manatawny Creek Study. Journal of the American Water Resources Association 38:1581–1599.

3. Casper A.F., Thorp J.H., Davies S.P. and Courtemanch, D.L.; Ecological responses of zoo benthos to dam removal on the Kennebec River, Maine, USA; Large Rivers Vol. 16, No.4 Arch. Hydrobiology Suppl. 158/4, p. 541-555,September 2006.

4. Doyle, M.W. and J.M. Harbor. 2003. A scaling approximation of equilibrium time-scales for sand-bed and gravel-bed rivers responding to base-level lowering, Geomorphology 54: 217–223.

5. Doyle, M.W., E.H. Stanley and J.M. Harbor. 2002. Geomorphic analogies for assessing probable channel response to dam removal, Journal of the American Water Resources Association 28: 1–13.

6. Doyle, M.W., E.H. Stanley and J.M. Harbor. 2003. Channel adjustments following two dam removals in Wisconsin, Water Resources Research 39: 1011.

7. Doyle, M.W., E.H. Stanley, C.H. Orr, A.R. Selle, S.A. Sethi, and J.M. Harbor. 2005. Stream ecosystem response to small dam removal: Lessons from the Heartland. Geomorphology, 71(1-2): 227-244.

8. Evans, J.E., Huxley, J.M. and Vincent, R.K., Upstream Channel Changes following Dam Construction and Removal using GIS/Remote Sensing Approach; *Journal of the American Water Resources Association* (JAWRA) 43(3):683-697. DOI: 10.1111/j.1752-1688.2007.00055.x

9. Flannery, D.M., Gardner, B.D., Vining, J.R., The Water Resources Protection Act and Its Impact on West Virginia Water Law; *The West Virginia Law Review* (WVALR) 107 749, 750-788, 2004-05.

10. George, Larry W., Public Rights in West Virginia Watercourses: A unique Legacy of Virginia Common Lands and the *Jus Publicum* of the English Crown, West Virginia Law Review, Vol. 101:407, pp 407-470

11. Gannett Fleming Inc.; *Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam and West Milford Dam on the West Fork River*; Pittsburgh, PA; September 2003.

12. Gannett Fleming Inc.; *Sediment Characterization Report Highland, West Milford and Two-Lick Dams*; Pittsburgh PA; January 2009.

13. Harvey, M. D., and C. C. Watson. 1986. Fluvial processes and morphological thresholds in incised channel restoration. Water Resources Bulletin 22: 359–368.

14. Heinz Center, The; Dam Removal Science and Decision Making; The H. John Heinz III Center for Science, Economics and the Environment, Washington, DC, 2002

15. Heppner, C., Loague, K.; A dam problem: Simulated Upstream Impacts for a Searsville-like Watershed; Ecohydrology. 1, 408–424 (2008); Stanford University, Stanford, CA Published online in Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/eco.34

16. Hynes, H.B.N. 1970. The Ecology of Running Waters. University of Toronto Press, Toronto, Ontario, pp. 555

17. Jernejcic, F., Snow, R. Best of the West Fork, Wild Wonderful West Virginia Magazine, 1995, pp.1-4

18. Kruse, S.A., Scholz, A.J., Preliminary Economic Assessment of Dam Removal: The Klamath River; Ecotrust, Portland, OR, 2006.

19. NatureServe. 2004. Downloadable animal datasets. NatureServe Central Databases. Available from: www.natureserve.org/getData/dataSets/watershedHucs/index.jsp (March 2008)

20. NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available from: http://www.natureserve.org/explorer. (Accessed: Multiple Dates 2007-08).

21. Pizzuto, J. 2002. Effects of dam removal on river form and process. BioScience 52:683–691.

22. Provencher, B., Does Small Dam Removal Affect Local Property Values? An Empirical Analysis; University of Wisconsin - Madison - Department of Agricultural & Applied Economic; Contemporary Economic Policy, Vol. 26, Issue 2, pp. 187-197, April 2008.

23. Public Sector Consultants Inc., Enhancing Fish Passage over Low-Head Barrier Dams in the Saginaw River Watershed, December 2005.

24. Sethi, S. A., A. R. Selle, M. W. Doyle, E. H. Stanley, and H. E. Kitchel. 2004. Response of unionid mussels to dam removal in Koshkonong Creek, Wisconsin (USA). Hydrobiologia 525:157–165.

25. Simons, R.K. and D.B. Simons. 1991. Sediment problems associated with dam removal— Muskegon River, Michigan. In: Shane, R.M. (ed.), Hydraulic Engineering, Proceedings of the National Conference on Hydraulic Engineering. American Society of Civil Engineers, New York, pp. 680-685.

26. Stanley, E. H. and M. W. Doyle. 2003. Trading off: the ecological effects of dam removal. Frontiers in Ecology and the Environment 1:15–22.

27. Stanley, E.H., M.A. Luebke, M.W. Doyle and D.W. Marshall. 2002. Short-term changes in channel form and macroinvertebrate communities following low-head dam removal, Journal of the North American Benthological Society 21: 172–187.
28. Schweiger, P.G., Roarabaugh, D.P., Mathur, D., Designing Fish Passage Facilities for Low-Head Dams on Rivers in the Northeastern United States; Gannett Fleming, Inc., Harrisburg, PA; 2005.

29. Thompson J.R., D.D. Hart, D.F. Charles, T.L. Nightengale, and D.M. Winter. 2005. Effects of removal of a small dam on downstream macroinvertebrates and algal assemblages in a Pennsylvania stream. Journal of the North American Benthological Society 24: 192–207.

30. USDA, *National Environmental Compliance Handbook* (190-VI-NECH), USDA, Natural Resources Conservation Service-USDA, First Edition, October 2003

31. USACE, Final Environmental Statement Stonewall Jackson Lake, West Fork River, West Virginia, U.S. Army Engineer District, Pittsburgh, PA., 30 July 1971

32. USEPA, Region 3; Tetra Tech, Inc. in Fairfax, Virginia under EPA Contract Number 68-C-99-249, Metals and pH TMDLs for the West Fork River Watershed, September 2002.

33. U.S. Geological Survey (USGS). 2004. Nonindigenous Aquatic Species Database, Gainesville, FL. http://nas.er.usgs.gov, April 2009.

34. U.S. Department of the Interior, Fish and Wildlife Service, National Wetlands Inventory Maps, Washington, D.C. http://www.fws.gov/wetlands/.

35. Watters, G.T., Clubshell (Pleurobema clava) & Northern Riffleshell (Epioblasma torulosa rangiana) Recovery Plan; Ohio Division of Wildlife-Ohio DNR Columbus, OH for USFWS; 1994

36. Wisconsin, Univ. of; Dam Repair or Removal: A Decision Making Guide, University of Wisconsin, 2000, Water Resources Management Practicum 2000. [http://www.ies.wisc.edu/research/wrm00/educ.htm]

37. Watters, G.T. 1995. Small dams as barriers to freshwater mussels (Bivalvia, Unionoida) and their hosts; Biological Conservation 78:79-85.

38. Wohl, E.E., and D.A. Cenderelli, 2000. Sediment deposition and transport following a reservoir sediment release. Water Resources Research, 36: 319-333.

39. WV Department of Environmental Protection (WVDEP), West Virginia Integrated Water Quality Monitoring and Assessment Report 2006; Prepared To Fulfill The Requirements of Sections 303(d) and 305(b) of The Federal Clean Water Act for the Period of July 2003 through June 2005.

LIST OF APPENDICES

APPENDIX I

PUBLIC NOTICES AND PUBLIC PARTICIPATION RECORD AND MAILING LISTS

Scoping Meeting Email January 7, 2008

-----Original Message-----
Subject: **CLARKSBURG WATER BOARD PUBLIC SCOPING MEETING 1/31/08**

Greetings:

This letter is to inform you that a public scoping meeting concerning four low-head dams in the West Fork River in Harrison County will be held on Thursday, January 31, 2008. Participants will meet at 3:00 pm at the Clarksburg Water Board Office 1001 South Chestnut Street Clarksburg, WV 26301. Directions to the CWB office may be found at: http://www.clarksburgwater.com/directions.htm .

The Clarksburg Water Board has requested that the Natural Resources Conservation Service (NRCS) participate in further evaluation of alternatives for the West Fork dams. NRCS is providing planning assistance under many different authorities including Public Law 74-46, 49 Stat. 163, 16 U.S.C. 590 a-f. From the federal perspective, there is an interest in re-establishing the connectivity of the stream and removing or minimizing impediments to aquatic movement within the river. Restoring the aquatic habitat of the West Fork River, to the greatest extent possible, is within the mission of NRCS.

The purpose of this scoping meeting is to identify potential environmental concerns, issues and impacts associated with the need to restore the connectivity of the West Fork River for the benefit of aquatic species including native mussels and their host fish while improving the habitat of the native fishery. There is also a need to reduce the liability associated with these structures that is currently being borne by the owners of the structures. The meeting will open with a brief presentation followed by a question and comment period. The public may make comments on the range of alternatives, suggest other alternatives, and express concern with regard to the alternatives under consideration. Written comments will be accepted up to February 15, 2008. Only written comments will be accepted. Submit comment by mail or email to:

Clarksburg Water Board
1001 South Chestnut Street
Clarksburg, WV 26301
or
Pamela.Yost@wv.usda.gov

Your participation in the environmental scoping process is both invited and encouraged. Please feel free to forward this email to those on your staff that should attend. We look forward to working with you toward the development of an environmentally sound and beneficial endeavor. Should you need additional information regarding this meeting, please contact Pamela Yost at 304-284-7572.

Casey D. Shrader
State Biologist
USDA Natural Resources Conservation Service
75 High Street
Room 301
Morgantown, WV 26505
Phone: (304) 284-7581
FAX: (304) 284-4839
Casey.Shrader@wv.usda.gov

CLARKSBURG WATER BOARD

A Municipal Corporation Serving Clarksburg Since 1887

RICHARD D. WELCH
GENERAL MANAGER

JOHN L. DEPOLO
GENERAL COUNSEL

Important Notice [1/11/08]

Greetings:

On June 26, 2007, the Clarksburg Water Board (CWB) entered into a Cooperative Agreement with the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) relative to the proposed modifications of four low-head dams on the West Fork River. From the federal perspective, there is an interest in re-establishing the connectivity of the stream and removing or minimizing impediments to aquatic movement within the river. Restoring the aquatic habitat of the West Fork River, to the greatest extent possible, is within the mission of the USDA-NRCS. As a part of this evaluation the CWB will hold a public scoping meeting on Thursday, January 31, 2008 from 3:00 – 5:00 pm at our office located at 1001 South Chestnut Street.

The purpose of this scoping meeting is to provide a forum for public concerns regarding any proposed actions to our dams and to identify potential environmental concerns, issues and impacts associated with the need to restore the connectivity of the West Fork River for the benefit of aquatic species including native mussels and their host fish while improving the habitat of the native fishery. There is also a need to reduce the liability associated with these structures that is currently being borne by the CWB.

The meeting will be conducted by Casey Shrader and Pamela Yost with the USDA-NRCS in cooperation with the CWB. The meeting will open with a brief presentation by the USDA-NRCS and followed by a question and comment period. The public may make comments on the range of alternatives, suggest other alternatives, and express concern with regard to the alternatives under consideration. Written comments will be accepted up to February 15, 2008. Submit comments by mail or email to:

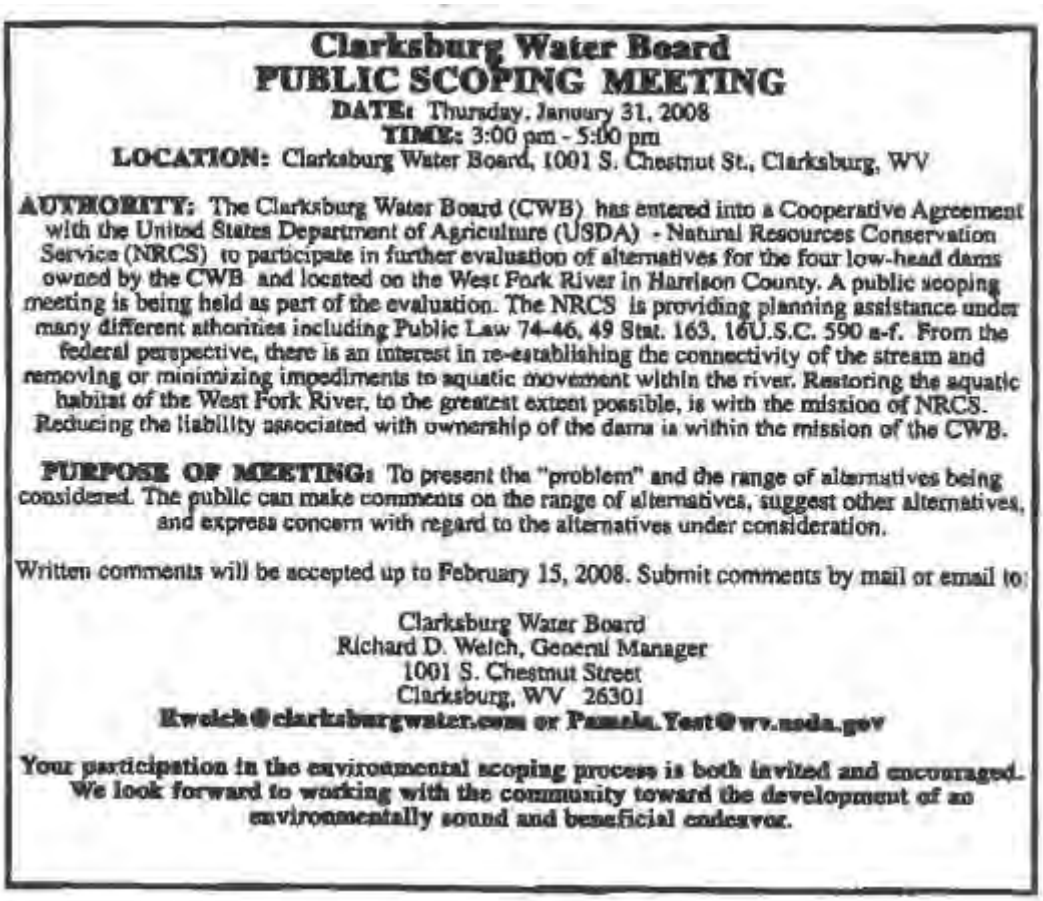
Clarksburg Water Board
Attn: Richard D. Welch, General Manager
1001 South Chestnut Street
Clarksburg, WV 26301
rwelch@clarksburgwater.com or Pamela.Yost@wv.usda.gov

Your participation in this locally-led planning process is both invited and encouraged. Please feel free to share this notice with your friends, neighbors or those on your staff that should attend. We look forward to working with you toward the development of an environmentally sound and beneficial endeavor. Should you need additional information regarding this meeting, please contact Pamela Yost, at 304-284-7572 or Casey Shrader, at 304-284-7581 or Casey.Shrader@wv.usda.gov.

Sincerely,
Richard D. Welch
General Manager

cc:
County Commissioners
Parks & Recreation
Harrison County Development Authority
Planning Commission
Harrison Co. Chamber of Commerce
Clarksburg Mayor
City Council Members
City Manager
Park Board
The Harrison Co. 4-H Club
Harrison Co. Board of Education

Notification of Scoping Meeting



Clarksburg Water Board
PUBLIC SCOPING MEETING

DATE: Thursday, January 31, 2008
TIME: 3:00 pm - 5:00 pm
LOCATION: Clarksburg Water Board, 1001 S. Chestnut St., Clarksburg, WV

AUTHORITY: The Clarksburg Water Board (CWB) has entered into a Cooperative Agreement with the United States Department of Agriculture (USDA) - Natural Resources Conservation Service (NRCS) to participate in further evaluation of alternatives for the four low-head dams owned by the CWB and located on the West Fork River in Harrison County. A public scoping meeting is being held as part of the evaluation. The NRCS is providing planning assistance under many different athorities including Public Law 74-46, 49 Stat. 163, 16U.S.C. 590 a-f. From the federal perspective, there is an interest in re-establishing the connectivity of the stream and removing or minimizing impediments to aquatic movement within the river. Restoring the aquatic habitat of the West Fork River, to the greatest extent possible, is with the mission of NRCS. Reducing the liability associated with ownership of the dams is within the mission of the CWB.

PURPOSE OF MEETING: To present the "problem" and the range of alternatives being considered. The public can make comments on the range of alternatives, suggest other alternatives, and express concern with regard to the alternatives under consideration.

Written comments will be accepted up to February 15, 2008. Submit comments by mail or email to:

Clarksburg Water Board
Richard D. Welch, General Manager
1001 S. Chestnut Street
Clarksburg, WV 26301
Rwelch@clarksburgwater.com or Pamela.Yost@wv.usda.gov

Your participation in the environmental scoping process is both invited and encouraged. We look forward to working with the community toward the development of an environmentally sound and beneficial endeavor.

Public Notice in Clarksburg Exponent ran 1/17, 24, 30/08

Notification of Availability of Draft Environmental Assessment (DEA)

DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service
West Fork River, Harrison County, West Virginia

AGENCY: Natural Resources Conservation Service.

ACTION: Notice of Availability of Draft Environmental Assessment.

SUMMARY: Pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969; the Council on Environmental Quality Guidelines (40 CFR part 1500); and the Natural Resources Conservation Service Guidelines (7 CFR part 650); the Natural Resources Conservation Service (NRCS), U. S. Department of Agriculture, is giving notice that a Draft Environmental Assessment for Dam Modifications on the West Fork River in Harrison County, West Virginia is available for review and comment. Since the recommended alternative involves aquatic life passage and Federal listed species, the U.S. Fish and Wildlife Service will be a cooperating agency.

FOR FURTHER INFORMATION CONTACT: Kevin Wickey, State Conservationist, Natural Resources Conservation Service, 1550 Earl L. Core Road, Suite 200, Morgantown, West Virginia 26505, telephone (304) 284-7545.

SUPPLEMENTARY INFORMATION:

The Natural Resources Conservation Service invites agencies and individuals that have special expertise, legal jurisdiction, or interest in the proposed Dam Modifications on the West Fork River in Harrison County to review the Draft Environmental Assessment (DEA) and provide comments. A copy of the DEA report may be downloaded electronically from http://www.wv.nrcs.usda.gov/. Hard copies of the DEA may be requested from the NRCS State Office in Morgantown, WV or by contacting the Clarksburg Water Board at 1001 South Chestnut Street Clarksburg, WV 26301. Comments are to be received at the NRCS State Office in Morgantown on or before Wednesday August 31, 2010.

KEVIN WICKEY /s/
State Conservationist
6/22/2010

Legal Advertisement 6/30/10 – 7/2/10, Clarksburg Exponent Telegram Vol. 146 No. 181

The Exponent Telegram

Water board approves added rate hike

If approved by PSC, average customer rate would increase 31 percent

by Sarah Moore
STAFF WRITER

CLARKSBURG — Rate increases approved for public hearing at the Clarksburg Water Board's June 1 meeting were determined to be insufficient, and an additional increase was approved by the board at Tuesday's meeting.

Further study showed it was apparent the increases "weren't quite adequate," said J.R. Sabatelli, CPA and manager for Tetrick & Bartlett, an accounting firm in the city.

"To make the numbers work, it was necessary to tweak the allocation somewhat compared to what the board approved recently," General Manager Richard Welch said.

If approved by the state Public Service Commission, the average customer rate would increase 31 percent instead of the originally proposed 28 percent. It still would be implemented over a four-year period, Sabatelli said.

The rates would increase by 18 percent the first year, followed by 5 percent the following year and 4 percent each of the two subsequent years, he said.

The original increase had called for a hike of 15 percent the first year, followed by a 5, 5 and 3 percent schedule of increases.

Resale customer rates will increase 20 percent instead of the originally approved 18 percent, Sabatelli said.

The minimum user rate was adjusted, however, to benefit those customers, he said.

Currently $13.14 a month, the board approved the rate to increase to only $23.19 per month instead of the initial $25 proposed, Sabatelli said.

The minimum water usage limit still will be from 2,200 gallons to 3,000 gallons.

This will allow more customers to fall into the minimum user category, board member Albert Cox said.

Also, the board unanimously approved the nearly $7 million annual budget for fiscal year 2010-11.

"The staff and I have attempted to identify areas of need and address them in this budget," Welch said.

Expected equipment purchases include a new mini backhoe, two service trucks, a forklift for the warehouse, a plotter to print out large maps and a leak detector, Welch said.

The budget also includes a 3-percent wage increase for employees.

The board also discussed removal of dams on the West Fork River at the meeting.

A letter was received from the U.S. Department of Agriculture requesting that the board post the draft of the environmental assessment for dam modifications on the Web site, Welch said.

In addition, paper copies of the assessment and the sediment report are to be made available to the public, he said.

About 40 copies of the report will be mailed out, asking for comments from interested parties. A public comment period will run for about 30 days, he said.

The assessment will then be finalized and a record of decision will be issued, Welch said.

The board also received notification that "the United States Fish and Wildlife Service has been officially identified as cooperating agency and is currently exploring funding options for the project," he said.

The next regular meeting will be 2:30 p.m. July 13 in the board room.

June 30, 2010 Clarksburg Exponent Telegram Vol. 146 No. 181

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, WV 26505
(304) 284-7540 (Phone)
(304) 284-4839 (Fax)

June 21, 2010

To Whom It May Concern:

Enclosed for your review and comment is a copy of the Draft Environmental Assessment (DEA) for Dam Modifications on the West Fork River, Harrison County, West Virginia. The DEA was prepared in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969 (Public Law 91-190).

Additional copies of the Draft Environmental Assessment report may be downloaded electronically from: http://www.wv.nrcs.usda.gov/programs.

We request that comments submitted to the NRCS State Office in Morgantown, WV be received on or before August 31, 2010.

Sincerely,

KEVIN WICKEY
State Conservationist

Pat
Gene L.
Pam
Kerry

DIVISION OF NATURAL RESOURCES
Wildlife Resources Section
324 Fourth Avenue
South Charleston WV 25303-1224
Telephone (304) 558-2771
Fax (304) 558-3147
TDD 1-800-354-6087

Joe Manchin III
Governor

Frank Jezioro
Director

November 4, 2009

Mr. Kevin Wickey
State Conservationist
USDA-Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, WV 26505

Re: Environmental Assessment for the Proposed West Fork River Dams Removal Project

Dear Mr. Wickey:

As you know, biologists from the West Virginia Division of Natural Resources, Wildlife Resources Section (WRS) have been working closely with your agency since 2008 regarding the placement of a fish passage structure on one low head dam and the removal of three low head dams on the West Fork River, upstream of Clarksburg, Harrison County, West Virginia. We have been invited by your agency to continue our cooperative efforts to see the project move forward.

The WRS fully supports returning the West Fork River to a riverine habitat. As a partnering agency, the WRS will continue to work with Natural Resources Conservation Service personnel and provide technical information regarding wildlife resources and habitat. The WRS is hopeful that the dam removal plan will be implemented.

Thank you for the invitation to participate in this important project. If you have any questions about our position, please feel free to contact me or Kerry Bledsoe at 304-825-6787, kerrybledsoe@wvdnr.gov.

Sincerely,

Curtis I. Taylor, Chief
Wildlife Resources Section

CIT/kbj

MAILING LIST (includes email)

The following groups were notified of the public scoping meeting and initiation of preparation of the Draft Environmental Assessment:

Local/County Government

Clarksburg Water Board
West Fork Conservation District
County Commission
Parks & Recreation
Harrison County Development Authority
Planning Commission
Harrison Co Chamber of Commerce
Clarksburg Mayor
City Council Members
Office of the City Manager
Park Board
The Harrison Co. 4-H Club

Non-Governmental Organizations (NGO)

Trout Unlimited
The Nature Conservancy
Guardians of the West Fork
Sierra Club
Rivers Coalition
National Wildlife Federation
Audubon Society
American Rivers

State Agencies

West Virginia Division of Natural Resources
West Virginia Department of Environmental Protection
West Virginia Culture and History
West Virginia Department of Highway
West Virginia Conservation Agency

Federal Agencies

US Army Corps of Engineers – Pittsburgh District
US Geological Survey
US Fish & Wildlife Service
US Environmental Protection Agency
US Forest Service

Other

West Virginia University – Jim Anderson, Bill Grafton
Gannett Fleming, Inc. – Rulison Evans

Mailing Distribution List for the *Draft Environmental Assessment for Dam Modifications on the West Fork River in Harrison County, WV*:

Virginia R. Painter
Deputy Commissioner
WV Dept of Education & Arts
Division of Culture and History
1900 Kanawha Blvd, East
Charleston, WV 25305-0300

Deborah Carter, Project Leader
US Fish & Wildlife Service
694 Beverly Pike
Elkins, WV 26241

Scott Hans, Chief Regulatory Branch
US Army Corps of Engineers
Pittsburgh District
William S. Moorhead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222-4186

Randy Huffman, Cabinet Secretary
WV Dept of Environmental Protection
601 57th Street
Charleston, WV 25304

Director of Water and Waste Management
601 57th Street
Charleston, WV 25304

Lyle Bennett
WV Department of Environmental Protection
Division of Water and Waste Management
601 57th Street
Charleston, WV 25304

Paul A. Mattox, Jr., Commissioner
WV Department of Transportation
Division of Highways
Building 5
1900 Kanawha Blvd, East
Charleston, WV 25305

Joe Manchin III, Governor
State of West Virginia
Bldg 5, Room 100
1900 Kanawha Blvd, East
Charleston, WV 25305-0700

Curtis Taylor, Chief
WV Department of Commerce
Division of Natural Resources
Wildlife Resources Section
Capitol Complex, Bldg 3, Room 812
1900 Kanawha Blvd, East
Charleston, WV 25305-0664

Frank Jezioro, Director
WV Department of Commerce
Division of Natural Resources
Capitol Complex, BLDG 3, Room 669
1900 Kanawha Blvd, East
Charleston, WV 25305

Roger Anderson
WV Department of Commerce
Division of Natural Resources
PO Box 67
Elkins, WV 26241

Truman Wolfe, Executive Director
WV Conservation Agency
1900 Kanawha Blvd, East
Charleston, WV 25305

William Hoffman, Chief
Environmental Programs
US EPA, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

David Rider
US Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Gus Douglas, Commissioner
WV Department of Agriculture
Bldg 1, Room M28, State Capitol
1900 Kanawha Blvd, East
Charleston, WV 25305-0170

Office of Federal Activities – A104
Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Director
Office of Environmental Project Review
US Department of Interior
Room 2024
Washington, DC 20240

Director, Ecology & Conservation Office
US Department of Commerce, NOAA
14th & Constitution Avenue, NW
Room 6222
Washington, DC 20230

Environmental Officer
US Dept of Housing & Urban Development
Wanamker Building
100 Penn Square, East
Philadelphia, PA 19107

Coordinator, Water Resources
US Department of Transportation
US Coast Guard G-MPS1
2100 Second Street, SW
Washington, DC 20590

Director
Office of Advocacy & Enterprise
South Building, Room 1345
Washington, DC 20250

West Fork Conservation District
Route 2, Box 204-E
Mt. Clare, WV 26408

Harrison County Planning Commission and
County Commissioners
301 W Main St
Clarksburg, WV 26301-2955

Jim Sconyers
WV Chapter Sierra Club
PO Box 4142
Morgantown, WV 26508

W. Neil Gillies, Director
Cacapon Institute
Route 1, Box 328
High View, WV 26808

Margaret Janes, DMV
Potomac Headwaters Resource Alliance
5640Howards Lick Road
Mathias, WV 26812

Bryan Moore, Executive Director
WV Rivers Coalition
801 N. Randolph Avenue
Elkins, WV 26241

Bryan Moore
Trout Unlimited
787 Twin Oaks Drive
Bridgeport, WV 26330

Natural Resources Defense Council, Inc.
1350 New York Avenue, NW
Suite 300
Washington, DC 20005

National Wildlife Federation
1412 16th Street, NW
Washington, DC 20036
Attn: Legislative Representative

Sierra Club
404 C Street, N
Washington, DC 20002

Clarksburg Water Board
1001 South Chestnut Street
Clarksburg, WV 26301

City of Clarksburg Board of Park
Commissioners
Municipal Building
222 West Main Street
Clarksburg, WV 26301

The Harrison County Development Authority
1215 Johnson Ave,
Bridgeport, WV 26330

City of Clarksburg
Office of the Mayor
222 W Main St.
Clarksburg, WV 26301

The Nature Conservancy
West Virginia Field Office
P.O. Box 250
Elkins, WV 26241

Guardians of the West Fork
c/o Mr. John Eleyette
830 Benoni Avenue
Fairmont, WV 26554

National Wildlife Federation
11100 Wildlife Center Drive
Reston, VA 20190-5362

Audubon Society
545 Almshouse Road
Ivyland, PA 18974

American Rivers
1101 14th Street NW
Suite 1400
Washington, DC 20005

US Geologic Survey
West Virginia Water Science Center
11 Dunbar Street
Charleston, WV 25301

APPENDIX II

COMMENT SUMMARY AND RESPONSES TO THE DRAFT ENVIRONMENTAL ASSESSMENT

The following are responses to written questions received during the comment period (June 21 – August 31, 2010) for the Draft Environmental Assessment (DEA). All written comments that expressed an opinion were noted. If a comment resulted in a change that was incorporated into the Final Environmental Assessment, the Agency response will be shown below that comment. Otherwise, those comments presented in the form of a question have responses from the Agency(s) below. Copies of the written comments submitted in their entirety are located in Appendix XII. Note that page numbers and paragraphs listed in this section refer to the format of the DEA and may not reflect formatting in the final document.

WVDNR Comment: ***Page 18, Para. 1. The discussion implies that water temps will be cooler after dam removal. The WRS believes that significant temperature reductions of the West Fork is unlikely and, in any case, would not substantially alter the specie composition currently found in the West Fork. Also, the expectations that the fish species present after dam removal will be similar to 100 years ago may be overly optimistic. There is significant development in the watershed, a presence of navigation and flood control dams and water quality issues associated with mine drainage which would effect these expectations.***

Comments noted. Reference to probable change in dominance of cool water species and population trends represented 100 years ago have been removed from the final document.

WVDNR Comment: ***Page 19, Table 5. Dam Removal Option Impact to Fish: The WRS agrees that some species may realize improved habitat while others will be diminished. However, stating "significant" increases/decreases is an overstatement considering that these are opinions that don't seem to be supported by documented evaluations of habitat quality. A simple (+), (-) or unknown may be more appropriate. The chart lists post project Muskellunge habitat as a significant reduction. This might be inaccurate. Muskellunge are native riverine fish and do very well in riverine habitats. The habitat will change post project but it is unclear if this change would represent a (+) or (-) of habitat quality for the entire life cycle of the Musky.***

Response: Comments noted. Table 5 was changed to reflect the WVDNR comment concerning muskellunge and has been revised to reflect a “no significant change”. However, Table 5 was developed in consultation with the West Virginia Division of Natural Resources. The methodology used was specifically developed to clearly identify the possible impacts to general habitat and resources available to various species of fish during juvenile and adult phases. It is our opinion that a (+) and (-) system may seem to imply to the general public that the populations or number of fish species will be increased or decreased as a result of the removal of dams. It is the intent of this table to indicate a general change in availability of habitat accounting for juvenile and adult life phases. Therefore the methodology used was not changed.

WVDNR Comment: ***Dam Removal Alternative: The correct scientific name for zebra mussel is <u>Dreissena polymorpha</u> not (Corbicula sp.).***

The scientific name for zebra mussel has been changed in the final document as shown.

WVDNR Comment: ***Appendix 6: Fluted Shell was not found in the survey and, therefore should be removed from the EI 89 column.***

According to data provided by the WVDNR, Event ID 89, Survey #521 project name “Marshall University” dated 4/13/1985, fluted-shell *(Lasmigona costata)* was listed as a species identified at that survey point. However, fluted-shell has been removed from EI 89 in Appendix IV as requested. This did not affect the total number of species found post dam construction.

WVDNR Comment: ***"Alternatively or in conjunction with adding structural measures (i.e. riprap) the banks may need to be graded to lessen their slopes to prevent large scale erosion and cutting of the banks." The Natural Resources Conservation Service (NRCS) and US Fish and Wildlife Service (FWS) should consider the use of rock/log vanes or other structures/techniques commonly utilized in channel restoration projects for bank stabilization/habitat improvement.***

Comment noted. The Agencies concur that all appropriate "natural stream" restoration techniques should be utilized where feasible. Since the scope of this document does not cover final design or applicable techniques incorporated into final designs, it is recommended that the final design criteria utilize the best methodology suitable to the area with the least amount of environmental disturbance. This may include more traditional structures where it is not feasible to utilize natural stream design. The action agency(s) and the Clarksburg Water Board (CWB) should utilize technical organizations and other State and Federal Agencies knowledgeable in dam removal and aquatic habitat restoration techniques in accordance with specifications outlined in the permit(s). This statement has been added to clarify and emphasize habitat improvement.

WVDNR Comment: ***Table 17. Estimated Cost for Dam Removal and Modification: Estimated cost for "Instream Habitat and Restoration Structures" and "Streambank & Riparian Corridor Restoration" seems very low. Less than $17,000 (4.5 percent of West Milford, Highland and Two Lick's budget) is budgeted for instream habitat restoration and streambank restoration. One of the stated goals of the project is to improve habitat of the native fishery, the sponsors should consider formulating an adaptive management plan and possible funding sources if more extensive instream habitat measures/riparian corridor restoration is required.***

Comment noted. Budget estimates are flexible and have been re-evaluated. It is important to remember that without final designs and engineering drawings these figures are only estimates based on past experiences with dam removal and vegetative establishment. Adaptive management is highly recommended depending on many factors. If possible, methods of funding should be utilized that allow for the maximum amount of flexibility in the utilization of those funds. For example, itemization of individual components of restoration need not be specified to the level shown in the table and may be funded as lump sum restoration.

Also, the original design and costs were based on dam removal and restoration of only the area immediately surrounding the sites of the dam (tailwaters). The remaining stretches of river are not factored into costs associated with headwaters of the pools. Restoration of riffle and pool complexes immediately surrounding the tailwaters is anticipated to be restored using a combination of methods. Coordination with landowners and restoration of those sites would need to be performed to achieve additional restoration goals.

WVDNR Comment: ***Table 17. The estimated cost of the Aquatic Life Passage device on the Heartland Dam is shown as $300,000. The total cost is $120,000. We don't understand why there is such a wide discrepancy between estimated and total cost for the Hartland Dam project and suggest this be resolved.***

Comment noted. This is a typographical error in the table and has been corrected. Note that the cost estimate has been revised. Most aquatic life passage structure costs were based on expensive Denil or Steeppass designs on similar dams or barriers from various parts of the country. It has since been determined that the same goals and objectives may be incorporated into fish passage designs utilizing much less expensive techniques including step-pool and alternative channel designs. This technology is much more attractive and requires less maintenance. This type of design does not leave a large footprint on the environment and actually improves fish habitat while adding to the visual aesthetics by blending into the surrounding landscape.

WVDNR Comment: ***"Timing of dam removals should be coordinated with times of low water and low turbidity." This statement may indeed be true but lacks supporting data. Late summer is generally a period of low water and turbidity. However, it is also a time of higher water temperatures, lower dissolved oxygen and consequently higher aquatic stress levels. Late summer also marks the end of the growing season resulting in exposed sediments to not start to rigorously re-vegetate until the following spring. There are many factors to consider when determining the "best" time to remove the dams. Growing seasons, spawning seasons, water quality parameters, sediment transport capacity and constructability are just a few that need to be considered.***

Comments noted. The Draft Environmental Assessment (DEA) did not state that the dams should be removed during late summer; only during times of low water and low turbidity (i.e. not immediately after storm events or periods of runoff and high flow). Timing of removal should be in accordance with all permit specifications as outlined by the various agencies regulating work in waters of the U.S. and the State. The action Agency(s) are highly recommended to coordinate with biologists from regulatory and permitting agencies to determine the best timing for deconstruction. This paragraph has been revised to clarify.

J. Stenger Comment: ***Cannot safety issues be resolved using signs, fences, ropes, etc.? Even with safety issues addressed, should we expect to stop drownings on a river any more than we can expect to stop traffic fatalities on our highways?***

As stated in the DEA, it is extremely important and essential, from a public safety standpoint, that the dams be marked to warn members of the public of their existence and potential hazard in order to protect the public from physical harm. The CWB has attempted to maintain appropriate signage and other structures to warn of the dangers and existence of the dams. Unfortunately this has proven ineffective. Signs and upstream markers have been vandalized and buoys and signs have been removed. In addition, signs and structures require constant maintenance and monitoring to be effective. Furthermore, this alternative does not meet the aquatic restoration goal.

It should be noted that if the CWB does not select the recommended alternative, warning devices and safety structures should remain in place indefinitely and/or be upgraded as appropriate.

The removal or modification of the dams is not solely for the purpose of preventing drowning. It is to restore the connectivity of the West Fork River in order to benefit aquatic species including native mussels and their host fish while improving the habitat of the native fishery. In addition, it is to reduce the liability associated with these structures that is currently being borne by the Clarksburg Water Board (CWB). It is not anticipated that removal of the dams will stop accidental drowning in the West Fork River, nor is it suggested in the document.

J. Stenger Comment: ***Might money for busting the dams be better spent on projects utilizing the same dams for hydroelectric power generation?***

Unfortunately this alternative does not meet the purpose and needs statement of this document (refer to page 15). This alternative does not satisfy the aquatic restoration component of the project; and unless ownership is changed, it also does not satisfy the liability aspect of the purpose and need statement. Individuals are certainly free to perform a feasibility study and present that option to the CWB for their consideration.

J. Stenger Comment: ***What is the current level of treatment at the wastewater facilities? And what contaminants might contribute to species decline, if any, in the waters?***

The West Milford Waste Water Treatment Facility operates by permit from the State of West Virginia which requires that all wastewater be treated to certain acceptable levels prior to discharge to waters of the State. Currently, the wastewater treatment facility is permitted in West Milford (permit # WV0084301). State Water Quality Standards are listed in Appendix V. Below are the pollutants that are permitted for release from this facility under the current authorization for the last three years.

Statute:Source ID CWA:WV0084301	Monitoring	QTR1 Apr-Jun07	QTR2 Jul-Sep07	QTR3 Oct-Dec07	QTR4 Jan-Mar08	QTR5 Apr-Jun08	QTR6 Jul-Sep08	QTR7 Oct-Dec08	QTR8 Jan-Mar09	QTR9 Apr-Jun09	QTR10 Jul-Sep09	QTR11 Oct-Dec09	QTR12 Jan-Mar10
Non-compliance in Quarter		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Effluent Violations by NPDES Parameter													
BOD, 5-DAY (20 DEG. C)	Mthly	5%	137%	7%	9%	22%	2742%						
	NMth		18%				2717%						
SOLIDS, TOTAL SUSPENDED	Mthly		13%										
NITROGEN, AMMONIA TOTAL (AS N)	Mthly	95%	67%	87%	56%	46%	89%	63%	36%	60%			
	NMth						22%	10%					
CHLORINE, TOTAL RESIDUAL	Mthly		54%										
COLIFORM, FECAL GENERAL	Mthly	3750%	2950%	1548%			125%						
	NMth	1825%	1425%	725%	800%		13%						
BOD, 5-DAY PERCENT REMOVAL	Mthly	13%	73%	7%	67%		433%			73%			
SOLIDS, SUSPENDED PERCENT REMOVAL													

Monitoring results for permit #WV0084301 located at West Milford, WV. (Source EPA)

The table above shows no permit violations currently exist at this location. According to WVDEP records the facility is operating at required specifications. Current permit information and past violations from this facility may be obtained anytime from the following Environmental Protection Agency (EPA) website at:

http://www.epa-echo.gov/cgi-bin/get1cReport.cgi?tool=echo&IDNumber=110010860158

J. Stenger Comment: ***What folly is it to drastically reduce the habitat pool for numerous existing species behind the dam(s)-in biased favor-hoping to enhance the population of a few "endangered" bivalves? Why put stress upon existing species of mollusks that thrive in the current pools?***

The intent of the aquatic restoration portion of the project is to connect fragmented habitats by removing barriers to habitat and creating additional habitat for various species of aquatic life while encouraging the greatest diversity of habitats possible. While it is true that some species may experience some declines in optimal habitat, it is not anticipated that species currently existing in pools behind the dams will experience extirpation. Most of the mollusk species and particularly those of concern do not thrive in the type of lentic environment that currently exist. While there are some species of pool-thriving freshwater mussels, most require riffle-pool complexes, oxygenated, faster moving water which is a component currently lacking in much of the West Fork River system. Some pool habitat will remain in the river system even after the dams have been removed. These areas will continue to support those species currently in the river that depend upon those conditions.

J. Stenger Comment: ***There will be significant economic costs to farmers along the riverbanks if existing river and pool depths/widths are reduced by dam destruction. Who has considered and estimated these costs? Who will bear the burden of fence building?***

Agency Response: The Agencies disagree. There is no evidence to suggest that there will be significant economic costs to farmers along the riverbank due to removal of the dams.

Note that there are several streamside fencing programs available from State and Federal agencies. Among these are the U.S. Fish and Wildlife Service (USFWS) Partners for Wildlife Program and the Natural Resources Conservation Service (NRCS). These programs may pay up to 100% of the cost of fencing along riparian corridors specifically to exclude livestock from streams. These programs also offer and provide fencing installation. Contact either the NRCS Mt. Clare Field Office (304) 624-9232 or the USFWS Elkins Field Office (304) 636-6586 to find out more information.

J. Stenger Comment: ***Have the people of the upper West Fork been assured that the Stonewall Dam waters will be released to maintain existing water levels?***

Agency Response: As stated previously, removal of the run-of-the-river dams will not affect the quantity of water flowing in the West Fork River. Water elevation will lower as dams are removed. There are currently no known agreements with individuals or entities downstream to maintain water levels to any specified elevation

either pre or post dam removal. However, there is a release schedule for Stonewall Jackson Lake as set by the U.S. Army Corps of Engineers (refer to Appendix VII). This schedule shows that the release ranges from 25 to 45 cu. ft per second measured at the Mount Clare USGS gauging station. Since the establishment of the Stonewall Jackson Dam, the average annual minimum discharge in the West Fork is 37 cu. ft per second (approximately 8.2 feet of stage).

J. Stenger Comment: ***How much accumulated human detritus could be exposed by lower water levels?***

Response: Upon dam removal, water level elevations will be lower without question. As with most watercourses in the State and Country there is human caused debris that accidentally or intentionally finds its way into the river. The Agencies have no reason to suspect that there is any more or less debris within the West Fork River than other similar stream systems. It is recommended that any exposed trash and debris immediately adjacent to the dam sites that becomes uncovered be included for removal in the specifications of the project by the Clarksburg Water Board (CWB). Any exposed debris that is removed should be disposed of properly. Intentional dumping of trash and debris in Waters of the U.S. or State is illegal.

J. Stenger Comment: ***There are dams throughout the United States. Why are a few selected dams on the upper West Fork being selected for destruction? Can't the problems be solved so the dams can be maintained?***

Agency Response: In recent years, dam removal has occurred in many States across the U.S. In particular the removal of obsolete structures has become very common throughout the Northeast by many State and Federal Agencies and organizations. The ownership, age, function, original purpose, barrier potential, location and setting all have particular bearing on whether a structure should be considered for removal. The structures on the West Fork are located in a watershed that has potential for restoration of federally listed species. They are owned by a local unit of government. The structures have reached the lifespan of their original design and are no longer required for the purpose in which they were intended and built. They will need to be maintained and/or upgraded by the owners in order to maintain their current safety certification. In addition, they pose serious public safety and liability issues. Altogether, these factors increase the likelihood of removal. In 2003, a private engineering firm, Gannet Fleming, prepared a study to look at the costs of repairing and maintaining (in addition to removal) of the dams. Refer to the report entitled *Evaluation of Public Safety Improvements for Hartland Dam, Two-Lick Dam, Highland Dam and West Milford Dam on the West Fork River; September 2003.*

J.Stenger Comment: ***What effect will lower water volume/levels resulting from dam busting have upon dilution of contaminants? What town treats sewage above the primary level? Do any treatment plants go beyond the minimal primary level of treatment to secondary or tertiary? Should streams be closed to swimming due to high bacterial levels in hot weather? Are "fin fish" tissues contaminated with heavy metals? Are the waters being monitored for possible unsafe contaminant levels?***

Response: There is no evidence to support that removal of the run-of-the-river dams will affect the quantity of water flowing in the West Fork River. Therefore dilution of any pollutants shall remain consistent. As stated earlier, water treatment facilities operate by permit from the State of West Virginia which requires that all wastewater be treated to certain acceptable levels prior to discharge to waters of the State. Currently, the wastewater treatment facility is permitted in West Milford (permit # WV0084301). The conclusion reached by the Agency(s) is that the water treatment plant located at West Milford is meeting State Water Quality standards as required by their permit requirements.

The Agency(s) agree that during instances of contamination due to high levels of bacteria one should, at a minimum, exercise caution when swimming. There is no evidence to suggest that dam removal will in any way contribute to increased contamination by bacteria.

Certain West Virginia sport fish have been found to contain low levels of chemicals like polychlorinated biphenyls (PCBs), mercury, selenium and dioxin. The West Virginia Department of Health and Human Resources (DHHR) offers an advisory suggesting how often these fish can be safely eaten.

The DHHR maintains the West Virginia Sport Fish Consumption Advisory for 2010. West Virginia DHHR partners with the West Virginia Department of Environmental Protection (DEP) and the Division of Natural Resources (DNR) to develop consumption advisories for fish caught in West Virginia. Fish consumption

advisories are reviewed annually. The advisory recommendation is the result of reviewing new and recent fish tissue data. Data collected from lakes and rivers in West Virginia show that a general statewide advisory of sport-caught fish is appropriate. A review of this information indicates that mercury, PCBs, and dioxin are the chemicals of the greatest concern. However, there are no special advisories for the West Fork River specifically due to high levels contaminants. If you would like more detailed information about these contaminants and the levels measured, consult the DHHR Web Site at http://www.wvdhhr.org/fish .

The Clarksburg Water Board regularly tests the water intake. This testing is compared to the State Water Quality Standard for Drinking Water. A copy of the standard and a sample copy of the CWB test results may be found in Appendix V.

Paragraph Three. You are attempting to hide the public reaction to dam removal. Public comment was overwhelmingly opposed to dam removal. Why do you cover up this very important factor?

Response: This Environmental Assessment was published through the National Environmental Policy Act (NEPA) process. This process includes a requirement that all Federal Agencies provide the ability to the public to have input into federally funded projects. This process requires that notice be given to the public of meetings, information and responses and an open public process. The first public scoping meeting was held January 31, 2008. This meeting was attended by approximately forty (40) individuals. These included members of the public and agency personnel from several State, Federal and non-governmental organizations. There was a written comment period of fifteen (15) days after the scoping meeting and NRCS received fourteen (14) written comments. The summary of the comments are shown in Table 18. A transcript of this meeting is also retained on file.

After publication of the Draft Environmental Assessment there was a comment period of seventy-two (72) days, June 21 - August 31, 2010. The agencies received a total of five (5) letters containing numerous comments. Three (3) of the five letters received expressed general approval or support for the project. The remainder were opposed (refer to Appendix XII). Public comments were also taken throughout the process and when appropriate have been recorded within the document. There were also a total of two letters that were received outside of the comment periods. Based on that evidence, it would be an overstatement of the facts to claim that there is overwhelming opposition to dam removal.

GWF Comment: *Page 9.*

Paragraph Three. This Stonewall Jackson Dam is given credit for the benefits it provides in several categories-improving water quality and supply, improvement of habitat for fish and wildlife hydropower, and recreation. However, you fail to give these other dams any such positive credit whatsoever. How can you say a dam is needed to provide these things and then turn around and claim that dams must be removed to provide these things? How do you justify all the dams built with federal fund and refuse to recognize similar benefits with these dams?

Response: NRCS and the USFWS were not responsible for the funding or construction of the Stonewall Jackson Dam. The agencies responsible for preparation of this Environmental Assessment did not claim that Stonewall Jackson Dam provided specific benefits. The actual statement to which you refer is:

> "*The project was authorized by the federal Flood Control Act of 1966 for the stated purposes of flood control, improvement of water quality and water supply, improvement of habitat for fish and wildlife, hydropower, and recreation.*"

This statement describes the Act which authorizes the construction of dams for these purposes. This was the authority that the U.S. Army Corps of Engineers utilized to justify construction of Stonewall Jackson Dam for the stated purpose of flood control. While all the purposes stated in the Act may or may not be currently provided by Stonewall Jackson Dam and the impoundment behind it, the stated purposes for construction of that project are irrelevant to the goals of this project. These facts were important to point out the scale and scope of the effects upon the West Fork River by Stonewall Jackson Dam. Therefore, its description and brief historical summary were included in this document.

The original purpose of construction and maintenance of the low-head dams owned by the CWB was to provide public water supply for local communities. Only one of the dams (Hartland Dam) currently provides a public water supply for a community. Therefore, this dam has not been recommended for removal. The purpose of this project is, to the greatest extent possible, restore the connectivity of the West Fork River in order to benefit aquatic species including native mussels and their host fish while improving the habitat of the native fishery; and to reduce the liability associated with low-head dams that is currently being borne by the owners.

GWF Comment: *Page II.*

Why are there no recognized uses for these dams when they are used by local citizens for Boating, Fishing, Swimming, Agriculture, and Golfing?

Response: The original purpose of construction, operation and maintenance of the low-head dams owned by the Clarksburg Water Board (CWB) was to provide public water supply for local communities. Only one of the dams (Hartland Dam) currently provides a public water supply. While the impoundments and dams may be utilized by some local individuals for these activities, they were not originally intended, constructed or designed for those purposes. The secondary activity usage associated with these structures has actually resulted in the concerns of public safety and liability. Furthermore, the use of the water within the West Fork River will still be available for all the activities mentioned.

Paragraph Two. You fail to list all the public concerns. Is this so you can hide and minimize the extent of opposition to dam removal?

Response: The purpose of scoping and scoping meetings is to identify concerns to be addressed by the document. Concerns are evaluated irrespective of whether they are identified by Agencies or the public. Table 4 lists all the concerns identified by the Agency(s) and members of the public during the scoping meeting on January 31, 2008. During that meeting, the attendees were charged to identify those issues that were not already identified by the Agency(s). The list on the right hand side of Table 4 was the result of that input. These were written and posted on a large poster on the wall during the public scoping meeting as they were suggested. The general public also listed many of the same concerns that the Agencies listed, therefore they were not re-identified.

Alternative 5 - If Stonewall Jackson Dam controls flooding then if the dams are raised the statement that flooding will become an increased concern has no fact supporting it.

Response: Comment noted. The alternative does not state that flooding will become an increased concern; but only implies the increased potential for flooding and/or flooding resulting from the modified or raised structures is of greater potential. It should be noted that “flood control” does not equate to “flood prevention” or the non-existence of floods on the West Fork River. The low-head dams on the West Fork were not designed for flood control or prevention. Flooding may occur irrespective of the presence of Stonewall Jackson Dam. Nonetheless, this statement has been revised to remove the implication that raised structures cause greater flooding concern.

GWF COMMENT: *Page 15.*

Conversion to Hydropower. Why do you not recommend a feasibility study? What about the goals of green energy? What about cutting back on carbon dioxide generation and stopping global warming? What's the better alternative, mining disasters and catastrophic oil spills or developing hydropower on existing dams?

Response: The Agencies are not opposed to the initiation of a feasibility study for conversion to hydropower. In fact, the recommendation listed in this alternative on page 15 outlines some of the items that a feasibility study should explore. However, a feasibility study for conversion to hydropower does not meet the goals of aquatic restoration of the West Fork. NRCS and USFWS currently have no mechanisms to fund such a study. Pursuit of a feasibility study is beyond the purview of our agencies and beyond the environmental scope of this document. Individuals or other agencies which could pursue that endeavor are encouraged to fund and complete those studies for review by the CWB. NRCS and the USFWS support and encourage the use of alternate forms of energy and reduction of carbon dioxide emissions.

Paragraph Two. The Dams are a beautiful addition to the local scenery. They have visual attraction similar to a waterfall. Why do you not state this?

Response: Comment noted. The document has been revised to reflect that the visual aesthetics are extremely subjective and that to some individuals the appearance of the dams may resemble waterfalls.

You show great ignorance to claim that only small areas of the river have characteristics of a free flowing stream. All the river from Weston to Good Hope and from Clarksburg to Worthington and several areas between West Milford and Clarksburg are completely free flowing. There is much more free flowing river than dammed.

Response: Comment noted. This sentence has been removed to omit the terms "small" and "free flowing". Note that Clarksburg to Worthington is outside the reach of stream directly affected by dam removal.

Perhaps the extensive strip mining for coal over the last 60 years, or all the pollution have had negative impact on mussels-not the Dams.

Response: Comment noted. It is very likely that several factors including degraded water quality historically played a role in the decline of aquatic species including freshwater mussels within the West Fork River. The water quality section of this document has been amended to acknowledge this fact. It should be noted that the current water quality seems to have improved to the point where it will support aquatic organisms that require higher water quality. The dams and their subsequent impoundments, however, prohibit the development of habitats necessary to allow the expansion of freshwater mussels (i.e. riffle-pool complexes) and this seems to be the limiting factor in the dispersal of their populations.

GWF COMMENT: *Page 16.*

Last Paragraph. The river has no problem with being eutrophic. Both Stonewall Jackson and Stonecoal lakes are releasing enough water to make eutrophic conditions a near impossibility.

Response: Comment noted. While eutrophication is a common occurrence in waters that do not have controlled discharge, the impoundments located in the West Fork are infrequently subjected to those conditions. It is noted that where the discharge is mostly regulated by Stonewall Jackson Dam, the outflows are not subject to frequent eutrophication issues. This section of the document was included only to illustrate the potential for eutrophication and does not specifically state that there is a eutrophication problem. Any references intentionally or unintentionally made to the West Fork specifically being eutrophic have been removed.

GWF COMMENT: *Page 18.*

Paragraph One. "Tend to be" is highly speculative. Have you actually measured these things?

Response: Comment noted. This paragraph has been revised to remove references to the one hundred year native fishery and thermal regimes.

GWF COMMENT: *Page 20.*

Public Health. This is highly misleading and poorly worded. These are Low Hazard dams. You say they are easily accessible and remote in the same sentence. Make up your minds. Something that's remote is not easily accessible and something that is easily accessible is not remote. These are opposite meanings. Is the public health and safety endangered by our highways as evidenced by hundreds of deaths each year? Are you advocating highway removal? Get Real Here Folks!

Response: Comment noted. The sentence referring to remoteness of the dams has been re-worded. The agencies are not advocating nor have implied the removal of the highway system. Low Hazard dam is a classification used by the West Virginia Department of Environmental Protection which refers to:

"… those dams located in rural or agricultural areas where failure may cause minor damage to non-residential and normally unoccupied buildings, or rural or agricultural land. Failure would cause only a loss of the dam itself and a loss of property use, such as use of related roads, with little additional damage to adjacent property. The potential for loss of human life resulting from failure of a dam must be unlikely."

GWF COMMENT: *Page 31*

Paragraph One. Where do you come up with 40 miles?

Response: The document speaks to river length instead of aerial distances between points. The stream length from Clarksburg (Route 50) to the Stonewall Jackson Dam is 43.39 miles due to the river's course and sinuosity. This distance includes the many additional miles of meanders (bends and curves) that make the length of the river much longer than the straight line distance from one point to another (i.e. Clarksburg to Weston). Although the linear distance from Clarksburg to Weston is approximately 15 miles the sinuosity of the river accounts for the greater distance.

You state as fact here that sediment transport behind the dams is severely restricted and that heavier material is deposited in the headwaters of the pools. Why then did you not sample for sediment except right at the dams? You failed to sample where you know you might find the greatest amount of sediment.

Response: Comment noted. The Agencies agree that the quantification of sediment performed by Gannet Fleming in the headwaters is inconsistent with areas requiring additional scrutiny. It is recommended that prior to implementation further investigation of headwater deposition be performed by additional appropriate techniques and analyzed.

GWF COMMENT: *Page 32*

Paragraph Two. You make an outrageously false claim to state there is only a "small amount of sediment". On page 31 you stated that sediment transport is "severely restricted". If transport is severely restricted and the dams have been there for up to 200 years, how can you be so ignorant to believe there is only a "small amount"?

Response: Comment noted. The agencies agree that there has been sediment deposition behind the dams to a certain degree. The paragraph quoted also goes on to state that sediment transport is limited, yet still occurs. Therefore transport of sediment continues to be a function of the river. Therefore, sediment levels immediately behind the dams have not accumulated to levels that would be of concern. The amount of legacy sediments does not prohibit dam removal. The phrase "*relatively small amount*" has been removed from this paragraph.

The dams' original construction dates are shown on page 11 in Table 3. The oldest dam (Hartland) was constructed in 1905; therefore the dam is 95 years old. These dates are based on the original engineering as-built designs and records of construction obtained from the CWB.

GWF COMMENT: *Page 34*

7.b. Why haven't the Hackers Creek mussels spread throughout all this connected free flowing habitat?

Response: The Hacker's Creek mussel populations (i.e. clubshell mussel) rely on faster moving better oxygenated water which is a habitat component currently lacking in the West Fork River. Removal of the dams will restore riffle-pool complexes that naturally occur in rivers and redistribution of bed materials which provide habitat for many species of freshwater mussels including the clubshell mussel. Dam removal will allow these habitats to form and thus create opportunities for host fish to deposit glochidea into these areas.

GWF COMMENT: *Page 35*

Last Paragraph. Host fish are plentiful, siltation –by your own claims-is not a problem, eutrophication is a complete non issue.

Response: Comment noted. The host fish are not absent and the paragraph has been revised to remove the references to eutrophication and the abundance of host fish.

GFW Comment: *Page 38.*

Paragraph Three. There is NO eutrophication problem in this section of the West Fork.

Response: Comment noted. This sentence simply states that this is a common problem in many impounded systems and outlines a common concern. However, this paragraph has been removed to avoid confusion.

GFW Comment: *Page 40.*

Paragraph Two. The claim that there will be only a single flush event of sediment is false. Flush events will occur repeatedly for an unknowable length of time. Why make such remarkably ridiculous statements?

Response: The Agencies believe that this statement and question has been taken out of context. The Agencies do not claim that there will be only a single event flush. The reference to single event flushes is made to illustrate the short term effect during dam deconstruction and the resultant action(s) necessary to mitigate the possible short term effects to water quality as it relates to the CWB during deconstruction. Nonetheless, a flush event should be defined as a rain event, the resulting high water and the resultant sediment transport. This cycle may occur over a period of time until the range of flows reach equilibrium with the sediment transport capabilities of the stream (i.e. stability).

Paragraph Four. There is no thermal pollution. Where is the evidence?

Response: Comment noted. This paragraph has been revised to remove the implication that there is thermal pollution. Impounded water typically shows increases in surface temperatures during the warmer months. Since these dams discharge water over the top of the dam, it is logical that temperatures downstream are routinely elevated due to the impoundment effect. Temperature data from the USGS gauges show a trend toward increasing water temperatures. This general trend may be attributed to many factors including the placement of dams on the river.

GFW Comment: *Page 46*

Is your proposal to demolish the dams and leave the unsightly concrete rubble behind to spoil the scenery and recreational potential of the river?

Response: The concrete debris and/or the existing rock at the Two-Lick, the Highland and West Milford dams may be utilized to create additional habitat for fisheries if suitable and appropriate. This will be determined by numerous factors such as permit conditions, cost and aesthetics and need. Concrete spoil and existing rock rip-rap may be suitable to create fish habitat by altering current patterns and providing fish sheltering and foraging locations. Concrete debris should be used only if it is removed and sized according to the needs of the restored fish habitat. This was intended merely as a consideration and not final design criteria. The funding as well as the regulatory agencies should make this determination during preparation of a final design.

GFW Comment: *Page 51*

What about possible endangered species that may now be living in the dam pools?

Response: Informal consultation with the USFWS has been ongoing throughout the development of this document. There are no known endangered species currently present in the pools behind the dams. However, the Agencies will continue to work closely with the USFWS and WVDNR to avoid and minimize impacts to any known populations of listed or sensitive species if they are encountered. Additional avoidance measures may be required when deconstruction commences should populations of listed or other sensitive species be encountered.

GFW Comment: *Page 55*

The Muskellunge comment response untrue. Musky will be seriously negatively effected as proven by your own data in Table 5 page 19.

Response: Comment noted. The Agencies disagree that muskellunge habitat will be detrimentally affected. According to the WVDNR fisheries biologists the response to dam removal is expected to be less severe than originally thought within this document. See WVDNR comments. The information in Table 5 has been revised to reflect a "*no significant change*" in habitat loss.

GFW Comment: *Page 56*

The comments concerning low water levels are not explained. What were these comments?

Response: The scoping comments were summarized in the draft for conciseness, thus the comment was summarized in Table 18 as "*Concerned about low water levels following dam removal*". All comments are retained on file. The actual written comment received is shown below:

> *I recently learned of the city of Clarksburg's plans to eliminate the four dams in the county.How can this be even feasible?The river is one of three rivers I only know that runs south to north.The Mon & Nile the other two.We have not the greatest flow now in the Adamston area along route 20 and Hepzibah, Meadowbrook,&Shinnston areas are shallow at best .The water levels at best are two feet.The city will run into future problems with water during drought conditions cause the city can't rely on Stonewall Jackson Dam to fill their needs.A dry river bed absorbs alot of water.The dam is used for tourism to accommodate pleasure boaters so you can't drain the lake.As for the condition of the river I see mussels galore from Weston to Fairmont.I have caught many fish over the fourty two years.Carp behind the power plant in Haywood or smallmouth in Shinnston.Catfish in Fairmont,smallmouth in Monongah.I recently have found my passion for life in the musky of the West Fork.I think we need to stick to an old addige my dad use to say "If it isn't broke don't fix it.Cause later on you might be sorry." Thank you for your time.* –Bill Hall

What are the "prefer no action" comments? It is unlikely that these comments simply state "prefer no action".

Response: Comment noted. This table summary has been revised. There were actually only three comments that should be listed as "*prefer no action*". One of the comments was assumed to prefer no action due to the presence of a cartoon drawing in the comment section of the form provided to the participants in the scoping meeting. The scoping comments were summarized in Table 18 for conciseness, thus "prefers no action". All comments are retained on file. The actual written comments (shown as prefer no action) received are below:

> *"As a resident and taxpayer of Harrison County I ask that West Milford and Highland Dams would be left alone as they are."* -Brandon L. Toth
>
> *"Like the dams the way they are- great fishing in the spring."* -Jordan Toth
>
> *"Have enjoyed fishing at the dams (West Milford and Highland) since I was a boy and would not like to see them changed."* – Jerry M. Toth

GFW Comment: *Page 65.*

The Town of West Milford was not among the groups receiving notice of the meeting. It is also likely that the Town of West Milford has not been sent a copy of this Draft Environmental Statement.

Response: The initial public scoping meeting as well as the DEA was listed in two major newspapers that are widely circulated in Harrison and surrounding counties. It was attended by approximately forty people which included the Mayor of West Milford. The DEA was published on the Clarksburg Water Board's website and the

NRCS website as well as being published in two newspapers. Personal copies of the DEA were mailed to all known interested individuals and agencies to the greatest extent possible.

GFW Comment: *Pages 77 to 78*.

Note that the host fish for both the Club Mussel and the Northern Riffleshell are present and common in the West Fork River. There are already miles of suitable habitat directly connected to the Hacker's Creek populations. What factors are stopping their dispersal into all this suitable habitat? Removing dams, that do not interfere with this present lack of dispersal, will make little difference.

Response: The habitat necessary to sustain populations of the mussels in question is currently not present in the West Fork River. The dams, while acting as a partial structural barrier, also create a lentic environment behind the dams. The freshwater mussels that are found in the Hackers Creek riffle-pool complexes do not subsist in the pools created by the dams currently in the West Fork River. This habitat type serves as a barrier to distribution. Additional distribution factors that are affecting the Hackers Creek population also include livestock access to the stream, sedimentation, runoff from development and streambank erosion among others. While it is likely that historic water quality did exacerbate the possible extirpation and/or decline of populations in the West Fork, the subsequent construction and alteration of habitat by dams removed the possibility of reintroduction and distribution in the West Fork River once the water quality improved.

GFW Comment: *Page 79.*

Where are the last 12 years data on dissolved oxygen?

Response: USGS gauges provide differing data for water quality depending on the gauge. The gauges in the West Fork have been periodically phased out of commission through the years. Gauge funding has been limited and data is lost or missing depending on the particular upkeep of the various gauges. All available data from the gauges in the West Fork were used. Some gauges provided data only for specific periods of time and for specific water data (water quality and/or flow) and often times there are gaps in that data. The ranges were selected that represent the most and longest consistent data available over the longest timeframe possible. This data is shown in Table 14. Therefore, when there are considerable gaps or omissions in the data it was not used or only incorporated in this document to show a general trend. The gauge that provided this particular dissolved oxygen data was decommissioned in 1998, thus the last twelve years is nonexistent.

GFW Comment: *Page 85*

[Reference to State Water Quality Standard] ***This is meaningless. Where is the West Fork Data?***

Response: The State Water Quality Standard is shown on page 85. It is shown in comparison to the water quality report/sediment sludge report generated from the CWB treatment facility on the following page. All indicators are within State Water Quality Standards and parameters.

GFW Comment: *Page 87*

[Reference to Appendix VI Flood Plain Maps] ***What is the relevance? There is none.***

Response: Comment Noted. The FEMA flood insurance maps were included to illustrate the irrelevance of flood control provided for the watershed by these dams. The Agencies agree that the dams provide no measure of flood protection, prevention or control as illustrated by the maps and discussed in Section 6.5 Hydrology.

GFW Comment: *Page 97*

Sediment. This section is very poorly done. The first place sediment is likely in accumulate is in the headwaters and at creek mouths-places where you choose not to study. You have hardly scratched the surface in conducting an adequate sediment study. This is obvious since your knowledge and understanding of sediment conditions is severely limited.

Response: Comment noted. As previously stated, although sediment quality does not appear to be of major concern the agencies recommend that the sediment analysis should be explored more comprehensively prior to implementation. The extent of the quantity of sediment located in the headwaters of the pools should be measured quantitatively prior to implementation. This should be done to substantiate the need and extent of revegetation to stabilize legacy sediments in the headwaters. Even if further analysis is not undertaken, it is the opinion of the Agencies that the quantity and quality of the sediments do not reach levels of concern that would prohibit dam removal and remediation due to the amount or quality of legacy sediment.

APPENDIX III

CULTURAL RESOURCES REPORT

December 17, 2007

Lora Lamarre
West Virginia Division of Culture & History
Charleston, West Virginia 25305-0300

RE: Dam Removal/Modification – Harrison County, WV (West Fork River)

Dear Ms. Lamarre,

The NRCS is providing technical and financial assistance for the removal of three low water dams and the modification of one low water dam near the city of Clarksburg, WV. The four dams were constructed under the authorization of the Clarksburg Water Authority between the years of 1901 and 1933. All four dams were originally used to generate water supply for the city of Clarksburg and surrounding communities. Currently only one dam is used for water supply. The dam currently used for water supply has an unrelated cut stone retaining wall on the east bank of the river, immediately downstream of the dam. This wall will not be impacted by the modification of the dam. This dam is in the view shed of modern metal and brick warehouses/buildings. The other three dams do not have any associated structures, thus impact will be limited to the dams.

All dams pose a liability issue for the Water Authority as three people have drowned at one of the dams. After the deaths, large rocks were placed immediately adjacent to two of the dams, extending downstream for approximately 20 feet. This was an attempt to slow the flow of water over the dam. This action has only created more foot travel at the dams.

There are no National Register properties present near any of the dam sites. Harrison County has twenty four National Register Properties, with several of these being located over one mile north of the nearest dam. The view shed will not be affected by the alteration and removal of the dams. West Virginia Historic Preservation Office USGS quadrangles were examined to locate known archaeological sites and historic structures recorded on the West Virginia Historic Inventory Property Form. No previously recorded archaeological sites were present within or immediately near the Area of Potential Effect. One prehistoric site, 46Hs2, is the only previously recorded site within three miles of the dam sites. This site is located on a hill top approximately .75 miles south-west of Hartland Dam. Several historic structures are recorded near the community of Center Branch, two miles east of Two-Lick Dam.

The NRCS Archaeologist/Cultural Resources Specialist Bryan Lee visited each dam site on November 9, 2007. Each dam site was photographed and inspection of the Area of Potential Effect was conducted. No cultural resources were identified. A

West Virginia Historic Properties Inventory Form was completed for each dam site. Additional maps and photographs were included with each dam.

It was also determined that very little ground disturbance will occur as removal of the dam abutments will be at ground level. Ground disturbance will be limited to areas previously disturbed during dam construction. Should archaeological remains be detected all work will cease and your office will be notified.

It is the finding of NRCS that no Historic Properties will be affected. It is recommended that the proposed work be implemented. If cultural resources are located during construction, work will cease and your office will be contacted. We seek your concurrence with these findings.

If you have any questions or need additional information do not hesitate to contact me at (614) 255-2487 or Bryan.Lee@oh.usda.gov . Thank you.

Sincerely,

Bryan Lee
Archaeologist, Ohio NRCS

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EEO/AA Employer

January 11, 2008

Mr. Bryan Lee
Archaeologist
Ohio NRCS
200 North High Street
Room 522
Columbus, OH 43215

RE: Dam Removal/Modification - Harrison County
West Fork River
FR#: 08-253-HS

Dear Mr. Lee:

We have reviewed the above referenced project to determine its effects to cultural resources. As required by Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties," we submit our comments.

According to the submitted project information, the Clarksburg Water Board is proposing to remove three low water dams and modify one low water dam on the West Fork River near the city of Clarksburg, Harrison County.

Architectural Resources:
It is our understanding that three low water dams known as the Hartland Dam, the Browns Creek Dam/ Two-Lick Dam and the West Milford Dam will be removed. We also understand that the Highland Dam will be modified and that the cut stone retaining wall on the east bank of the river just below the dam will not be impacted. A search of our records indicates that these four dams are potentially eligible for listing in the National Register of Historic Places under Criterion A. Therefore, we can not concur at this time that the removal of the three dams and the modification of the fourth will have no adverse effect.

With the creation of the Clarksburg Water Board in1909 they completed the construction on the first water filtration plant in the state of West Virginia on November 14, 1911. Mr. Boynton, a chemist for this plant from 1912 - 1953 held the first water plant operator's license issued by the state of West Virginia and was the first Fuller Award winner from West Virginia. The brick filtration plant is located adjacent to Highland Dam and is known as the Clarksburg Water Works Station. Upon review of the 1955 (1972 revised) Sanborn Map of Clarksburg it is possible that the cut stone retaining wall is a portion of the original coagulating basin. The photographs provided shows the dam adjacent to the cut stone wall and another concrete structure adjacent to the brick filtration buildings. Please provide additional information and design plans on how the dam will be modified and how the work would impact any of the adjacent structures. In our opinion, the three dams to be removed were an important part of the original Clarksburg water system and are identified as Dam No. 1 - Hartland no construction date found, Dam No. 2 - Brown's Creek constructed in 1911, Dam No. 3 - Highland constructed in 1931, and Dam No. 4 - West Milford Dam constructed in 1922.

Therefore, in addition to the information previously requested please resubmit the West Virginia Historic Property Inventory (HPI) forms and a Statement of Significance for each resource to be prepared by an Architectural Historian meeting the Secretary of Interior's Professional Qualification Standards. Please include black and white photographs that also meet the National Park Service requirements. We will continue our review upon receipt of the information requested.

Archaeological Resources:
A search of office site files and maps located no known archaeological sites within the proposed project areas and several known archaeological sites within a one-mile radius. Project information states that proposed ground disturbing activities will be confined to areas previously impacted by dam construction, which in our opinion makes it unlikely that there are intact archaeological deposits present. In our opinion, there are no archaeological sites located within the proposed project area that are eligible for or listed in the National Register of Historic Places. If, however, cultural materials are encountered during proposed ground disturbing activities, all activity shall cease and our office shall be contacted immediately.

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please contact Carolyn Kender, Archaeologist, or Ginger Williford, Structural Historian, in the Historic Preservation Office at (304) 558-0240.*

Sincerely,

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP/CMK/GW

cc: Clarksburg Water Board

enclosures

Professional Qualification Standards

In the September 29, 1983, issue of the Federal Register, the National Park Service published the following Professional Qualification Standards as part of the larger Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. These Professional Qualification Standards are in effect currently. Since 1983, the National Park Service has not issued any revisions for effect, although the National Park Service is in the process of drafting such revisions.

The following requirements are those used by the National Park Service, and have been previously published in the Code of Federal Regulations, 36 CFR Part 61. The qualifications define minimum education and experience required to perform identification, evaluation, registration, and treatment activities. In some cases, additional areas or levels of expertise may be needed, depending on the complexity of the task and the nature of the historic properties involved. In the following definitions, a year of full-time professional experience need not consist of a continuous year of full-time work but may be made up of discontinuous periods of full-time or part-time work adding up to the equivalent of a year of full-time experience.

Architectural History

The minimum professional qualifications in architectural history are a graduate degree in architectural history, art history, historic preservation, or closely related field, with coursework in American architectural history; or a bachelor's degree in architectural history, art history, historic preservation or closely related field plus one of the following:

1. At least two years of full-time experience in research, writing, or teaching in American architectural history or restoration architecture with an academic institution, historical organization or agency, museum, or other professional institution; or

2. Substantial contribution through research and publication to the body of scholarly knowledge in the field of American architectural history.

Architecture

The minimum professional qualifications in architecture are a professional degree in architecture plus at least two years of full-time experience in architecture; or a State license to practice architecture.

Historic Architecture

The minimum professional qualifications in historic architecture are a professional degree in architecture or a State license to practice architecture, plus one of the following:

1. At least one year of graduate study in architectural preservation, American architectural history, preservation planning, or closely related field; or

2. At least one year of full-time professional experience on historic preservation projects.

Such graduate study or experience shall include detailed investigations of historic structures, preparation of historic structures research reports, and preparation of plans and specifications for preservation projects.

Photographic Requirements:

A series of black and white photographs will be taken of all exterior facades that are to be altered or interior spaces that are to be changed in any way. Photographs of buildings to be demolished must reflect the significant features of the building and include all relevant facades and key interior elements. The use of a 35 mm camera is acceptable. Photo paper shall be **archival** and be black and white processed only. **Fugi Crystal Archive paper is not acceptable as this has not been identified as a true archival paper, nor should the photos be color processed.** Negatives need to be included in the documentation package submitted to the WVSHPO.

Digital photographs are acceptable if guidelines established by the National Register of Historic places are followed. Please consult http://www.nps.gov/nr/policyexpansion.htm. In general, digital photographs must meet a 75 year permanence standard using specific paper and ink combinations. In place of negatives, digital photographs must also be submitted with CD-R media. Files must be saved as uncompressed Tiff files. Each image must be at least 1600x1200 pixels at 300 ppi and saved in 8-bit (or larger) color format.

Images must demonstrate the feel of the exterior façade or interior space, including a variety of photograph angles to include all relevant features. For example, the exterior images should include the whole elevation as well as close ups of windows, cornices, brackets or other features. Interior images should include overall views as well as details of interior features, such as baseboard, cornice, furnishings and other finishes.

RALPH PEDERSEN ARCHITECT
351 WASHINGTON AVE. P.O. BOX 1885 CLARKSBURG, WEST VIRGINIA 26302
(304) 624-9298

29 August 2008

SEP 3 - 2008

GANNETT FLEMING

Ms. Ginger Williford
West Virginia Division of Culture and History
The Cultural Center
1900 Kanawha Blvd E.
Charleston, WV 25305

Re: Dam Removal/Modification – Harrison County
West Fork River
FR#: 08-253-HS

Dear Ms. Williford:

I am pleased to advise you that my firm has completed the historic documentation of the four water dams owned by the Clarksburg Water Board that are proposed for removal or modification, Hartland Dam, Two-Lick Dam, Highland Dam and West Milford Dam.

At their meeting this week, the Clarksburg Water Board authorized us to forward the documentation to the State Historic Preservation Office. Enclosed please find the following for each dam:

- Historic Property Inventory Form and Continuation Sheets
- Black & White Photos
- Black & White Negatives
- Digital Color Photos
- Copy of the USGS Map
- Site Plans – 1 full size & 1 smaller copy

Also enclosed are copies of two historic photographs, one of the Hartland Dam and one of the original West Milford Dam and Gristmill, and originals of the USGS maps. Only three originals are included, however, since two of the dams appear on the same USGS map.

All of the above documentation has been placed on a CD, which is included as well.

We are providing copies of this information in the form of a bound report to our client, Gannett Fleming, to the Clarksburg Water Board, and to NRCS, which prepared the original historic inventories.

Although the documentation being sent to the SHPO is in loose form, we are including a copy of the report cover and table of contents for information purposes.

We appreciate your assistance with this project. If you have any questions, please don't hesitate to contact me.

Sincerely,

Ralph Pedersen, AIA

RP:ms

cc: Gannett Fleming, Inc.

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September 10, 2008

Mr. Ralph Pedersen, AIA
Ralph Pedersen Architect
351 Washington Ave.
P.O. Box 1885
Clarksburg, WV 26302

RE: Dam Removal/Modification - Harrison County
West Fork River
FR#: 08-253-HS-2

Dear Mr. Pedersen:

We have reviewed the *Historic Property Documentation* for the above referenced project to determine its effects to cultural resources. It is unclear at this time which federal agency is providing funding or permitting for this project. The following comments are based upon the assumption that state or federal agencies are involved and are offered as comment under federal regulations of Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36 CFR 800 or under West Virginia Code 29-1-8.

According to the previously submitted project information, the Clarksburg Water Board is proposing to remove three low water dams and modify one low water dam on the West Fork River near the city of Clarksburg, Harrison County.

In our opinion, these dams are eligible for listing in the National Register of Historic Places under Criterion A as part of Clarksburg's municipal water system which was administered by the Clarksburg Water Works Commission, predecessor of the Clarksburg Water Board, as one of the first public utility ventures in West Virginia and one of the first efforts on the part of a municipality to supply water directly to homes and business. These dams are also eligible for listing under Criterion B for their association with George W. Fuller for which the George Warren Fuller Award is named and presented annually to one member of each section of the American Water Works Association for their distinguished service in the water supply field. They are also eligible under Criterion B for their association with the second plant operator Mr. Perkins Boynton. Mr. Boynton worked for the Clarksburg Water Works Commission from 1913-1953 and was the first recipient of the Fuller Award for his innovations with the water filtration process. In addition, the dams are eligible under Criterion C for their association with the design and construction of the water supply system. Therefore, the removal or modification of these dams will be an adverse effect to a resource eligible for listing in the National Register of Historic Places.

It is our understanding that the Clarksburg Water Board has requested that the Natural Resources Conservation Service (NRCS) participate in further evaluation of alternatives for the dams and that NRCS is providing planning assistance. Therefore, please state what other alternatives that have been considered other than the removal of Dams #2, #3 and #4 as well as what modifications that will be done at Dam #1.

Should the Clarksburg Water Board decide to proceed with the project we have provided a draft Memorandum of Agreement (MOA) with language reflecting the use of federal funding. We will provide further instructions on the execution of the MOA upon verification of the funding source. In our opinion all of the Stipulations except #7 have been met with the submittal of the *Historic Property Documentation.*

We look forward to working with you on this project and please do not hesitate to call our office if you have any questions.

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please contact Ginger Williford, Structural Historian, in the Historic Preservation Office at (304) 558-0240.*

Sincerely,

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP/GW

attachment

cc: Clarksburg Water Board
NRCS

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May 11, 2009

MAY 15 2009

GANNETT FLEMING INC.

Mr. Rulison Evans, P.E.
Senior Project Manager
Gannett Fleming
Foster Plaza III-STE. 200
601 Holiday Drive
Pittsburgh, PA 15220

RE: Dam Removal/Modification - Harrison County
West Fork River
FR#: 08-253-HS-4

Dear Mr. Evans:

We have reviewed the *Historic Property Documentation* report for the above referenced project to determine its effects to cultural resources. As required by Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties," we submit our comments.

In our opinion, the Historic Property Documentation satisfies the Stipulations set forth in the draft Memorandum of Agreement. It is our understanding that a second copy of this documentation will also be presented to the Clarksburg Library. No further documentation is necessary.

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please contact Ginger Williford, Structural Historian, in the Historic Preservation Office at (304) 558-0240.*

Sincerely,

Susan M. Pierce

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP/GW

cc: Clarksburg Water Board
Bryan Lee, NRCS

APPENDIX IV

FISHERIES AND MUSSEL DATA

WVDNR CONSOLIDATED FISHERIES DATA (based on periodic sample data 1949-2002)

DARTERS (7 species)

Common Name	Species	Mean Relative Abundance (per sample)	State Ranking*	Global Ranking*	Comments
Darter, Blackside	*Percina maculata*	2.8	S5	G5	See footnote b
Darter, Banded	*Etheostoma zonale*	23.4	S5	G5	See footnote a
Darter, Fantail	*Etheostoma flabellare*	3.4	S5	G5	
Darter, Greenside	*Etheostoma blennioides*	16.7	S5	G5	
Darter, Johnny	*Etheostoma nigrum*	5.8	S5	G5	
Darter, Rainbow	*Etheostoma caeruleum*	0.7	S4	G5	
Logperch	*Percina caprodes*	4.2	S5	G5	See footnote b

MINNOW (16 species)

Common Name	Species	Mean Relative Abundance (per sample)	State Ranking*	Global Ranking*	Comments
Stoneroller, Central	*Campostoma anomalum*	5.3	S5	G5	See footnote b
Carp, Common	*Cyprinus carpio*	0.3	----	----	Exotic Species
Chub, Bigeye	*Hybopsis amblops*	0.3	S4	G5	
Chub, River	*Nocomis micropogon*	0.1	S5	G5	
Creek Chub	*Semotilus atromaculatus*	6.2	S5	G5	
Minnow, Bluntnose	*Pimephales notatus*	155.5	S5	G5	
Minnow, Silverjaw	*Ericymba buccata*	15.3	S5	G5	
Shiner, Common	*Luxilus cornutus*	5.6	**S3**	G5	See footnote d
Shiner, Golden	*Notemigonus crysoleucas*	5.3	S4	G5	
Shiner, Mimic	*Notropis volucellus*	2.4	S5	G5	
Shiner, Rosyface	*Notropis rubellus*	4.3	S5	G5	
Shiner, Sand	*Notropis stramineus*	79.0	S5	G5	
Shiner, Silver	*Notropis photogenis*	16.8	S5	G5	
Shiner, Spotfin	*Cyprinella spiloptera*	8.4	S5	G5	
Shiner, Striped	*Luxilus chrysocephalus*	5.6	S5	G5	See footnote b
Chub, Bigeye	*Hybopsis amblops*	0.3	S4	G5	

SUCKERS (7 species)

Common Name	Species	Mean Relative Abundance (per sample)	State Ranking*	Global Ranking*	Comments
----	*Moxostoma sp.*	0.4	----	----	
Northern Hog Sucker	*Hypentelium nigricans*	6.8	S5	G5	
Quillback	*Carpiodes cyprinus*	0.2	S4	G5	
Redhorse, Golden	*Moxostoma erythrurum*	13.7	S5	G5	
Redhorse, Silver	*Moxostoma anisurum*	0.1	S4	G5	
River Carpsucker	*Carpiodes carpio*	0.3	**S2**	G5	See footnote d
Sucker, White	*Catostomus commersoni*	7.6	S5	G5	

WVDNR CONSOLIDATED FISHERIES DATA

GAME FISH (15 species)

Common Name	Species	Mean Relative Abundance (per sample)	State Ranking*	Global Ranking*	Comments
----	*Hybrid L. cyanellus x L.m.*	<0.1	----	----	
Bass, Largemouth	*Micropterus salmoides*	10.3	S5	G5	
Bass, Rock	*Ambloplites rupestris*	1.6	S5	G5	
Bass, Smallmouth	*Micropterus dolomieu*	2.1	S5	G5	
Bass, Spotted	*Micropterus punctulatus*	4.4	S5	G5	
Bluegill	*Lepomis macrochirus*	26.1	S5	G5	
Catfish, Channel	*Ictalurus punctatus*	0.4	S5	G5	
Catfish, Flathead	*Pylodictis olivaris*	<0.1	S5	G5	
Crappie, Black	*Pomoxis nigromaculatus*	0.7	S4	G5	
Crappie, White	*Pomoxis annularis*	2.3	S4	G5	
Muskellunge	*Esox masquinongy*	<0.1	S4	G5	Stocked species
Sauger	*Sander canadensis*	----	S5	G5	See footnote c
Sunfish, Green	*Lepomis cyanellus*	12.3	S5	G5	
Sunfish, Longear	*Lepomis megalotis*	0.2	S5	G5	
Walleye	*Sander vitreus*	<0.1	S5	G5	

OTHER (9 species)

Common Name	Species	Mean Relative Abundance (per sample)	State Ranking*	Global Ranking*	Comments
----	*Ictalurus sp.*	<0.1	----	----	
----	*Lepomis sp.*	<0.1	----	----	
Bullhead, Brown	*Ameiurus nebulosus*	0.3	S5	G5	
Brindled Madtom	*Noturus miurus*	10.9	S4	G5	
Brook Silverside	*Labidesthes sicculus*	16.4	S4	G5	
Bullhead, Black	*Ameiurus melas*	<0.1	**S3**	G5	1 specimen 1964 See footnote d
Bullhead, Yellow	*Ameiurus natalis*	9.4	S5	G5	
Lamprey, Least Brook	*Lampetra aepyptera*	0.8	**S2**	G5	1 specimen 1964 See footnote d
Longnose Gar	*Lepisosteus osseus*	<0.1	S4	G5	2 specimens 1983

* According to NatureServe Database
[a] Literature indicates this species is a suitable host for the federally endangered Northern riffleshell mussel.
[b] Literature indicates this species is a suitable host for the federally endangered clubshell mussel.
[C] This species is present only downstream of Hartland Dam. Not listed in WVDNR survey data.
[d] Considered "rare" by WVDNR

SUMMARY

Total Fish Species	WV State Ranking						Global Ranking					
	NR	S5	S4	S3	S2	S1	NR	G5	G4	G3	G2	G1
54	**5**	**33**	**12**	**2**	**2**	**0**	**5**	**49**	**0**	**0**	**0**	**0**
Percent of Total Species	9%	61%	22%	4%	4%	0%	9%	91%	0%	0%	0%	0%

WVDNR Mussel Survey Records & Locations

SCIENTIFIC NAME	COMMON NAME	SURVEY LOCATIONS* (Survey Event No. & Date)												
		CWB DAM CONSTRUCTION ERA				CWB DAM POST-CONSTRUCTION ERA								
		EI 536 (1911)	EI 538 (1912)	EI 539 (1911)	EI 537 (1919)	EI 90 (1980)	EI 89 (1985)	EI 91 (1993)	EI 853 (1993)	EI 1804 (2001)	EI 1805 (2001)	EI 1806 (2001)	EI 980 (2005)	EI 1002 (2005)
Alasmidonta marginata	Elktoe	X		X										
Amblema plicata	Threeridge	X	X	X	X	X	X	X	X		X	X	X	
Cyclonaias tuberculata	Purple Wartyback	X												
Elliptio dilatata	Spike	X	X	X		X	X	X	X		X	X	X	
Epioblasma torulosa rangiana	Northern Riffleshell	X												
Epioblasma triquetra	Snuffbox	X	X		X	X*								
Fusconaia flava	Wabash Pigtoe					X			X					
Fusconaia subrotunda	Long-Solid	X												
Lampsilis cardium	Plain Pocketbook	X	X	X	X	X	X	X	X		X			
Lampsilis fasciola	Wavy-rayed Lampmussel	X	X	X										
Lampsilis siliquoidea	Fat mucket	X	X	X		X	X		X	X	X			X
Lasmigona costata	Fluted-shell	X	X	X		X			X		X		X	X
Obovaria subrotunda	Round Hickorynut	X	X	X							X			
Pleurobema clava	Clubshell	X	X	X										
Pleurobema sintoxia	Round Pigtoe	X	X	X	X									
Ptychobranchus fasciolaris	Kidneyshell	X	X		X	X					X		X	
Pyganodon grandis	Giant Floater	X	X	X		X	X							
Quadrula cylindrica	Rabbitsfoot				X									
Quadrula metanevra	Monkeyface				X									
Simpsonaias ambigua	Salamander mussel		X											
Strophitus undulatus	Creeper	X		X		X	X		X					
Tritogonia verrucosa	Pistolgrip	X	X		X									
Utterbackia imbecillis	Paper Pondshell									X				
Villosa fabalis	Rayed Bean	X	X	X										
Villosa iris	Rainbow	X	X	X										

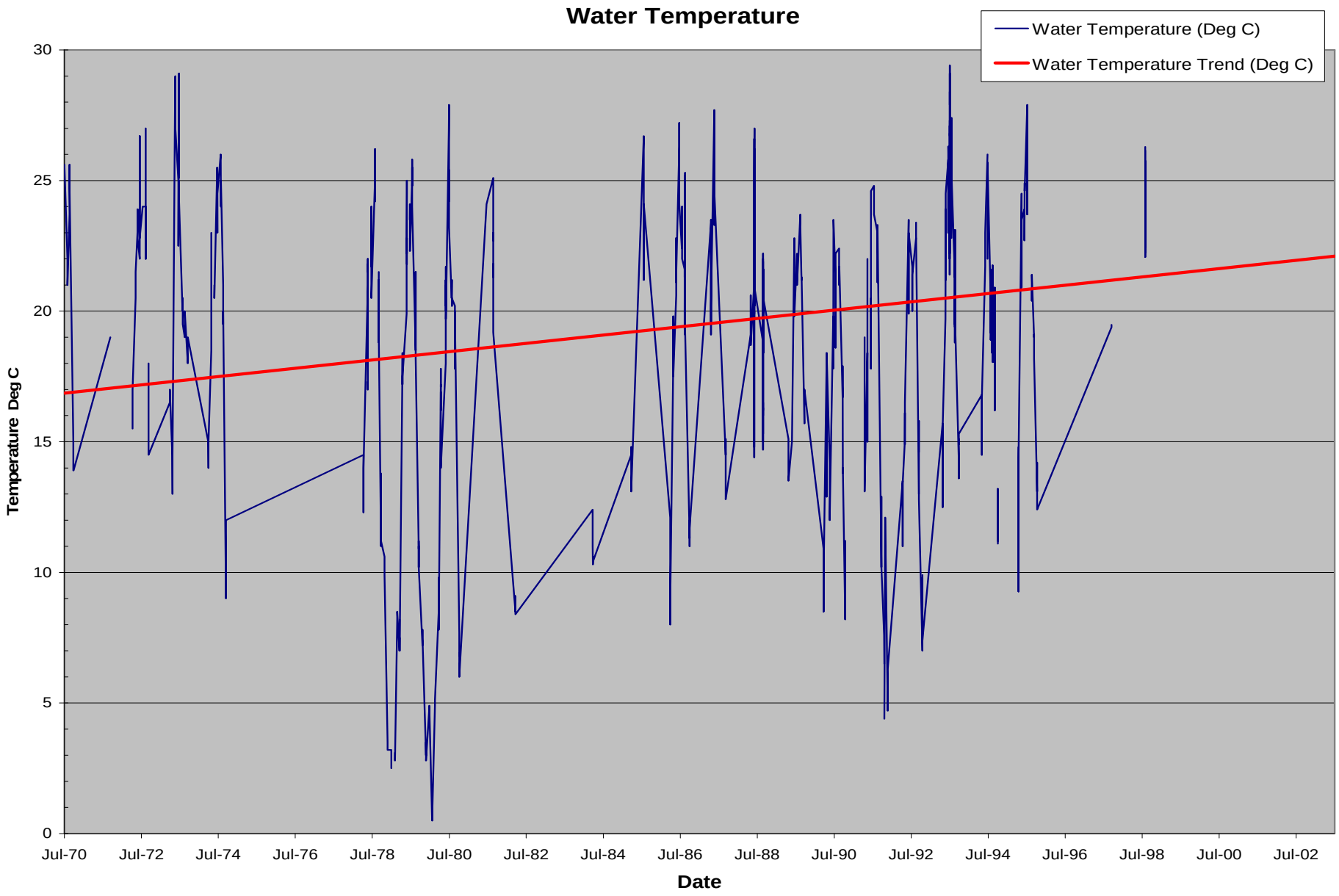
Refer to the following map for locations of survey sites. An "**X**" indicates that the species was found to be present at that survey location.

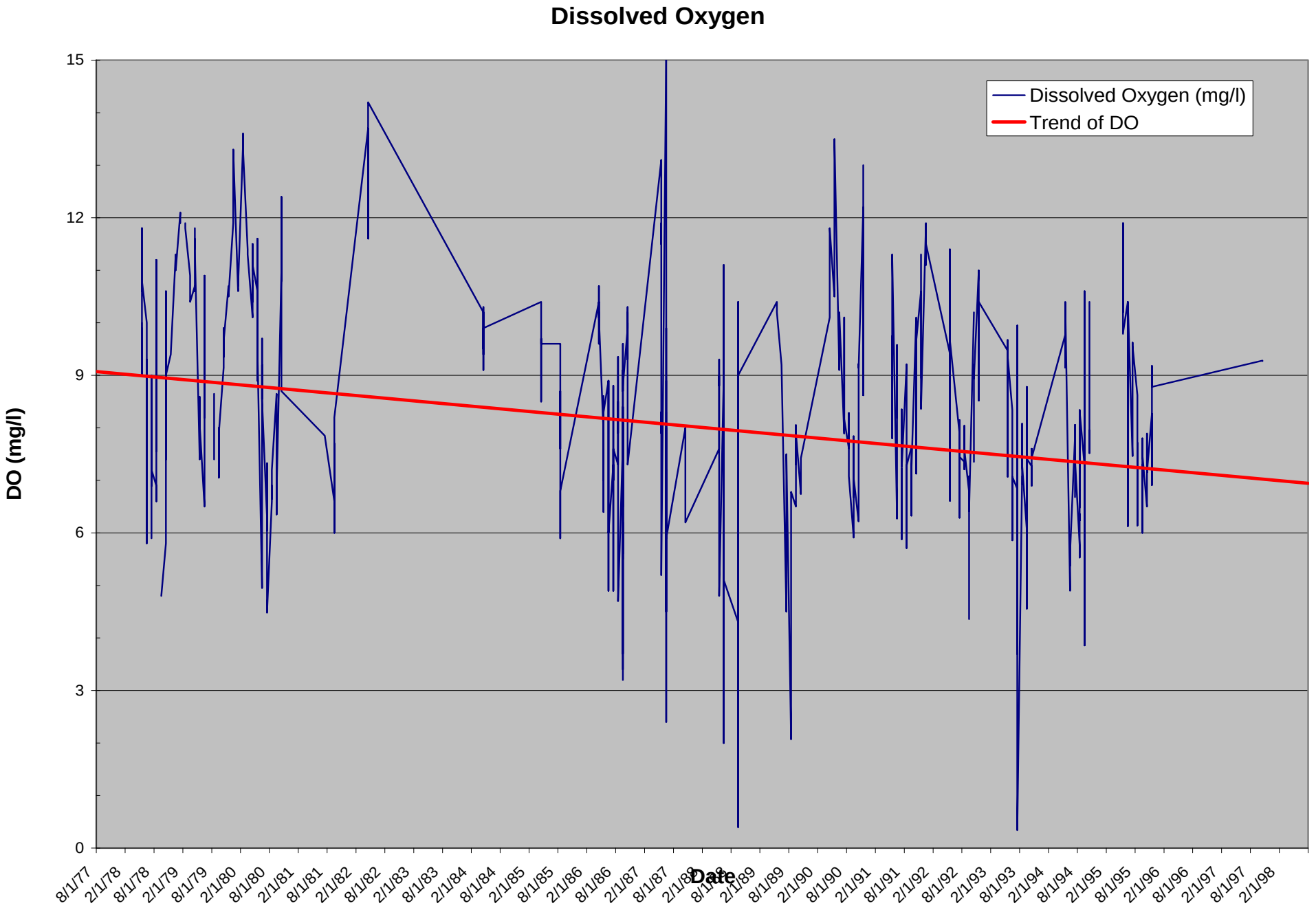
* Species was identified as being present but no indication of live or dead condition was noted, therefore the viability of the species is questionable (personal communication J. Clayton, WVDNR).

Locations of Selected Mussel Surveys 1919 - 2005

APPENDIX V

WATER QUALITY DATA (Data courtesy USACE Pittsburgh District)




Dissolved Oxygen
Dissolved Oxygen (mg/l)
Trend of DO
DO (mg/l)
15
12
9
6
3
0
Date
8/1/77
2/1/78
8/1/78
2/1/79
8/1/79
2/1/80
8/1/80
2/1/81
8/1/81
2/1/82
8/1/82
2/1/83
8/1/83
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2/1/92
8/1/92
2/1/93
8/1/93
2/1/94
8/1/94
2/1/95
8/1/95
2/1/96
8/1/96
2/1/97
8/1/97
2/1/98

State Water Quality Standards

The WV Department of Environmental Protection describes the West Fork water quality as compared to the state water quality standards as follows:

> *Water Quality Standards consist of three components: designated and existing uses; narrative and/or numerical water quality criteria necessary to support those uses; and an anti-degradation statement. Water quality standards serve two purposes. The first is establishing the water quality goals for a specific waterbody. And the second is establishing water quality-based treatment controls and strategies beyond the technology-based levels of treatment required by section 301(b) and 306 of the Act (USEPA, 1991). Title 46, Legislative Rule, Environmental Quality Board; Series 1, Requirements Governing Water Quality Standards, West Virginia sets forth designated and existing uses as well as numeric and narrative water quality criteria for waters in the state.*
>
> *The Requirements Governing Water Quality Standards (Appendix E) displays the numeric water quality criteria, while narrative water quality criteria are largely contained in Section §46-1-3 of the same document. Total aluminum, total iron, total manganese, dissolved zinc, and pH have numeric criteria under the Aquatic Life and the Human Health use designation categories (Table below). The listed waterbodies in the West Fork watershed have been designated as having an Aquatic Life and a Human Health use (WVDEP, 1998a).*

Applicable West Virginia Water Quality Criteria

POLLUTANT	USE DESIGNATION				
	Aquatic Life				Human Health
	B1, B4		B2		A^c, C^c
	Acute [a]	Chronic [b]	Acute [a]	Chronic [b]	
Aluminum, Total (ug/L)	750	-	750	-	-
Iron, Total (mg/L)	-	1.5	-	0.5	1.5
Manganese, Total (mg/L)	-	-	-	-	1.0
Zinc, dissolved (mg/L)	$(0.978)(e^{[0.8473)(ln[hardness\surd])+0.8604]})$	$(0.986)(e^{[0.8473)(ln[hardness\surd])+0.7614]})$	$(0.978)(e^{[0.8473)(ln[hardness\surd])+0.8604]})$	$(0.986)(e^{[0.8473)(ln[hardness\surd])+0.7614]})$	-
pH	No values below 6.0 or above 9.0 (inclusive)	No values below 6.0 or above 9.0 (inclusive)	No values below 6.0 or above 9.0 (inclusive)	No values below 6.0 or above 9.0 (inclusive)	No values below 6.0 or above 9.0 (inclusive)

Note: B1 = warm water fishery streams, B4 = wetlands, B2 = trout waters, A = public water supply, C = water contact recreation.
a One-hour average concentration not to be exceeded more than once every 3 years on the average.
b Four-day average concentration not to be exceeded more than once every 3 years on the average.
c Not to exceed.
$\surd$ Hardness as calcium carbonate (mg/l). The minimum hardness allowed for use is this equation shall not be less than 25 mg/l, even if the actual ambient hardness is less than 25 mg/l. The maximum hardness value for use in this equation shall not exceed 400 mg/l even if the actual hardness is greater than 400 mg/l. Note: Recent findings suggest that TMDL development for this pollutant is not necessary

Source: WVWQS, 2002

Sturm Environmental Services

RECEIVED
FEB 4 2008
CLARKSBURG WATER BOARD

JOHN W. STURM, PRESIDENT

COMPANY:	CLARKSBURG WATER BOARD	
NPDES NUMBER:		
PHONE:		
REQUIRED REPORTING FREQUENCY:		
SAMPLE TYPE:	SLUDGE	
DATE OF LAST CHEMICAL ANALYSIS:		(MMDDYY)
TIME OF SAMPLE:*	1000	(24 HOUR CLOCK)
DATE OF SAMPLE:*	01-03-08	(MMDDYY)
SAMPLED BY:	D. SUMMERS	
SAMPLE ID:	SLUDGE	
DATE/TIME RECEIVED:	01-03-08 1030	

PARAMETER	EPA METHOD	DETECTION LIMITS	DATE ANALYZED	ANALYST	RESULTS	UNITS
$NH_3 - N$	350.2	.06	01-07-08	KH	519.	mg/kg
ORGANIC NITROGEN	Calc.	.10	01-08-08	KH	3491.	mg/kg
TOTAL NITROGEN	351.3	.10	01-08-08	KH	4010.	mg/kg
POTASSIUM	7610	10.0	01-23-08	KNR	482.	mg/kg
PHOSPHORUS	365.2	.30	01-07-08	DB	1.81	mg/kg
CALCIUM	6010B	.50	01-23-08	KNR	3250.	mg/kg
MAGNESIUM	6010B	.50	01-23-08	KNR	1210.	mg/kg
COPPER	6010B	1.00	01-23-08	KNR	<8.76	mg/kg
CADMIUM	6010B	.25	01-23-08	KNR	<2.19	mg/kg
ZINC	6010B	.25	01-23-08	KNR	21.9	mg/kg
MERCURY	7471	.25	01-15-08	RC	<.25	mg/kg
SODIUM	7770	2.50	01-23-08	KNR	<43.8	mg/kg
NICKEL	6010B	2.00	01-23-08	KNR	<17.5	mg/kg
LEAD	7421	.05	01-24-08	RC	38.0	mg/kg
CHROMIUM	6010B	2.50	01-23-08	KNR	<21.9	mg/kg
ARSENIC	7060A	.05	01-25-08	RC	34.9	mg/kg
MOLYBDENUM	6010B	.50	01-23-08	KNR	<4.38	mg/kg
SELENIUM	7740	.10	01-23-08	RC	2.25	mg/kg
PERCENT SOLIDS	SM2540G	.10	01-04-08	VV	21.94	mg/kg
pH	150.1	1	01-08-08	KH	6.5	mg/kg

(Results in dry weight basis)

OFFICIAL: _____ DATE: _____

ANALYSIS PERFORMED BY: STURM ENVIRONMENTAL SERVICES, INC.

X compliant ___ non-compliant (see attached)

Susan M. Hickman
Approved

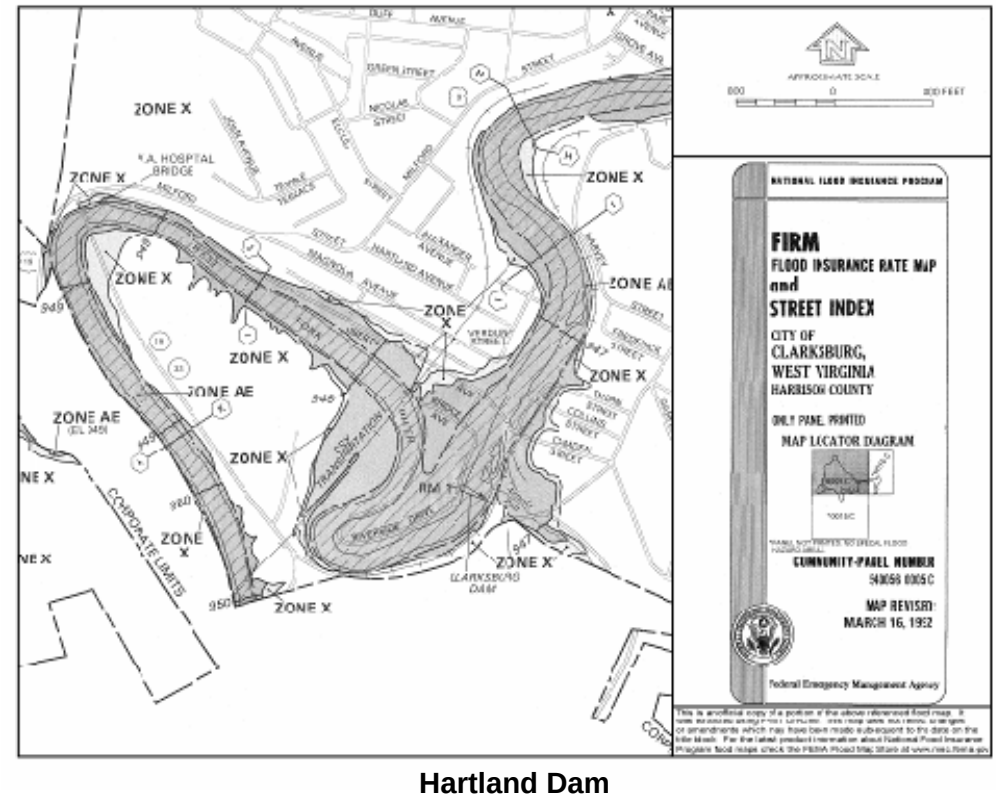
* client provided

NOTE: all detection limits based upon 100% Solids and 2 gms sample digested

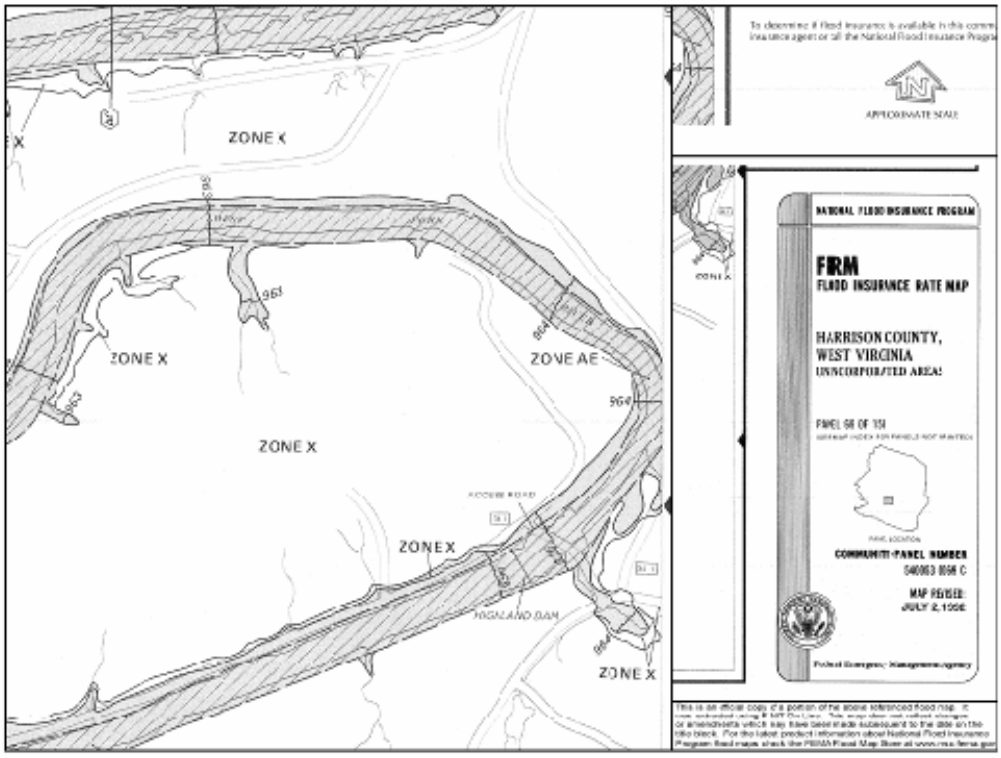
MAIN OFFICE—POST OFFICE BOX 650 • BRIDGEPORT, WEST VIRGINIA 26330 • (304) 623-6549
CHARLESTON BRANCH—POST OFFICE BOX 8337 • SOUTH CHARLESTON, WEST VIRGINIA 25303-0337 • (304) 744-9864

APPENDIX VI

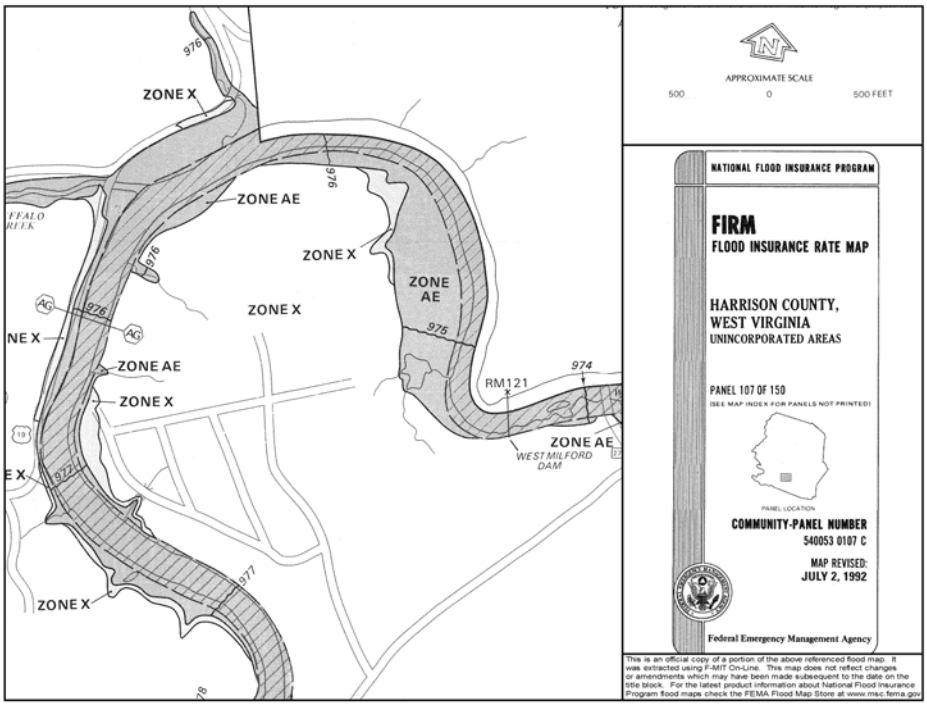
FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE MAPS



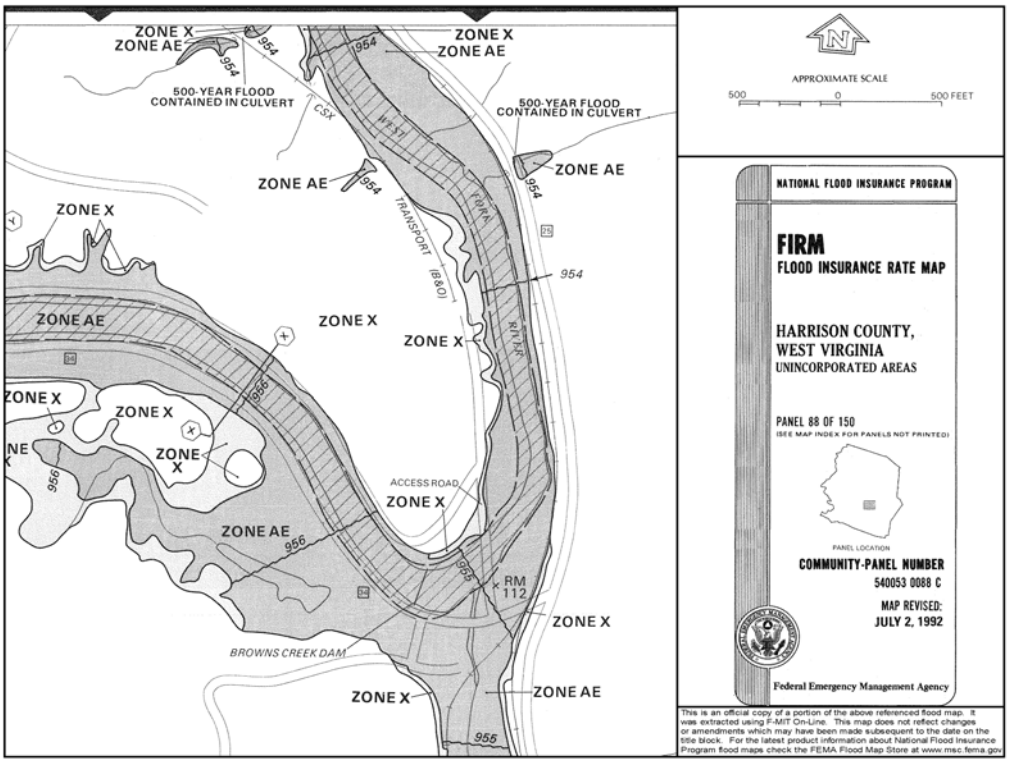
Hartland Dam



Highland Dam



West Milford Dam

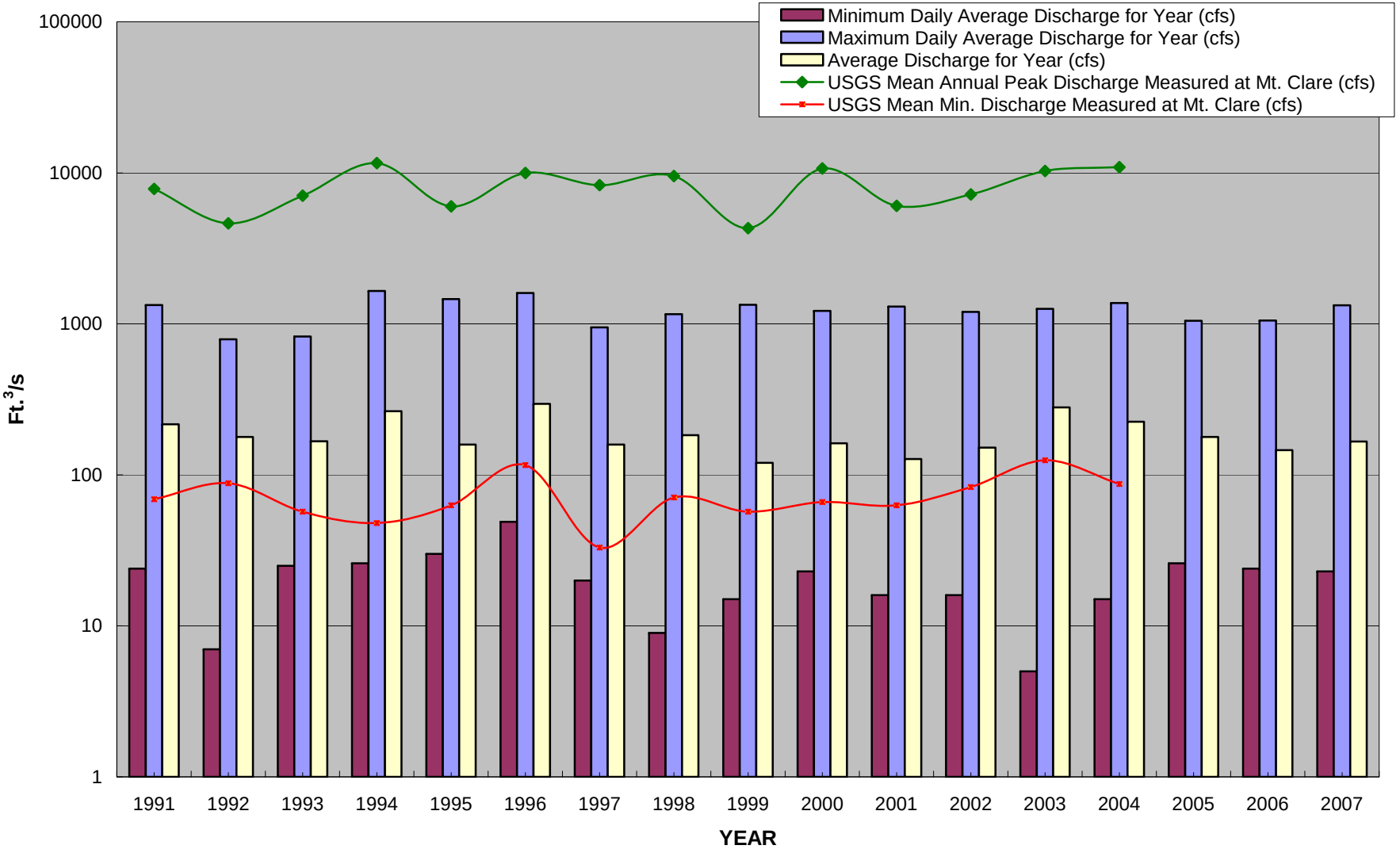


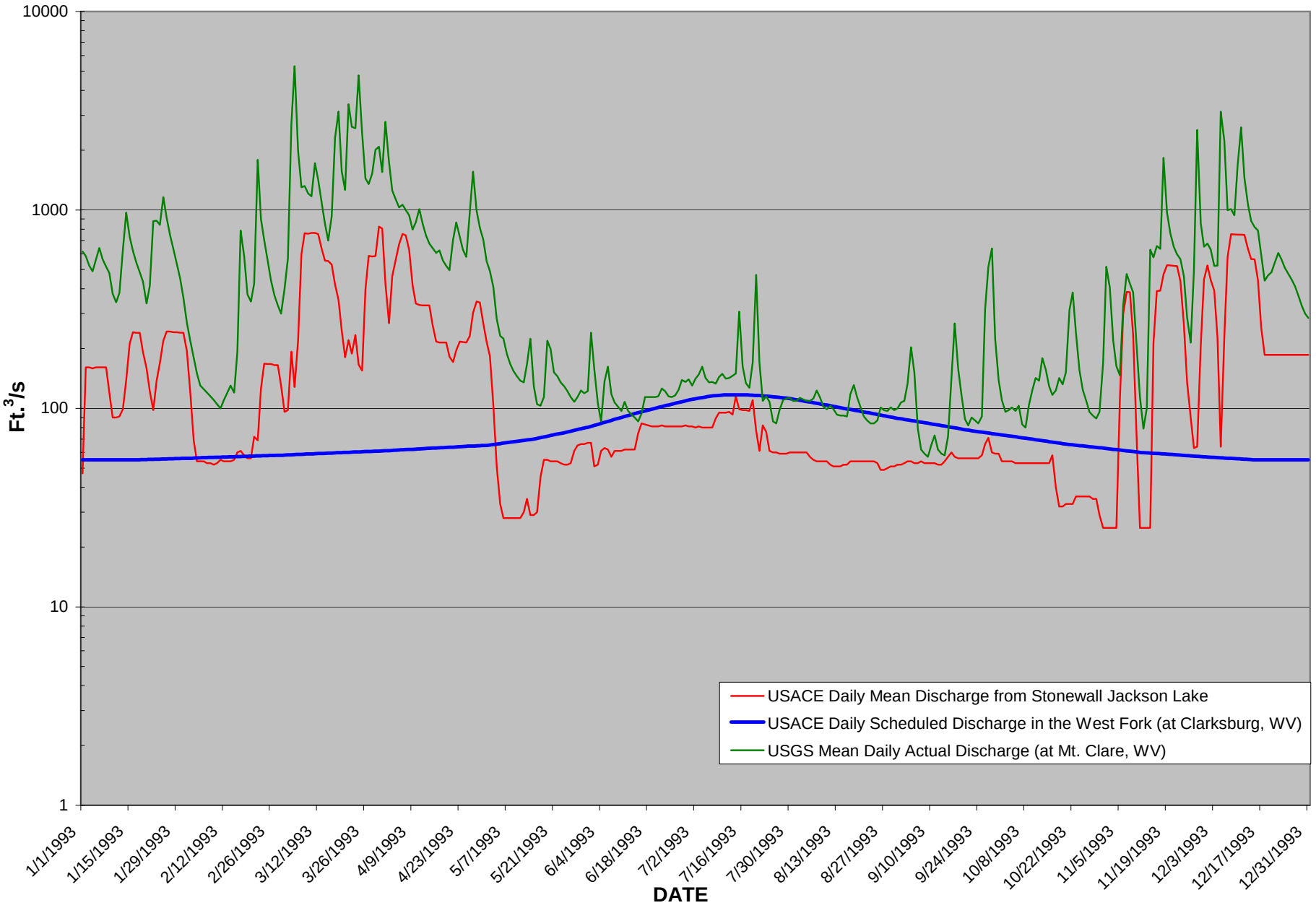
Two-Lick Dam

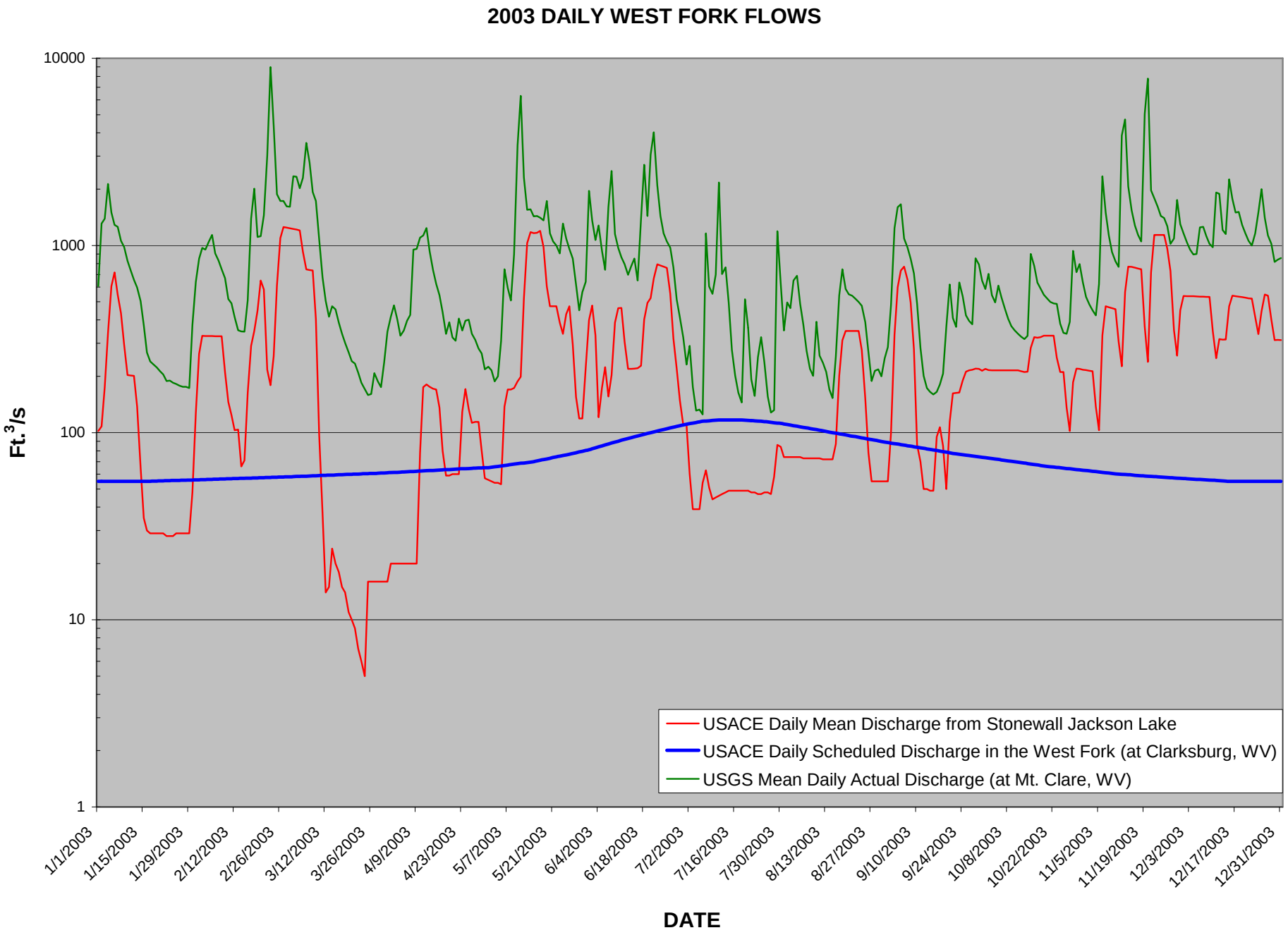
APPENDIX VII

HYDROLOGY DATA

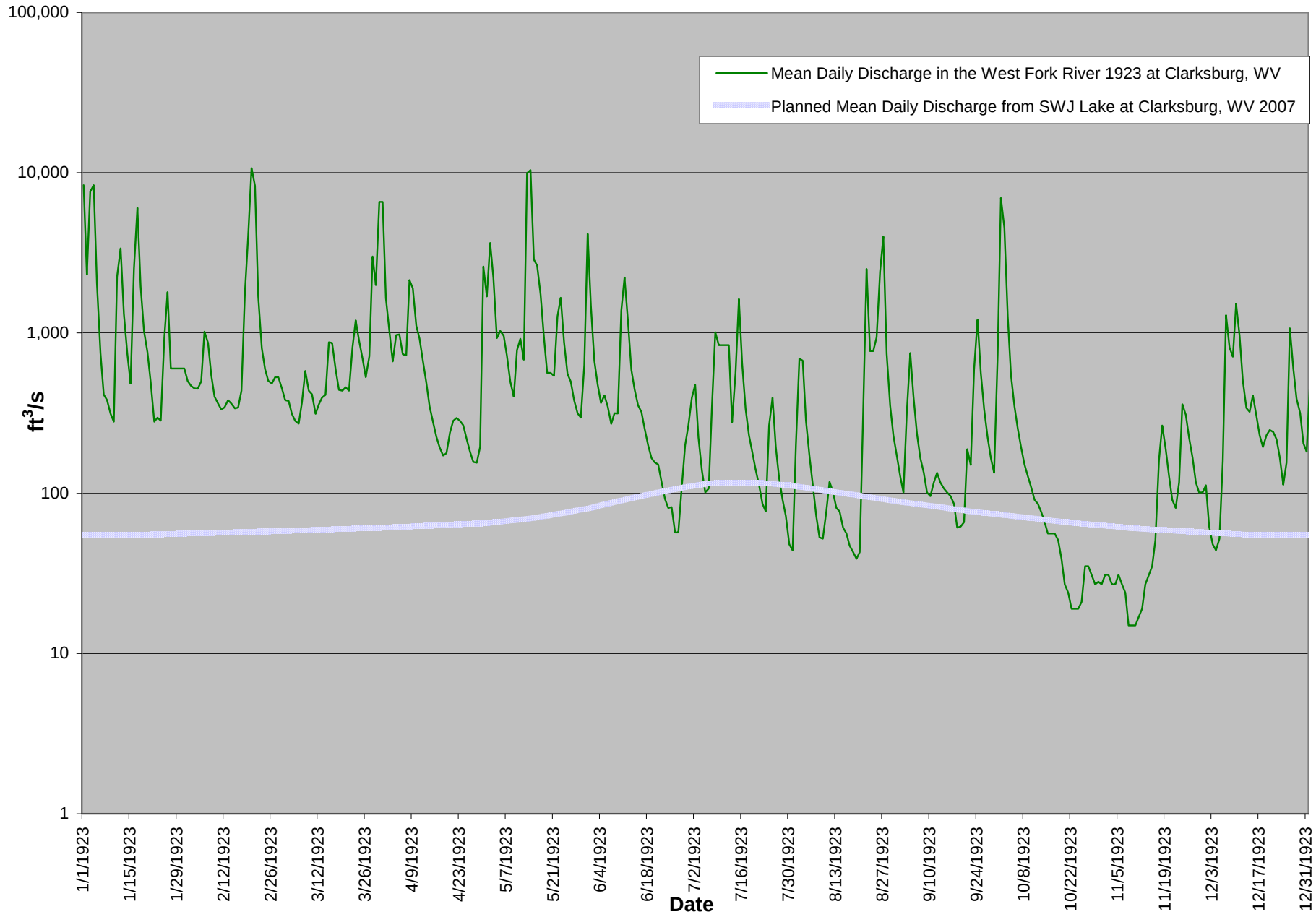
Stonewall Jackson Lake Discharge Summary

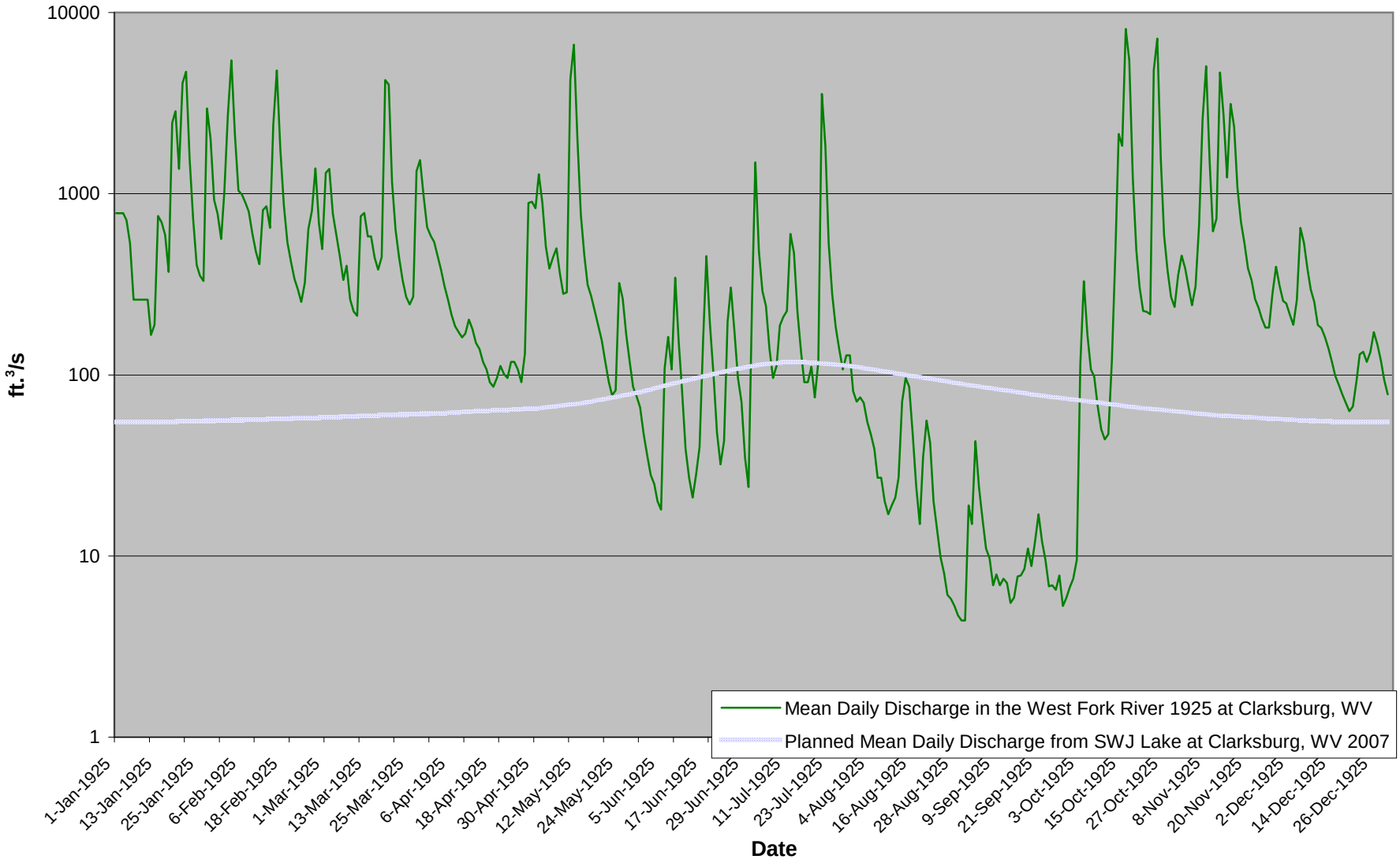



1993 DAILY WEST FORK FLOWS
10000
1000
100
10
1
Ft.3/s
1/1/1993
1/15/1993
1/29/1993
2/12/1993
2/26/1993
3/12/1993
3/26/1993
4/9/1993
4/23/1993
5/7/1993
5/21/1993
6/4/1993
6/18/1993
7/2/1993
7/16/1993
7/30/1993
8/13/1993
8/27/1993
9/10/1993
9/24/1993
10/8/1993
10/22/1993
11/5/1993
11/19/1993
12/3/1993
12/17/1993
12/31/1993
DATE
USACE Daily Mean Discharge from Stonewall Jackson Lake
USACE Daily Scheduled Discharge in the West Fork (at Clarksburg, WV)
USGS Mean Daily Actual Discharge (at Mt. Clare, WV)


2003 DAILY WEST FORK FLOWS
10000
1000
100
10
1
Ft.3/s
1/1/2003
1/15/2003
1/29/2003
2/12/2003
2/26/2003
3/12/2003
3/26/2003
4/9/2003
4/23/2003
5/7/2003
5/21/2003
6/4/2003
6/18/2003
7/2/2003
7/16/2003
7/30/2003
8/13/2003
8/27/2003
9/10/2003
9/24/2003
10/8/2003
10/22/2003
11/5/2003
11/19/2003
12/3/2003
12/17/2003
12/31/2003
DATE
USACE Daily Mean Discharge from Stonewall Jackson Lake
USACE Daily Scheduled Discharge in the West Fork (at Clarksburg, WV)
USGS Mean Daily Actual Discharge (at Mt. Clare, WV)

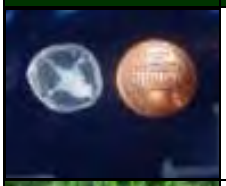
1923 Discharge Compared with 2007 Scheduled Release




1925 Discharge Compared with 2007 Scheduled Release
10000
1000
100
10
1
ft.3/s
Mean Daily Discharge in the West Fork River 1925 at Clarksburg, WV
Planned Mean Daily Discharge from SWJ Lake at Clarksburg, WV 2007
1-Jan-1925
13-Jan-1925
25-Jan-1925
6-Feb-1925
18-Feb-1925
1-Mar-1925
13-Mar-1925
25-Mar-1925
6-Apr-1925
18-Apr-1925
30-Apr-1925
12-May-1925
24-May-1925
5-Jun-1925
17-Jun-1925
29-Jun-1925
11-Jul-1925
23-Jul-1925
4-Aug-1925
16-Aug-1925
28-Aug-1925
9-Sep-1925
21-Sep-1925
3-Oct-1925
15-Oct-1925
27-Oct-1925
8-Nov-1925
20-Nov-1925
2-Dec-1925
14-Dec-1925
26-Dec-1925
Date

APPENDIX VIII

INVASIVE SPECIES DATA FOR THE WEST FORK RIVER DRAINAGE

Photo	Group	Family	Scientific Name	Common Name	Native Habitat	Exotic / Native Transplant
	Coelenterates-Hydrozoans	Olindiidae	*Craspedacusta sowerbyi*	freshwater jellyfish	Freshwater	Exotic
	Plants	Lythraceae	*Lythrum salicaria*	purple loosestrife	Freshwater	Exotic
	Fishes	Clupeidae	*Dorosoma petenense*	threadfin shad	Freshwater-Marine	Native Transplant
	Mollusks-Bivalves	Corbiculidae	*Corbicula fluminea*	Asian clam	Freshwater	Exotic

freshwater jellyfish (*Craspedacusta sowerbyi*)

Specimen ID	State	County	Locality	Year	Drainage Name	Status*
156545	WV	Harrison	Buffalo Creek Reservoir near West Milford	1999	West Fork	collected
156557	WV	Lewis	Stonewall Jackson Lake at Canoe Run and Carrion Run (state park)	1999	West Fork	collected
168441	WV	Harrison	Lake Floyd	2003	West Fork	collected
236176	WV	Lewis	Stonewall Jackson Lake, near Walkersville, near I-79	2003	West Fork	collected
236177	WV	Lewis	Stonewall Jackson Lake, near Weston, Rt. 4, 19 & I-79	2004	West Fork	collected
168442	WV	Harrison	Lake Floyd	2005	West Fork	collected
236178	WV	Lewis	Stonewall Jackson Lake, near Weston, Rt. 4, 19 & I-79	2005	West Fork	collected

purple loosestrife (*Lythrum salicaria)*

Specimen ID	State	County	Locality	Year	Drainage Name	Status*
213632	WV	Harrison	Lake Floyd	1973	West Fork	established

threadfin shad (*Dorosoma petenense*)

Specimen ID	State	County	Locality	Year	Drainage Name	Status*
46776	WV	Lewis	Stonecoal Lake	1993	West Fork	extirpated

Asian clam (*Corbicula fluminea*)

Specimen ID	State	County	Locality	Year	Drainage Name	Status*
52274	WV	Harrison	West Fork River, 1.6 km NE of West Milford	1980	West Fork	collected
155617	WV	Harrison	Kinchloe Creek, Station 1: CR 1/1 and Hollick Run Road	1995	West Fork	collected
155636	WV	Harrison	Tenmile Creek, Station 1: First church on left below Rt. 50 below bridge	1997	West Fork	collected
155637	WV	Harrison	Tenmile Creek, Station 2: at 10 mile Church of Christ	1997	West Fork	collected
155613	WV	Harrison	Isaacs Creek, Station WF6: upstream of CR 19/48 bridge	1999	West Fork	collected
155625	WV	Harrison	Lost Creek, Station WF7: at first bridge from I 70 between I 79 and West Milford	1999	West Fork	collected
155606	WV	Harrison	Brushy Fork, Station WF4: CR 42 E of I 79, behind PREBENA factory upstream to bridge (tributary of Elk Ck)	1999	West Fork	collected
155609	WV	Upshur	Hackers Creek, Station 19: 1.1 mi E of Upshur/Lewis County line on CR 13	2001	West Fork	collected

Data provided by: U.S. Geological Survey (USGS). 2004. Non-indigenous Aquatic Species Database, Gainesville, FL. http://nas.er.usgs.gov, April 2009.

Status represents the reproductive population status of the species in that particular location and includes the following categories:

- **Collected** (default status)-species was collected or observed from the site; reproduction is not known; these could be established populations
- **Established**-population is reproducing and overwintering
- **Extirpated**-population died out on its own, without human interference (i.e., cold winter)

APPENDIX IX

SEDIMENT ANALYSIS (Complete report available upon request from the Clarksburg Water Board)

Clarksburg Water Board
Clarksburg, West Virginia

Sediment Characterization Report
Highland, West Milford and Two-Lick Dams

January 2009

Gannett Fleming
Pittsburgh, Pennsylvania

MEMORANDUM

DATE: January 23, 2009

FROM: Paul Hale, P.G., L.R.S.

TO: R. Evans, P.E.

RE: Clarksburg Water Board

Sediment Characterization Investigation

Introduction

The Clarksburg Water Board (CWB) owns and is responsible for three dams on the West Fork River (See Figure 1). The dams were originally constructed for water supply, but are no longer needed for that purpose. The dams represent a liability to the CWB. For these reasons, removal of the dams is being considered. The CWB contracted with Gannett Fleming, Inc. (GF) to characterize the accumulated sediment at the three dams slated for demolition. The dams of interest for this investigation include;

- Two Lick Dam (Figure 2)
- Highland Dam (Figure 3)
- West Milford Dam (Figure 4).

The following tasks were performed for this investigation;

- Initial Site Reconnaissance
- Development of Sediment Sampling Plan
- Sediment Sampling and Analysis
- Data Analysis

Each task is discussed below more fully.

Initial Site Reconnaissance

Two GF environmental personnel visited the sampling locations on October 9, 2008, to evaluate site accessibility and determine the need for boat-based sampling. Each site was characterized by steep slippery overhanging banks and saturated clay stream bottoms. Interviews were conducted with representatives of Horner Brothers Engineers (HBE), who has conducted recent profiling of the stream at each dam location. HBE indicated that the maximum depth of stream was approximately 5', 10', and 8' at Two Lick, Highland, and West Milford dams, respectively. Based on the information gathered during this initial site visit, GF determined that a boat would be required for sample collection.

Development of Sediment Sampling Plan

GF developed an internal sampling plan to characterize the sediments at each location based on engineering judgment regarding each river's hydraulic parameters and expected mobilization of sediment after dam removal. Based on this, sampling transects were planned at stations 50', 100', 200', and 300' feet upstream of each dam. Three sampling nodes along each transect were established at the left bank, center, and right bank. Therefore, 12 sampling points were established for each dam.

Sediment Sampling and Analysis

GF mobilized to the site November 6, 2008, to conduct sediment sampling at the three dam locations. The following procedure was utilized at each site:

- Measured and flagged stations 50, 100, 200, and 300 feet upstream of dam.
- One GF representative stayed on shore for data recording, One GF sampler went on boat with boat operator.
- Collected data at each sampling node consisting of sediment thickness and material acquisition.
- Sampling was conducted utilizing a WaterMark® Universal Core Head Kit Sediment Sampler. The maximum sample depth practical with this equipment is 10 feet of water. The clear sample tube was pushed manually into the sediment until refusal. The sampler utilizes a check valve to maintain a vacuum on the sample material during extraction from the stream. Once the sample tube was in the boat the recovery was measured with a folding rule and called out to the recorder on the shore. The retrieved sediment was placed in labeled storage bags and stored in a cooler on ice.
- The stream channel was found to be deeper than reported by HBE during the initial field reconnaissance. Whereas HBE reported a maximum depth of 10 feet of water, depths of roughly 18 feet were encountered on the channel centerline at Two Lick and Highland Dams. HBE profiling efforts were limited to immediately upstream and downstream of the dams, and were therefore not representative of the sampling transect locations selected. In areas greater than 10 feet in depth the sampling equipment could not be utilized for sediment retrieval. At these locations, a 20 length of PVC was utilized to gauge sediment thickness by slowly lowering it to the stream bottom, marking it relative to the boat edge, pushing to refusal, and measuring the penetration depth.
- Once on shore, GF decontaminated the sampling equipment and transferred sample material into clean bottleware provided by the analytical laboratory. Entries were made on the chain of custody form for each sample. The project analytical suite, identified during the proposal phase of the project, consists of the following analytes:
    - Polyaromatic Chlorinated Biphenyls (PCB's)
    - Metals (lead, mercury, aluminum, iron, magnesium, manganese, and zinc)
    - Hexavalent Chromium
    - Nitrate

- Nitrite
- Sulfate
- Chloride
- Free Cyanide

Properly labeled and preserved sample containers were placed in a cooler with ice until their delivery to the analytical laboratory (Test America of Pittsburgh, PA).

- All sites were sampled on November 6, 2008. The samples were delivered to Test America on the morning of November 7, 2008.

Data Analysis

Sediment Thickness/Quantity

Sample recovery lengths ranged from 0 to 1.9 feet. However, in many cases the recovered material included 0.3-0.4 feet of brown sediment overlying a grey saturated silty clay stream bed material. Sediment thickness values ranged from 0 to 1.0 feet, with a typical value of 0.3-0.4 feet. The sediment thickness values and their distribution are included in Appendix A. Based on the data collected, the quantity of sediment present within the area samples was estimated for each dam. The resulting quantities are shown below.

Location	Sediment Quantity Estimate (cubic yards)
Two Lick Dam	416
Highland Dam	880
West Milford	599

As shown in Appendix A, most of the sediment thickness values are less than 0.5 feet . Based on this thickness, it may not be practical to dredge these materials without over-dredging the underlying clay streambed material.

Chemical Analysis

The results of the chemical analyses are presented in Tables 1 through 3 of Appendix A. The tables compare the analytical values against the West Virginia Department of Environmental Protection (WVDEP) deminimis criteria for residential and industrial soils. As shown in the tables, all analytes are below the residential soil criteria, with the exception of arsenic. The arsenic values for the samples

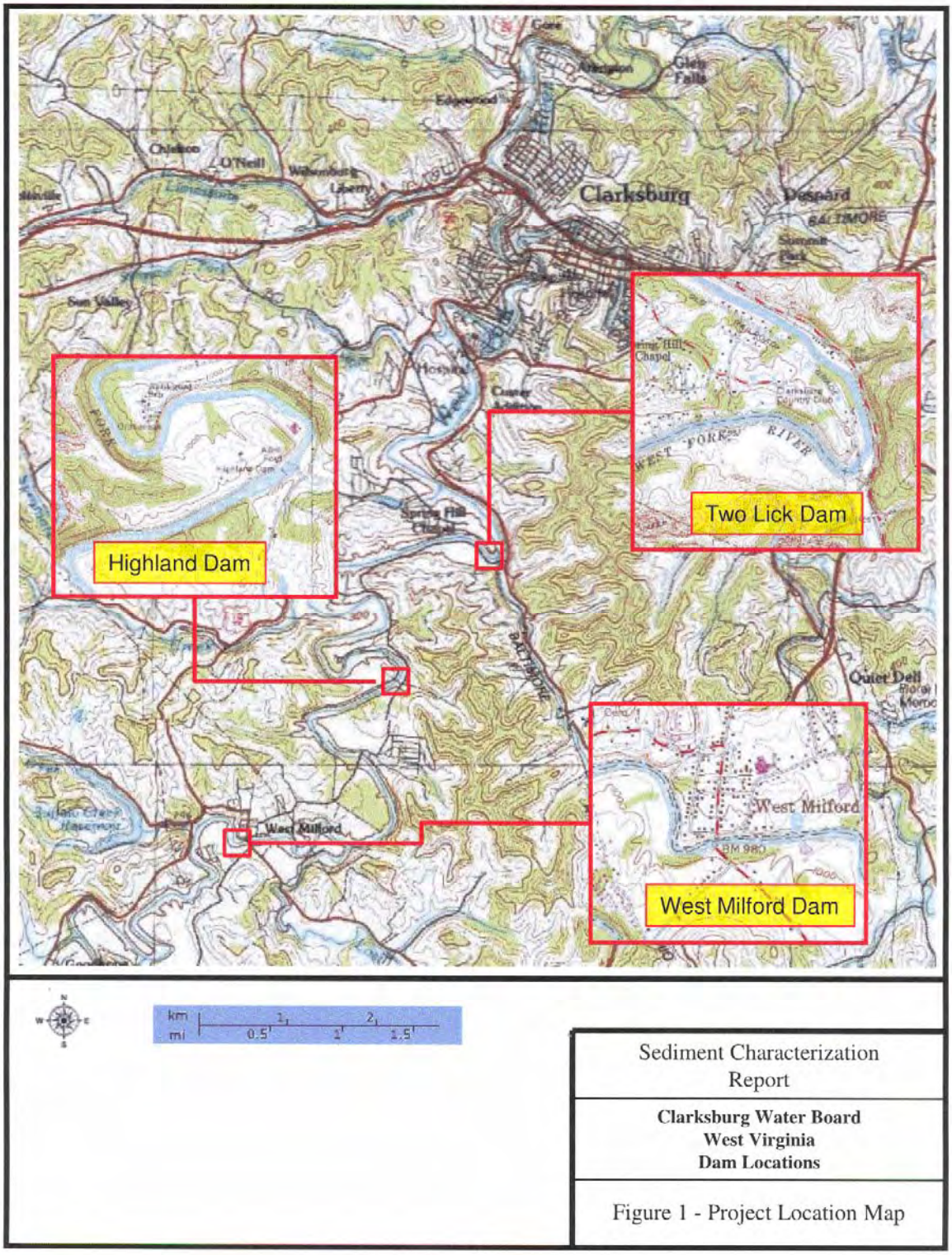
collected range from 5.3 to 7.1 mg/kg, with an average value of 6.0 mg/kg. The deminimis concentration for residential soil for arsenic is 0.39 mg/kg.

Due to the constrained range of arsenic values, the concentrations encountered in the samples collected are interpreted to represent arsenic's regional background value occurring naturally in soils/ sediments. This is supported by a USGS published paper by Shacklette and Boergnen (1984) titled "Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States". This reference documents a national study of several elements, including arsenic. The reported range of arsenic values for the eastern US is <0.1 to 73 mg/kg, with an arithmetic mean of 7.4 mg/kg.

Conclusions

GF draws the following conclusions from the investigation results:

- The central channel depth at Highland and Two Lick Dams is approximately 18 feet deep, whereas the channel depth at West Milford Dam is approximately 5-9 feet deep.
- The typical sediment thickness encountered was 0.3-0.4'. This may be impractical to dredge.
- All analytical parameters analyzed were less than WVDEP Deminimis Criteria for Residential Soil with the exception of arsenic.
- The arsenic values reflected in the collected samples represent regional background values for this naturally occurring element.



Sediment Characterization Report

Clarksburg Water Board
West Virginia
Dam Locations

Figure 1 - Project Location Map

0+50 SAMPLE STATION

POOL AREA

POOL AREA CENTER LINE

Clarksburg Water Board
West Virginia

Dam Locations

Two Lick Dam

Gannett Fleming

DATE: Oct. 2008

SCALE: 1"=800'

FIGURE 2

K:\047829 Clarksburg Water Board\SA#6 Dam Removals\E. Prj Wrk\a. CADD\DAM Exhibit.dwg

0+50 SAMPLE STATION

POOL AREA

POOL AREA CENTER LINE

Clarksburg Water Board
West Virginia

Dam Locations

Highland Dam

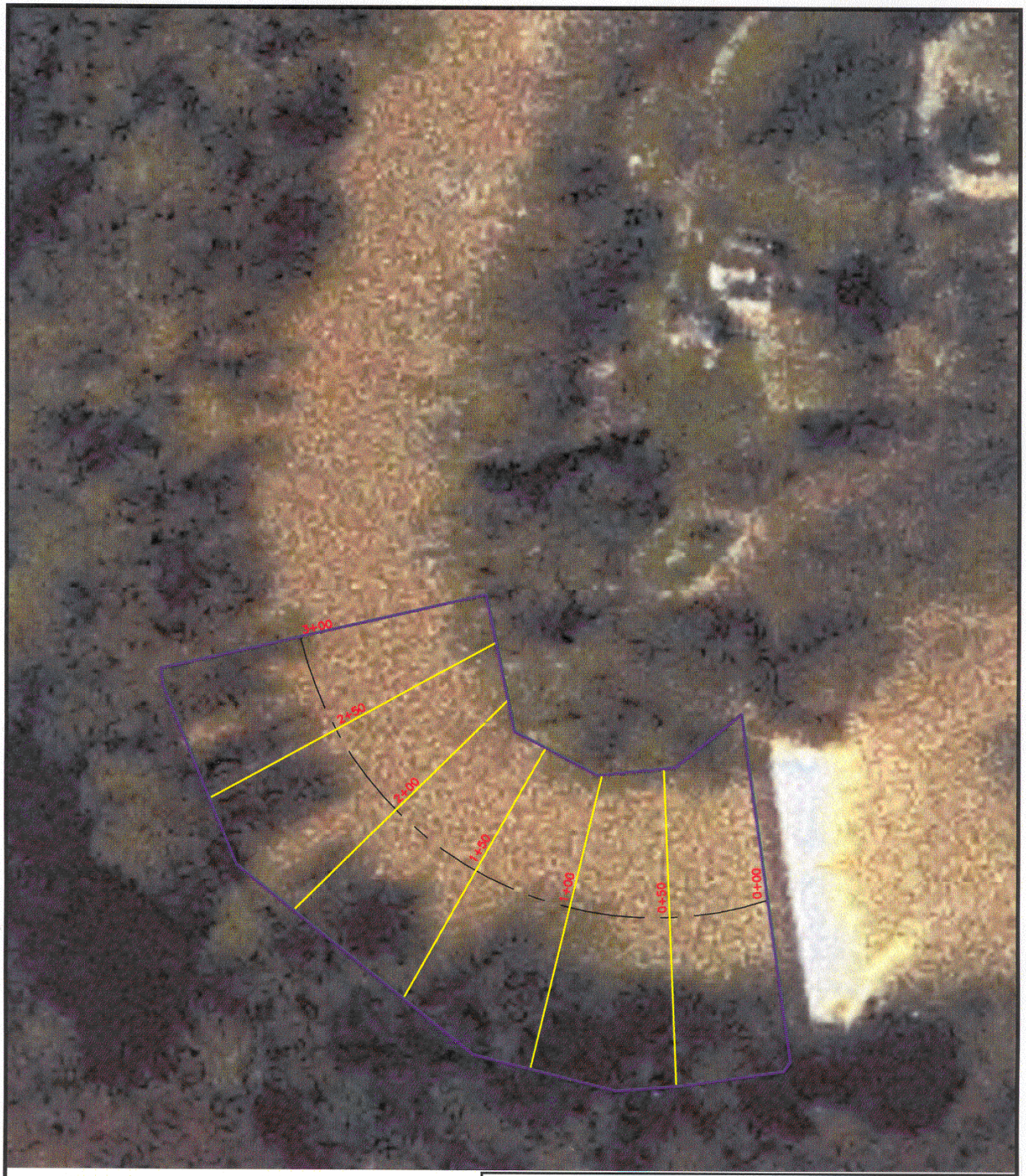
Gannett Fleming

DATE: Oct. 2008

SCALE: 1"=800'

FIGURE 3

K:\047829 Clarksburg Water Board\SA#6 Dam Removals\E. Prj Wrk\a. CADD\DAM Exhibit.dwg



0+50 SAMPLE STATION

POOL AREA

POOL AREA CENTER LINE

Clarksburg Water Board
West Virginia

Dam Locations

West Milford Dam

Gannett Fleming

DATE: Oct. 2008

SCALE: 1"=800'

FIGURE 4

K:\047829 Clarksburg Water Board\SA#6 Dam Removals\E. Prj Wrk\a. CADD\DAM Exhibit.dwg

Table 1 Clarksburg Dams Analytical Results (vs. WVDEP Criteria)								
Compound	Method	Residential Soil (mg/Kg)	Industrial Soil (mg/kg)	HD-10	MD-12	MD-3	TL-3	TL-9
Inorganics								
Arsenic	6010B	0.39	27	5.3	5.7	5.6	6.6	7.1
Aluminum	6010B	75000	1000000	8610	9210	11300	8030	10700
Antimony	6010B	31	820	ND	ND	ND	ND	ND
Barium	6010B	15000	2900000	113	126	157	119	114
Beryllium	6010B	150	3700	0.91	0.99	1.2	0.97	1.1
Cadmium	6010B	39	1000	0.31 B	0.31 B	0.32 B	0.31 B	0.56
Calcium	6010B	*	*	1670	1740	1960	2080	1510
Chromium (Trivalent or III)	6010B	120000	1000000	15.8	16.3	18.0	15.1	16.6
Cobalt	6010B	9000	19000	14.7	14.8	14.4	15.3	18.7
Copper	6010B	3100	82000	25.7	21.6	28.2	21.3	22.5
Iron	6010B	55000	1000000	22200	23100	24100	24000	24700
Lead	6010B	400	1000	19.0	20.6	25.2	19.9	24.4
Magnesium	6010B	*	*	1930	2020	2250	1740	1930
Manganese	6010B	3300	48000	333	541	319	538	428
Nickel	6010B	1600	41000	22.1	22.5	26.4	22.3	28.3
Potassium	6010B	*	*	995	1030	1470	923	1110
Selenium	6010B	392	10000	ND	ND	ND	ND	ND
Silver	6010B	390	10220	ND	0.20 B	0.12 B	0.16 B	0.10 B
Sodium	6010B	*	*	89.2 B	104 B	110 B	107 B	95.1 B
Thallium	6010B	6.3	160	ND	ND	ND	ND	ND
Vanadium	6010B	78	2000	21.2	22.2	23.9	21.0	23.8
Zinc	6010B	23000	610000	98.1	97.3	119	93.9	185
Mercury	7471A	6.1	88	0.078	0.077	0.12	0.072	0.12

* West Virginia Department of Environmental Protection does not provide criteria for this constituent.

LEGEND	
	Exceeds WVDEP Deminimis Criteria for Residential Soil
	Exceeds WVDEP Deminimis Criteria for Industrial Soil
ND	No detection.
B	Estimated result. Result is less than RL.

Table 2 Clarksburg Dams Analytical Results (vs. WVDEP Criteria)								
Compound	Method	Residential Soil (mg/Kg)	Industrial Soil (mg/kg)	HD-10	MD-12	MD-3	TL-3	TL-9
Polychlorinated Biphenyls (PCBs)								
Aroclor 1016	8082	3.93	50.23	ND	ND	ND	ND	ND
Aroclor 1221	8082	0.22	10.05	ND	ND	ND	ND	ND
Aroclor 1232	8082	0.22	10.05	ND	ND	ND	ND	ND
Aroclor 1242	8082	0.22	10.05	ND	ND	ND	ND	ND
Aroclor 1248	8082	0.22	10.05	ND	ND	ND	ND	ND
Aroclor 1254	8082	0.22	10.05	ND	ND	ND	ND	ND
Aroclor 1260	8082	0.22	10.05	ND	ND	ND	ND	ND

LEGEND	
	Exceeds WVDEP Deminimis Criteria for Residential Soil
	Exceeds WVDEP Deminimis Criteria for Industrial Soil
ND	No detection.
B	Estimated result. Result is less than RL.

Table 3 Clarksburg Dams Analytical Results (vs. WVDEP Criteria)								
Compound	Method	Residential Soil (mg/Kg)	Industrial Soil (mg/kg)	HD-10	MD-12	MD-3	TL-3	TL-9
Wet Chemicals								
Chloride	300.0A	*	*	3.7 B	3.1 B	5.9 B	5.4 B	2.2 B
Cyanide, Total	9012A	11	35	ND	ND	ND	3.5	ND
Hexavalent Chromium	7196A	210	4500	ND	ND	ND	ND	ND
Nitrate	353.2	130000	1000000	0.84 B	1.7 B	1.5 B	1.2 B	1.6
Nitrite	353.2	7800	200000	ND	ND	ND	ND	ND
Sulfate	300.0A	*	*	155	265	230	376	241

* West Virginia Department of Environmental Protection does not provide criteria for this constituent.

LEGEND	
	Exceeds WVDEP Deminimis Criteria for Residential Soil
	Exceeds WVDEP Deminimis Criteria for Industrial Soil
ND	No detection.
B	Estimated result. Result is less than RL.

Gannett Fleming

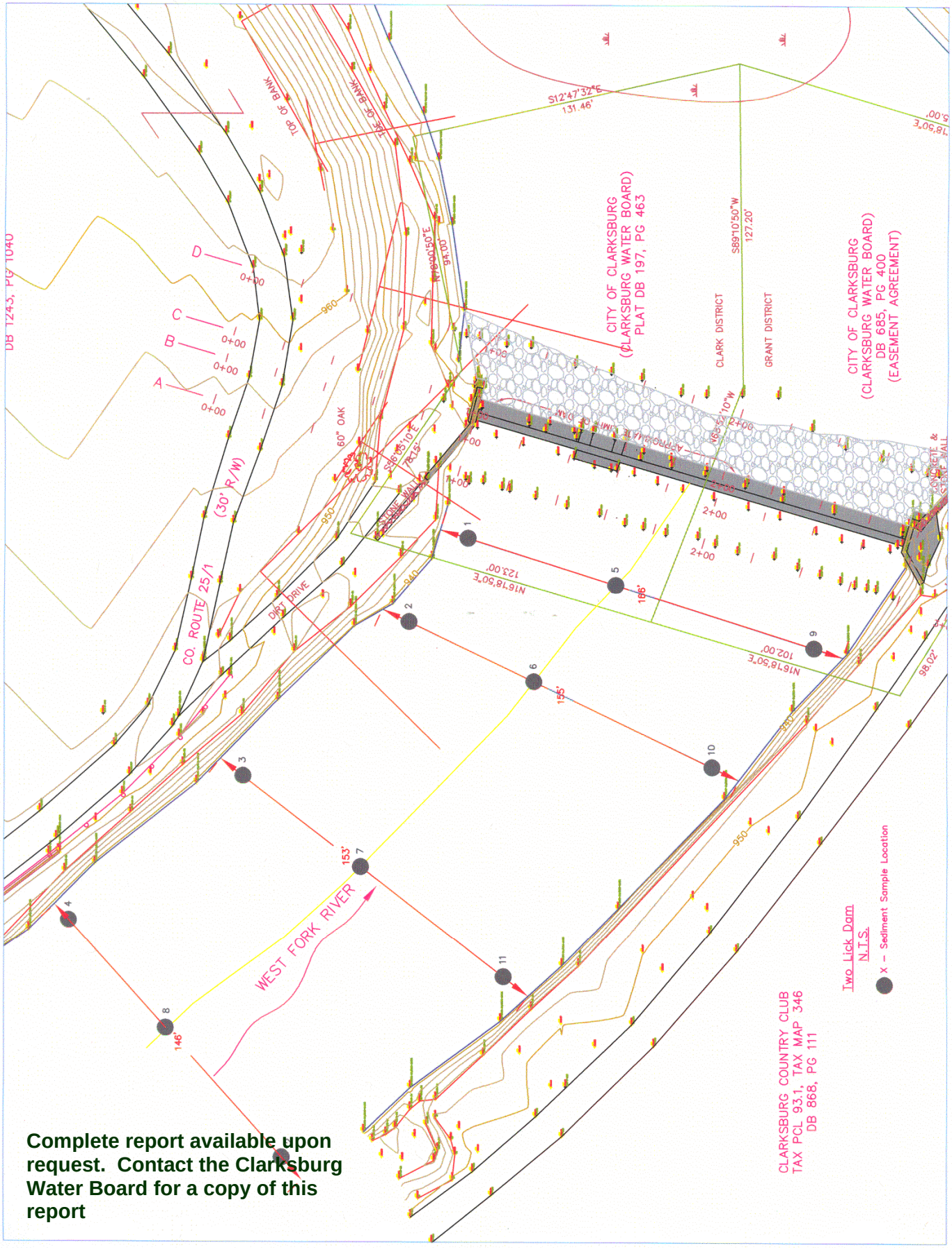
Subject: Clarksburg, West Virginia Dams — Sheet No. 1 of 4
Estimation of Sediment Quantity — Job No. 47829.P08.0411
By: SJP Date: 12/08 — Chk. By: PAH Date: 1-09

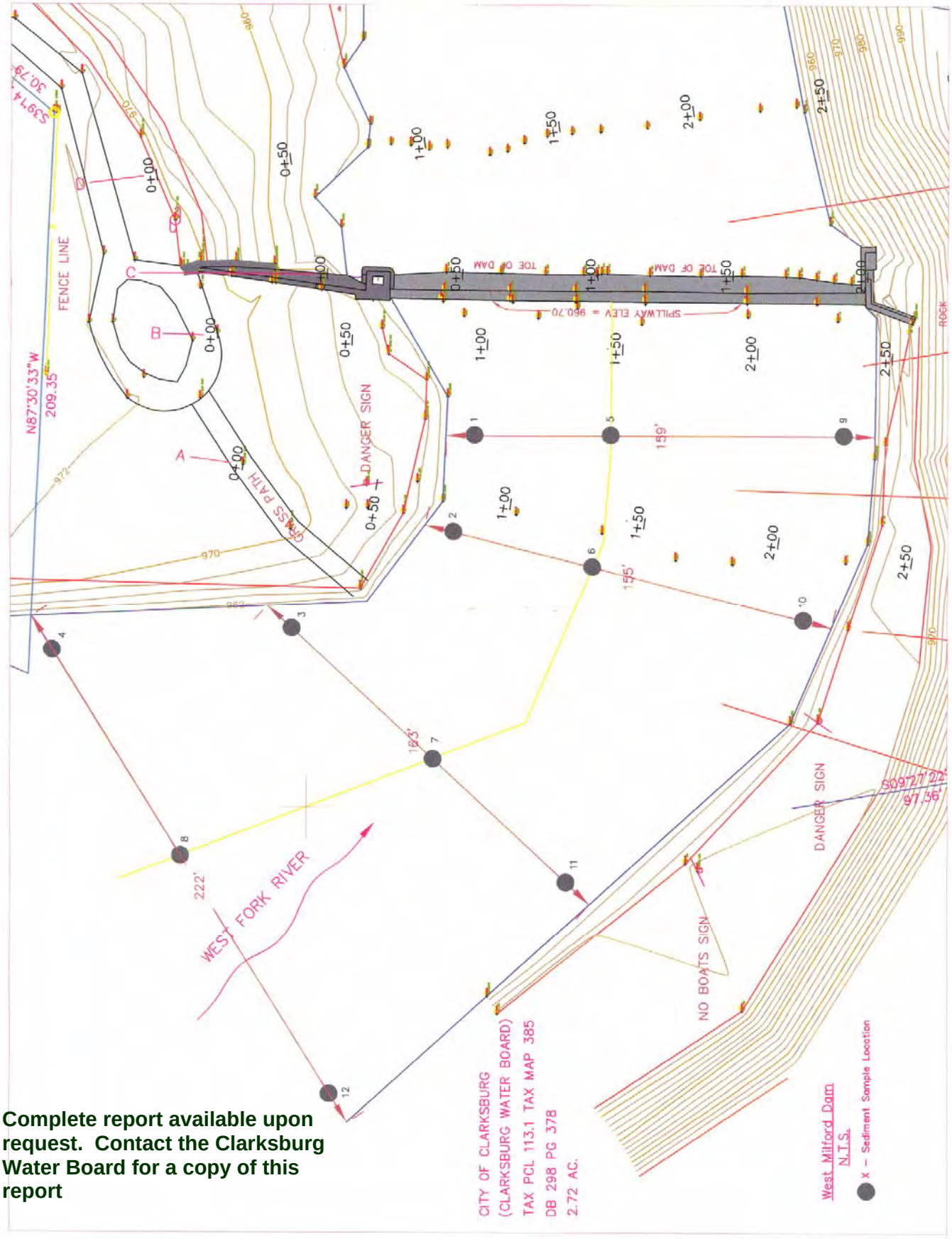
Estimation of Total Sediment for the Clarksburg Dam Removals										
		Highland Dam			West Milford Dam			Two Lick Dam		
Distance upstream of dam[1] (ft.)	Sample[1]	Depth of Sediment (ft.)	Avg. Sediment Depth (ft.)	Length of Section[2] (ft.)	Depth of Sediment (ft.)	Avg. Sediment Depth (ft.)	Length of Section[2] (ft.)	Depth of Sediment (ft.)	Avg. Sediment Depth (ft.)	Length of Section[2] (ft.)
50	1	0.4	0.6	186	0.4	0.4	159	0.3	0.2	166
	5	0.4			0.0			0.0		
	9	0.9			0.7			0.3		
100	2	0.3	0.4	181	0.5	0.5	155	0.3	0.2	155
	6	0.4			0.0			0.0		
	10	0.4			1.0			0.2		
200	3	0.3	0.5	176	0.1	0.2	163	0.5	0.3	153
	7	0.7			0.0			0.2		
	11	0.4			0.4			0.2		
300	4	0.4	0.4	174	0.2	0.2	222	0.3	0.3	146
	8	0.3			0.0			0.3		
	12	0.4			0.4			0.3		
		Average	0.44	179.3	Average	0.31	175	Average	0.24	155.0
		Total Est. Sediment[3] (CY) =		880	Total Est. Sediment[3] (CY) =		599	Total Est. Sediment[3] (CY) =		416

Notes:

1. Refer to the attached drawings for the locations of sampled sediment at each corresponding dam.
2. Refer to the attached drawings. The total length of section was scaled using AutoCAD dimensioning tools.
3. Total Estimated Sediment = (Total Average Sediment Depth*Total Average Length of Section*300')

Complete report available upon request. Contact the Clarksburg Water Board for a copy of this report


CITY OF CLARKSBURG
(CLARKSBURG WATER BOARD)
PLAT DB 197, PG 463
CLARK DISTRICT
GRANT DISTRICT
CITY OF CLARKSBURG
(CLARKSBURG WATER BOARD)
DB 685, PG 400
(EASEMENT AGREEMENT)
CO. ROUTE 25/1
(30' R/W)
DIRT DRIVE
WEST FORK RIVER
CLARKSBURG COUNTRY CLUB
TAX PCL 93.1, TAX MAP 346
DB 868, PG 111
Two Lick Dam
N.T.S.
x - Sediment Sample Location
Complete report available upon request. Contact the Clarksburg Water Board for a copy of this report



Complete report available upon request. Contact the Clarksburg Water Board for a copy of this report

APPENDIX X

CORRESPONDENCE AND COOPERATING AGENCY STATUS

Clarksburg Water Board
1001 South Chestnut Street
Clarksburg, WV 26301

January 28, 2007

To Whom It May Concern:

I am writing on behalf of West Virginia Rivers Coalition (WVRC) regarding the proposed West Fork Dam Removal Project. Our organization first learned about the project during an informational session held in Clarksburg, W.Va. on October 3, 2007.

WVRC is a nonprofit organization with nearly 2500 members nationwide. Most of our members are residents of West Virginia, neighboring states, and the District of Columbia. Our constituency includes approximately 50 affiliate organizations and a multitude of watershed groups within West Virginia. All have a vested interest in WVRC's mission: To conserve and restore West Virginia's exceptional rivers and streams.

WVRC endorses the further exploration of this project and feels that its objectives run astride our mission statement: "Seeking the conservation and restoration of West Virginia's exceptional rivers and streams."

Our organization, however, maintains concerns about sediment contamination and removal that will take place during the project, as well as potential impacts from nearby abandoned mine lands. We will be interested in data gathered during future progression of the project, including the results of an Environmental Impact Statement (EIS).

We recommend that the Clarksburg Water Board and the Natural Resources Conservation Service take every effort to keep any potentially contaminated sediment from moving into downstream reaches. We also encourage these groups to keep the public involved about the results of the EIS and how any challenges may be approached.

We recognize the safety concerns expressed by the owner of these dams, the Clarksburg Water Board; nonetheless, we commend the Board for seeking beneficial results of removing these structures.

We commend the effort to remove three dams on the West Fork for reasons including:

- The restoration of approximately 12 miles of river to historic free-flowing conditions;
- The potential to restore aquatic habitat, fisheries populations, and related recreational opportunities;
- The potential to restore habitat characteristics supportive of a federally-listed endangered species, Clubshell mussel;
- The potential to reconnect stream reaches by installing fish passage structures on other dammed sections of West Fork;
- The potential to set a precedence for other similar dam removal projects in West Virginia;
- Efforts to include the public in the decision-making process.

PaT
Geee K.
Pam
Casey

DIVISION OF NATURAL RESOURCES
Wildlife Resources Section
324 Fourth Avenue
South Charleston WV 25303-1224
Telephone (304) 558-2771
Fax (304) 558-3147
TDD 1-800-354-6087

Joe Manchin III
Governor

Frank Jezioro
Director

November 4, 2009

Mr. Kevin Wickey
State Conservationist
USDA-Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, WV 26505

Re: Environmental Assessment for the Proposed West Fork River Dams Removal Project

Dear Mr. Wickey:

As you know, biologists from the West Virginia Division of Natural Resources, Wildlife Resources Section (WRS) have been working closely with your agency since 2008 regarding the placement of a fish passage structure on one low head dam and the removal of three low head dams on the West Fork River, upstream of Clarksburg, Harrison County, West Virginia. We have been invited by your agency to continue our cooperative efforts to see the project move forward.

The WRS fully supports returning the West Fork River to a riverine habitat. As a partnering agency, the WRS will continue to work with Natural Resources Conservation Service personnel and provide technical information regarding wildlife resources and habitat. The WRS is hopeful that the dam removal plan will be implemented.

Thank you for the invitation to participate in this important project. If you have any questions about our position, please feel free to contact me or Kerry Bledsoe at 304-825-6787, kerrybledsoe@wvdnr.gov.

Sincerely,

Curtis I. Taylor, Chief
Wildlife Resources Section

CIT/kbj

NRCS
Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, WV 26505
(304) 284-7540 (Phone)
(304) 284-4839 (Fax)

June 10, 2010

Deb Carter
Supervisor West Virginia Field Office
US Fish and Wildlife Service
694 Beverly Pike
Elkins, WV 26241

Dear Ms. Carter:

In accordance with the National Environmental Policy Act (NEPA), the Natural Resources Conservation Service has initiated preparation of an Environmental Assessment (EA) to evaluate potential environmental effects associated with proposed dam modifications in the West Fork River in West Virginia.

In order to adequately evaluate the potential environmental effects of the action, the NRCS and USFWS will benefit from working together to analyze the potential effects of fish passage alternatives on the environment and effects to endangered and threatened species under Section 7 of the Endangered Species Act.

To assist this effort, and in accordance with the 40 CFR Section 1501.6 and the Council on the Environmental Quality Cooperating Agency guidance issued on 30 January 2002, NRCS requests USFWS serve as a cooperating agency for the development of Draft Environmental Assessment for Dam Modifications on the West Fork River in Harrison County, West Virginia.

Although I have worked closely with you and your staff throughout this environmental analysis, an official status of "Cooperating Agencies" has not been documented. The overarching expectations of the agencies' cooperation include:

1. NRCS is the lead agency and has primary responsibility for ensuring that the Environmental Assessment (EA) will meet NEPA compliance requirements.

2. NRCS and USFWS shall work in good faith to ensure that issues of mutual concern are resolved prior to issuance of any documents for public review.

3. NRCS and USFWS may terminate this letter by providing written notice to the other parties.

NRCS appreciates your consideration of this request. Please contact me if you have questions or concerns at (304) 284-7581.

Sincerely,

Casey D. Shrader
USDA NRCS State Biologist

Helping People Help the Land

An Equal Opportunity Provider and Employer

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

June 15, 2010

Mr. Casey Shrader
USDA NRCS State Biologist
U.S. Department of Agriculture
Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, West Virginia 26505

Dear Mr. Shrader:

Thank you for your letter dated June 10, 2010, requesting the U.S. Fish and Wildlife Service (Service) be a cooperating agency in the preparation of a National Environmental Policy Act (NEPA) Environmental Assessment (EA) to evaluate potential effects associated with proposed dam modifications on the West Fork River in Harrison County, West Virginia.

We appreciate the Natural Resource Conservation Service's (NRCS) efforts to ensure an interagency process for the assessment of alternative methods of fish passage, and we agree, in accordance with the NEPA implementing regulations at 40 CFR 1501.6, to be a cooperating agency for the EA due, in part, to our responsibilities to protect these resources. We have met with the NRCS on several occasions concerning this project and are currently exploring funding opportunities for the dam modifications.

Under the cooperating agency role, the Service will assist NRCS in the specific ways described in the June 10, 2010, letter. We look forward to working with you and our other partners on the completion of the project. Please call Mr. John Schmidt at (304) 636-6586, Ext. 16 if you have any questions.

Sincerely,

Deborah Carter

Deborah Carter
Supervisor

Enclosure

APPENDIX XI

PERMIT CORRESPONDENCE

Copies to: Kevin Louis Pam Angela

DEPARTMENT OF THE ARMY
PITTSBURGH DISTRICT, CORPS OF ENGINEERS
WILLIAM S. MOORHEAD FEDERAL BUILDING
1000 LIBERTY AVENUE
PITTSBURGH, PA 15222-4186

August 4, 2010

REPLY TO
Operations Division
Regulatory Branch
2010-1056

Kevin Wickey, State Conservationist
Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, WV 26505

Dear Mr. Wickey:

I refer to your Draft Environmental Assessment (DEA), received in this office June 25, 2010, requesting comments on the proposal for Dam Removal/Modifications on the West Fork River near Clarksburg, Harrison County, West Virginia. The submitted information proposes to remove three (3) dams (Two-Lick Dam, Highland Dam, and West Milford Dam) as well as constructing an aquatic life passage structure (ALPS) at the Hartland Dam to preserve the water supply storage and allow freer movement of fish and other aquatic life.

If this activity will require the placement of any fill material in waters of the United States, including streams, wetlands, and open water impoundments, a permit may be required from this office under Section 404 of the Clean Water Act (CWA). If you determine that this project may require Federal authorization under Section 404 of the CWA, you should contact this office to discuss Department of the Army permit requirements.

Based on the information that has been provided your project may qualify for West Virginia Nationwide Permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities). Every effort should be made to avoid and minimize impacts to the aquatic resources on-site. We will continue to work with you in order to protect any aquatic resources that may be present.

This project has been assigned Department of the Army Permit Number 2010-1056. Please refer to this number in all future correspondence. If you have any questions, please contact Josh Shaffer at (412) 395-7121 or by email at joshua.d.shaffer@usace.army.mil.

Sincerely,

Marcia H. Haberman
Chief, Southern Section
Regulatory Branch

Copies Furnished

WV DEP (Bennett)

WV Public Lands Corporation

APPENDIX XII

PUBLIC COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

August 27, 2010

Copied to:
Laura
Pam
Pat

Kevin Wickey, State Conservationist
Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, West Virginia 26505

Dear Mr. Wickey:

Thank you for the opportunity to comment on the Draft Environmental Assessment (DEA) for the Dam Modifications on the West Fork River, Harrison County, West Virginia. The U.S. Fish and Wildlife Service (Service) is sending a joint letter of support for this project because it will enhance the long-term conservation of mussels in the West Fork Drainage.

The Federally-endangered clubshell mussel (*Pleurobema clava*) is known to inhabit Hackers Creek, a tributary of the West Fork River. The project will increase the amount of suitable habitat for the species within the watershed and will improve the ability of clubshell to establish additional populations within the West Fork Drainage by increasing the opportunity for host fish to move freely between Hackers Creek and an expanded reach of the West Fork River. Thus, this project will contribute to the recovery goals for this species as outlined in the U.S. Fish and Wildlife Service's 1994 Clubshell and Northern Riffleshell Recovery Plan.

There are also historic records for the West Fork Drainage indicating that the Federally-endangered riffleshell (*Epioblasma torulosa rangiana*) and two Federal candidate species, the snuffbox (*Epioblasma triquetra*) and the rayed bean (*Villosa fabalis*), inhabited this area. If these species are present in the river, dam removal would improve potential habitat for them. In addition, dam removal would improve conditions for the state-rare least brook lamprey (*Lampetra aepyptera*) and other native fish, especially those that migrate for spawning (e.g., white bass (*Morone chrysops*), and many sucker species).

While the long term effects of this project will greatly benefit the mussel community in the West Fork River, it is difficult for the Service to comment at this time on any temporary effects (or possible conservation measures) of the project on current mussel populations near these dams due to the lack of detail in the dam modification plans. The details of the dam modification plans should be closely coordinated with the Service and the West Virginia Department of Natural Resources to ensure that any potential adverse effects to both listed and non-listed mussel species are avoided.

In addition, we have the following specific comments and recommendations of measures to incorporate into the project.

Invasive Species Prevention

1. Surveys for invasive aquatic plants should be conducted at these sites prior to dam removal (if surveys have not already been completed). If aquatic invasive plants are found, these species should be treated prior to dam removal. It should also be noted that some of these invasive aquatic plants persist in "pond like" habitats. Thus, the removal of the dams could actually prevent invasion by these species into this segment of the West Fork River.

2. Construction crews should take measures to prevent any inadvertent introduction of invasive species into the site (e.g. equipment should be cleaned following standard protocols prior to use in any deconstruction projects; only clean rock fill or rip rap should be used, etc.).

Avoidance of Effects on Mussels

Areas in the direct impact zone (construction zone) of the dam removal project should be surveyed for mussels prior to beginning the project to determine if any mussel species are present. If any of these species are present, measures to avoid and/or minimize impacts should be developed. If any listed species are found to be present, additional coordination with the Service should occur.

1. Work at the sites should be conducted during months of low flow and not during times of mussel spawning.

2. Construction equipment should be confined to streambanks. If this is not feasible, equipment should be restricted to only enter the river in areas where mussels are not present to prevent direct impacts (crushing) to mussel communities.

3. Large releases of sediment which may smother existing mussel communities or affect fish populations below dam sites should be avoided by incrementally reducing the height of the dams and slowly lowering retained water levels, and if necessary, using temporary sediment barriers during dam removal activities.

4. Monitoring stations should be located in selected areas throughout the watershed and baseline surveys conducted to more effectively track and quantify changes (benefits) to the mussel communities in the watershed after project implementation.

We appreciate your efforts to develop this important project and we look forward to continuing our cooperating efforts in this regard. Please contact Barbara Douglas at 304-636-6586, Ext. 19, if you need further information.

Sincerely,

Deborah Carter Callie McMunigal

Deborah Carter
Field Supervisor

Callie McMunigal
Appalachian Partnership
Coordinator

cc:
USFWS - McMunigal
WVDNR – Janet Clayton
Project File
Reader File
ES:WVFO:MCrockett:skd:8/27/2010
Filename: P:\1 - Users\Laura Hill\Comments_EA_WestFork DRAFT 3.doc

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy in WV
P.O. Box 250
Elkins, WV 26241

tel (304) 637.0160
fax (304) 637.0584
nature.org

August 31, 2010

Kevin Wickey
State Conservationist
Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, WV 26505

Dear Mr. Wickey:

I'm writing with comments on the *Draft Environmental Assessment for Dam Modifications on the West Fork River*. The Nature Conservancy supports the recommended alternative for this project that will restore the aquatic connection for fish and freshwater species between sections of the West Fork River.

During our ecoregional planning process for the Ohio River freshwater ecoregion in 2006, The Nature Conservancy identified the West Fork River as a conservation priority because of its diversity of native species relative to other rivers in the area. The river serves as a good representative of the freshwater diversity that can be found in the Monongahela River drainages of West Virginia, making it an important site to work to conserve the state's natural heritage.

This first project, if implemented, to restore freshwater habitat connectivity on a West Virginia river is important because it removes, or modifies, barriers to the free movement of fish and mussels both representative and rare to the state. Importantly, if completed the project would allow West Fork fish populations, and subsequently the mussel species for which they are hosts, to have access to habitat that they historically used.

Thank you for the opportunity to comment,

Sincerely,

Amy Cimarolli
Director, Science and Stewardship

US Department of Agriculture
Natural Resources Conservation Service
1550 Earl Core Road, Suite 200
Morgantown, WV 26505

DATE: August 25, 2010

RE: Comments on Draft Environmental Assessment for Dam Modifications on the West Fork River, Harrison County, WV.

SUBMITTED BY: John R. Stenger, PhD

PERSONAL & PROFESSIONAL QUALIFICATIONS RELATED TO THIS ISSUE INCLUDE:

- B.S. (Biology/Chemistry) Salem College, WV;
- M.Ed. (Biology/Geology) University of DE;
- Former naturalist, Cape Henlopen State Park (Lewes, DE);
- Asst. Prof. Environmental Science, DE Bay Marine Science Consortium;
- Instructor, Wastewater Microbiology for treatment operators, DE Tech & Community College;
- Instructor of Biology and Geology at Cape Henlopen Schools (DE), retired.
- National Science Foundation participant in Biology, Ecology and Geology Programs for science educators at the universities of Maryland, Marshall, Central Michigan, Ohio State and Delaware.
- 83+ year observer of the West Fork River as a WV resident and visitor.

1. The hydro-electrical potential of these dams should be investigated and utilized. The state legislature and community governments could be entitled to funding from all levels (e.g. stimulus grants from energy and commerce departments). The local R.E.A should pursue this as a possible project.

.

2. At the slightest hint of bias or capriciousness on the part of government agencies, adversely affected individuals/groups should not hesitate to litigate for remedies. This is an opportunity for law professionals to work pro-bono for protection of a valuable recreational asset. (*Example: My environmental institute did so to protect 1000 acres of Cape Henlopen marshlands, dunes and*

pine forests at the mouth of the Delaware Bay over twenty years ago—at a fee of only a couple thousand dollars— to enforce a public charitable trust established in the 17th century by William Penn).

3. It is ridiculous and far-fetched to hold liable owners of a dam, used for public recreation/economic purposes for over a century, for an accident. The legislature should provide proper protection status to owners of the dams.

A man who paddles his canoe into the over-falls of a dam should have no standing in any court—he deserves no more compensation than a hunter who breaks his neck falling out of a tree stand.

Is the state liable for a driver who fails to negotiate a turn? Did we take up the tracks when a B&O Train at Salem, WV took the life of my coach, Paul West? (Not until the railroad line was obsolete!) Do we destroy a mountain because a climber falls to his death? Do we bust a dam because an idiot risks drowning by going over or under it for thrills? I would hope we haven't reached that state of molly-coddling protectionism.

There is a point where individuals should assume responsibility for their behavior. On the banks of the West Fork, at Gore, I watched as Clarksburg firemen attempted but failed to revive my childhood schoolmate (of the Dick Skinner family). And I, myself, failed to revive my own neighbor (father of the Phillips family) when he was thrown and run over by the propeller of a boat motor he was attempting to start. None of these people, to my knowledge, ever associated the dam's owners with blame. No litigation ever resulted from those accidents.

Is this the age of blame it on others? I personally cut a tendon on my foot on the spillway of the Clarksburg Water Board's Buffalo Creek (tributary of the West Fork) Dam. There were no signs of any kind and no fences; yet, it never occurred to me hold the city responsible. I put my foot into a broken tile on the dam while water sliding the spillway. It was my own action. I would not have litigated against the city.

A problem is that courts have failed to dismiss such cases (molly-coddled).

4. The State or federal government should own, maintain and insure the dams; not a city or private enterprise. An alternative would be that the West Milford City Council should (re)consider possible acquisition of the dam.

Will the West Virginia State Legislature establish for the city—or another public agency if it purchases the dam—immunity from litigation in accidents cases? Cannot safety issues be

resolved using signs, fences, ropes, etc.? Even with safety issues addressed, should we expect to stop drownings on a river any more than we can expect to stop traffic fatalities on our highways?

5. Might money for busting the dams be better spent on projects utilizing the same dams for hydroelectric power generation? I think so.

6. What is the current level of treatment at the wastewater facilities? And what contaminants might contribute to species decline, if any, in the waters?

Throughout my teens, I lived along West Fork River, about a mile upstream from the West Milford Dam.

We had a boat tied up over the bank from our farm. We rowed, fished, swam, dived from limbs and from ropes tied to trees, and frolicked by the hour. I spent almost as much time in the water as out. We caught bass, bluegills, crappie, catfish, frogs, and soft shell turtles, which substituted for chicken dinner on Sundays. We ice-skated on the frozen dam pool when the ice thickness was greater than 3 inches. (*Repeat: The owners of a dam should not be held liable for any of the possible injuries associated with such recreational activities. Today, one might not be surprised to hear the preposterous reasoning that if a kid breaks a foot ice-skating, the owners of the dam should pay the doctor bills. Of course, this is nonsense. The legislature should reaffirm "hold harmless" status to dam owners.)* But after a few courses in microbiology, believing that some of the polio cases might be attributed to viral contamination from sewage and suspecting that only primary (minimal) treatment of human wastes was done by cities, I stopped swimming in the West Fork River.

7. What folly is it to drastically reduce the habitat pool for numerous existing species behind the dam(s)—in biased favor—hoping to enhance the population of a few "endangered" bivalves? Why put stress upon existing species of mollusks that thrive in the current pools? Why rob Pete to pay Pauline?

8. There will be significant economic costs to farmers along the riverbanks if existing river and pool depths/widths are reduced by dam destruction. Who has considered and estimated these costs? Who will bear the burden of fence building?

Present widths/depths of the river serve as a barrier to livestock, thereby eliminating the need for building and maintaining fencing. Farmers miles upstream from the dam will be forced

into building fences to replace what is currently a wide, deep and natural deterrent to livestock river-crossings. At significant cost, farmers will need to fence the riverbanks to keep livestock from wading across shallow waters.

Economic shock was inflicted on farmers when the dams were built and the water area increased; and there will be economic shock when the dams are busted. I encourage farmers, and others opposed to the dam destruction, to organize for litigation against those who are unconcerned about the effects of resultant lowered water depth

As a practicing biologist for over a half-century, I fully appreciate the value of species diversity and protection. But as a human (and former farmer, myself) I understand the cost and labor a farmer can expect if the stream(s) he has worked around are altered. I would hope that those engaged in livestock production deserve legal standing and protection under the law.

9. Have the people of the upper West Fork been assured that the Stonewall Dam waters will be released to maintain existing water levels? Don't they deserve the same consideration and assurance from the Corps of Engineers that was granted to people of the lower regions of the Monongahela? If dams are busted, let the waters of the Stonewall Dam pool be reduced in order to maintain the existing pool levels below!

10. A decade or so ago, I found a large bed of mussels—approximately 6 x 10 feet square—along the south bank of the West Fork opposite the community of Good Hope. A large sycamore had fallen into the water and the mollusks were attached to the gravel bed created when sediments built along the upper part of the tree. Therefore, I conclude that any claim that bivalve habitats are altered by the dam pool is false. And I would expect that conditions have not changed appreciably in the few years since.

Though I wanted to, I did not eat those tasty morsels due to my fears of pollutants — mercury, etc.—and I didn't know if they were protected or if I needed a license. Yet I was pleased to know that mussels were thriving in the West Fork some three miles upstream from the West Milford Dam.

11. It seems highly speculative to theorize that reduction of bivalve species is attributable to the dam impoundment of a stream. Having personally located a huge mussel bed at Good Hope, my limited scientific training leads me to hypothesize that the West Milford Dam is not a "limiting factor" with respect to bi-valve populations.

I had no reason to search for other mollusk beds at the time. They should still be there.

Has anyone bothered to check? "Unbiased" people are being paid to study such things at biology departments all over this world. 100-year-old studies were fine; but what modern research has been utilized? (Has the mercury level in tissues of edible species been determined? Is it safe to consume the fish, turtles, frogs, mammals or mussels taken from those waters? I wonder?)

12. Existing populations—from people to birds to mollusks and a whole ecosystem—have *adapted* to the pressures they encountered by the original dam construction. Busting the dam will *induce* equal stress on those existing populations of organisms. All have adapted/adjusted and survived in, and adjacent to, the dam pools for at least a century (all of my 83 years). New habitats were created when the dams were built.

13. The river was once a junkyard dump. "Out-of-sight, out-of-mind" was vogue along with a prevailing concept of 'the solution to pollution is dilution".

How much accumulated human detritus could be exposed by lower water levels? Large, broken rock fragments from dam destruction, if left in streambeds, could potentially add to that debris and become a source of injury to swimmers or boaters.

I personally have seen dangerous debris while swimming, boating and wading the West Fork. While growing up in Clarksburg and West Milford—and on many recent visits to three family-owned farms along the West Fork River from Good Hope to the mouth of Lost Creek—I've seen bed springs, tires, commodes, bottles, pots and pans, sinks, farm implements and automobile parts of all kinds.

14. The West Fork offers many a fascinating and memorable experience. One New Years Day, P. J. Reymond and I canoed the flooded West Fork waters from Lost Creek to Gore. I have also drifted those same, calmer waters alone and observed the unsuspecting bird life—from crows to eagles and herons— that didn't seem to know the boat from a drifting log. Canoeing is not all about shooting rapids.

15. There are dams throughout the United States. Why are a few selected dams on the upper West Fork being selected for destruction? Can't the problems be solved so the dams can be maintained? I would think so—if bias is avoided and the mind-set turns to preservation of the existing dams.

16. I have no potential personal gain by advocating preservation of the West Fork Dams. I have divested all ownership and claims to lands entitled to me. My son, John L. Stenger; now owns the three family farms along the West Fork but nothing would prevent me from arguing for dam destruction, were I inclined to do so.

17. A cost-benefit analysis is lacking. One should be compiled and evaluated.

18. The scientific methodology may not meet acceptable standards. And, there appears to be some bias in selection of mussel sample sites. Randomness in selection is essential, yet it seems to be disregarded, consequently suggesting invalidity

It seems a flawed conclusion that diversification of mussel species is more important than all others species. The conclusion that dams have caused the disappearance of mussels is akin to saying that dams have caused the recent decline in bee populations. This is the same kind of faulty reasoning that has been applied to the dam question.

19. What effect will lower water volume/levels resulting from dam busting have upon dilution of contaminants? What town treats sewage above the primary level? Do any treatment plants go beyond the minimal primary level of treatment to secondary or tertiary? Should streams be closed to swimming due to high bacterial levels in hot weather? Are "fin fish" tissues contaminated with heavy metals? Are the waters being monitored for possible unsafe contaminant levels?

Sincerely and respectfully,

John R. Stenger

John R. Stenger, PhD

AUG. 27, 2010

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Wendy L. Compton 8/27/10

WENDY L. COMPTON
NOTARY PUBLIC
STATE OF DELAWARE
My commission expires Oct. 6, 2010

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GUARDIANS OF THE WEST FORK WATERSHED

The Guardians of the West Fork Watershed, a grassroots citizens' group dedicated to the protection and preservation of the West Fork River, has reviewed the Draft Environmental Statement concerning the possible removal of the West Fork, Highland, and Two Lick Dams. Our membership consists of a broad spectrum of concerned citizens, fishermen, boaters, sportsmen, farmers, riverfront property owners, and others dedicated to improving the quality and usefulness of this river.

We are seriously concerned with problems in your Draft Environmental Impact Statement. The errors, omissions, shoddy work, and poor science that characterizes this document are very disturbing to our members. We as an organization feel strongly that dam removal is a bad idea. Removal cannot be justified in an honest study and appraisal of all the diverse factors involved.

Our members have identified many problems with your Draft Impact Statement. We submit the following 15 pages of comment and criticism.

GENERAL COMMENTS

(1) The absence of a real cost- benefit analysis in your document is an inexcusable omission. Claimed benefits must be presented realistically, without hype or exaggeration. The costs and losses associated with dam removal for recreation-swimming, fishing ,boating etc., for agriculture, for potential hydropower, for the needs and wishes of local residents, for damage and disturbance to existing aquatic species and ecosystems, all these costs must be honestly evaluated and quantified.

(2) NRCS has put mussel habitat above that of Largemouth Bass and Muskellunge. You also have placed real human needs, uses, and preferences far below what is just a mere possibility of helping to promote mussel species diversity.

(3) Data for different studies of species present, in different eras over many decades, with widely different sampling sites, standards, rigor and methodology, are used and compared without consideration of how the data was obtained. It seems likely that a more time consuming and rigorous approach was taken in the horse and buggy days. The results of these vastly differing studies (in location and methodology) cannot be directly compared with any semblance of scientific validity.

(4) The omission of mention of the strip mine era and its effects on organisms that liveD in streams, then, and their progeny, now, is serious. The impact of this major ecological disruption on the river in general, and on mussel diversity especially, may largely overshadow all dam effects, meaning that dam removal is likely to have little, if any, positive impact on mussel diversity.

(5) The omission of the role of Stonecoal Dam in protecting flow for the Harrison Power Station is remarkable. It is as though this rather large body of water did not exist - through the whole document.

(6) The work of Gannet Fleming may be state of the art, but it is horse and buggy stuff. The sample tube being pushed into sediment "until it meets refusal" and calling data to an assistant on shore to be recorded by hand is primitive. I would suggest that pushing in to "refusal" is not very repeatable, nor is it so much a function of the depth below the water surface of the original stream bed, but is rather a function of the state of consolidation of the sediment. You'd about as well use a lead line with knots tied to a rope each foot the way Mark Twain did. Electric fish finders exist. Don't they have depth sounders using sonic waves, and electronic or laser means to accurately establish sampling position on the surface?

(7) Your failure to measure sediment anywhere except at the dams and then drawing the conclusion that there is very little sediment anywhere, on the basis of this extremely limited survey, is scientifically and logically unsupportable. Just at the mouths of nearly all the major creeks are massive deposits of sediment, of which you are totally unaware.

(8) The West Fork River will never fully become a free flowing river. Dam structures will always block sections of this river.

(9) The frequent reference to literature, rather than getting out and talking to people and looking at the situation first hand, is poor. Literature has its uses, but it cannot duplicate data obtained by spending time on the ground.

(10) Refusal to consult with and to take seriously the comments and concerns of local residents severely limits your knowledge and understanding of facts and reality. The public has repeatedly informed you of serious problems with sediment , debris, recreational and ecological damage, etc. yet you stubbornly ignore this input and thus have hurt yourselves by producing an impact statement full of errors, ridiculous statements, and unsupportable claims.

SPECIFIC COMMENTS AND CRITICISM OF THE DRAFT IMPACT STATEMENT :

The members of our organization have read through this Draft Impact Statement concerning dam removal and have found many problems. Many pages of this document are littered with mistakes, omissions, speculation, exaggeration, and factual errors. To bring order to our comments, we have followed the same sequence as your Draft, with our reply following and addressing your document by section, page and paragraph.

For clarity we have numbered our pages with a "R", for Reply to avoid confusion,

TITLE PAGE

Abstract: Page 3

Bias and lack of objectivity is shown immediately in this Draft by referring to the dams as "obsolete". These dams serve multiple purposes, and the fact that they are no longer needed for one purpose- water storage by the Clarksburg Water Board- does not negate beneficial uses for other purposes.

The aquatic and ecological integrity of the West Fork is presently sound and in need of no restoration to a state which has not existed for nearly 200 years. The human and cultural uses and value must be fairly and fully considered and evaluated and then compared to a possible improvement in mussel habitat. Removal cannot restore more suitable habitat for all 25 species of mussel. Twenty five species were never found in this section of the river to begin with. Many of these species are already present and adapted to existing conditions. Thus dam removal will likely harm at least some mussel species.

PURPOSE AND NEED

Page 7

Paragraph One. This paragraph sets out lofty ideals and objectives but the actual Impact Statement falls woefully short.

Paragraph Two. This is a false statement as written. Habitat change will benefit some species but harm others that are adapted to existing conditions.

Paragraph Three. You are attempting to hide the public reaction to Dam Removal. Public comment was overwhelmingly opposed to Dam Removal. Why do you cover up this very important factor? The dams do not stop fish passage down river. Also, you must remember that the Highland Dam currently has a fish ladder for upstream passage.

Paragraph Six. Your goals are arbitrary and were chosen so that Dam removal will be the only alternative that can possible fit the goals. An alternative goal would be to maximize the value and utilization of the river for the local citizens for recreation, agriculture, fishing, etc. This or similar goals should be added to your selection criteria.

Paragraph Eight. You hide the reasons NRCS has not gone forward with funding. This is largely because the local West Fork Soil Conservation District is strongly opposed to Dam Removal, as is the Local Farm Bureau.

PROJECT DESCRIPTION

Page 8

Paragraph Two. This section should mention that the river flows through the town of West Milford where one of the dams is located.

Paragraph Five. You fail to state that adjacent to the river are hundreds of acres of prime farmland-cropland-not merely pasture. This is the best and most fertile soil in the area.

Page 9.

Table does not even mention cropland or prime farmland.

Paragraph Three. This Stonewall Jackson Dam is given credit for the benefits it provides in several categories-improving water quality and supply, improvement of habitat for fish and wildlife, hydropower, and recreation. However, you fail to give these other dams any such positive credit whatsoever. How can you say a dam is needed to provide these things and then turn around and claim that dams must be removed to provide these things? How do you justify all the dams built with federal funds and refuse to recognize similar benefits with these dams?

Paragraph Five. This is factually wrong. The West Milford Dam has been there since 1817. Also, the last dam in this section of river is at West Milford not at Weston. You seem much too ignorant of your subject matter.

Paragraph Six. Another error of omission. There is still another dam on the West Fork at Worthington.

Page 11.

Table-The Two Lick Dam has only about 3 feet of head. Why are there no recognized uses for these dams when they are used by local citizens for Boating, Fishing, Swimming, Agriculture, and Golfing.

SCOPING ISSUES OF CONCERN

Page 11

Paragraph One. You hide the overwhelming public opposition to dam removal. This is unacceptable.

Paragraph Two. You fail to list all the public concerns. Is this so you can hide and minimize the extent of opposition to dam removal?

Page 12.

Table-This table is very incomplete. The false impression you try to create is that the "Agency" has thought of and addressed all issues and that the public has raised very few issues. The truth is the exact opposite. The public has raised all these issues (and more) that are listed under Agency. You are not playing fair. This table is false.

ALTERNATIVES CONSIDERED

Page 12

Paragraph Two. No Action: You fail to state that even after removal of these three dams, the West Fork will continue to be impounded in multiple locations-Worthington, Clarksburg, and three dams at or above Weston. Our position is that aquatic habitat will continue to be enhanced if the Dams are kept in place. If Stonewall Jackson Dam gets credit for providing benefits to habitat, so should these other three dams. There is no assurance at all-only a hope really- that any endangered species will be positively effected by removal.

Paragraph Three. This insurance figure is false. Actual liability costs for these dams are but a very small fraction of your $137, 000 figure. The Guardians of the West Fork looked into this matter and received a quote for liability insurance on all three dams of only $2300 per year for the first million dollars of coverage.

Paragraph Four. This is a serious misrepresentation of the truth. You are trying to hide that local residents are opposed to dam removal.

Page 13.

Alternative 2-Installing Signs. This alternative is removed from consideration only because it doesn't meet your arbitrary and restrictive goals which can only met by dam removal. Your goal is not aquatic restoration, your real goal is removal, and you seem willing to say anything to achieve it.

Alternative 3-Again, you remove this alternative of portage from consideration because it does not meet your ultimate pre-ordained goal of Dam Removal.

Alternative 4-This alternative of removal does not meet the goal of meeting the needs and wishes of the PEOPLE. Who by the way pay your salaries.

Alternative 5-If Stonewall Jackson Dam controls flooding then if the dams are raised the statement that flooding will become an increased concern has no fact supporting it.

Page 14.

Paragraph One. Actually, this is a somewhat positive development in that it has increased public use and enjoyment and the recreational value of the river. However, as for the problems of vandalism, simple police enforcement would solve the problem . Police drive past these dams on a regular schedule. They need to stop and confront the trespassers.

Page 15.

Divest Ownership. This is the best solution to this whole problem. Federal funds should be spent to facilitate this option, not to destroy a valuable asset.

Conversion to Hydropower. You provide only negative speculation and comment but you have no expertise in this area. Why do you not recommend a feasibility study? Instead you simply remove this option from consideration. This is biased, shortsighted, and plain wrong. What about the goals of green energy? What about cutting back on carbon dioxide generation and stopping global warming? What's the better alternative, mining disasters and catastrophic oil spills or developing hydropower on existing dams?

RATIONALE FOR RECOMMENDED ALTERNATIVE

Page 15

Last Paragraph. Dam Removal meets the goals only because the goals were arbitrarily selected to make removal the only possible option. This is highly improper.

EFFECTS OF RECOMMENDED ALTERNATIVE

Page 16.

Paragraph One. You make a false statement to claim that the effects of dam removal will be fully described then you proceed to cover-up and hide most of the these effects.

6.1 AESTHETICS

Page 16

Paragraph Two. The Dams are a beautiful addition to the local scenery. They have visual attraction similar to a waterfall. Why do you not state this? Rails to trails are irrelevant as none of the river sections affected by dam removal are adjacent to trails. This should be removed from the document.

You show great ignorance to claim that only small areas of the river have characteristics of a free flowing stream. All the river from Weston to Good Hope and from Clarksburg to Worthington and several areas between West Milford and Clarksburg are completely free flowing. There is much more free flowing river than dammed.

Paragraph Three. False statement. The pools do not in any instance back up water clear to the next dam. There are extensive sections of free flowing river and many riffles in the West Fork between dams. Perhaps the extensive strip mining for coal over the last 60 years, or all the pollution have had negative impact on mussels-not the Dams. You are merely speculating.

Paragraph Five. This too is a false statement. Many members of the Guardians have direct and positive proof of debris. There is an absolute certainty of hidden debris. However, you have made provisions to deal with only the debris adjacent to the dams and have allocated no money to deal with the rest.

6.2 BIOLOGICAL ENVIRONMENT

Page 16

Last Paragraph. There is no evidence to support the belief that this actually happens. Apparently

no tests were made. This is a non-issue. The river has no problem with being eutrophic. Both Stonewall Jackson and Stonecoal lakes are releasing enough water to make eutrophic conditions a near impossibility.

Page 17.

Paragraph One. This is a non-issue in the West Fork. Dams do not eliminate insects and mussels. Look at the river, not the book.

Paragraph Two. You should explicitly state what you're trying to hide. Removing the Dams will eliminate habitat for some species. In its present condition with dams the West Fork is still a moving stream.

Paragraph Three. The deeper the water, the cooler the temperature. Eliminating the dams is likely to increase average water temperature.

Paragraph Four. These periods of inundation occur regularly, often several times a year, when fish can swim across the dams at will. High water follows high precipitation-very predictably.

Paragraph Seven. You admit that diversity of species is very good with the dams in place. The different fish species can move with floods. You don't mention that Highland Dam has a fish ladder. To speculate that species "may not" have opportunity to expand cannot be justification for dam removal because it isn't true. The species "may have" expanded all they are going to expand even with dam removal.

Paragraph Eight. There will still be dams at Worthington, Clarksburg, and three at Weston. The West Fork River after removal will not be full connected. There is no assurance of a positive net benefit to dam removal even for fish. There is a certainty that the net effect on local residents will be negative.

Last Paragraph. The fishery that now exists is in many ways superior to what will exist after dam removal.

Page 18.

Paragraph One. "Tend to be" is highly speculative. Have you actually measured these things? There are already all sorts of different habitats in the river. Dam removal will only narrow, not expand, the range of different habitats by eliminating deep water habitats now existing. The West Milford Dam is 200 years old.

Paragraph Two. This is merely speculation. It is quite possible that certain species adapted to deep water pools will be severely stressed and possibly eliminated.

Paragraph Three. This paragraph contradicts what you claim in the paragraph immediately above. Changes in the habitat will have a large impact on the biology at the river. You state that dam removal may strongly influence invertebrates and the food chain and that it is highly variable how individual species will respond to dam removal , then you state here that dam "removal is not expected to cause significant change to prevalence, abundance or total loss of important communities". In the preceding paragraph you make a categorical denial that even any single species could be severely impacted by dam removal. Please get your story straight and try to stick to it. Your own chart in table 5 shows " Significant decrease" in habitat for Largemouth Bass, Bluegill and Muskellunge. These species are often sought by fishermen, and the Muskellunge in the West Fork are often trophy specimens.

Figure 2-Map. This is highly misleading. The sections below Clarksburg are not opened up by removal of the upper three dams, because a dam will remain at Clarksburg.

Page 19.

By your own chart, we see that habitat for many species of fish will decrease. In fact there are as many species harmed as helped. You fail to state the total net effect on pounds of fish in the West Fork River. There may be "more total fish" with the dams in place than without dams.

6.3 CULTURAL RESOURSES

Page 20.

There has apparently been no study or investigation of the history of the West Milford Dam

dating back to 1817 before its takeover by the Water Board. You have perhaps deceived the WV Division of Culture and History.

6.4 HEALTH AND PUBLIC SAFETY

Page 20

Public Health. This is highly misleading and poorly worded. These are Low Hazard dams. You say they are easily accessible and remote in the same sentence. Make up your minds. Something that's remote is not easily accessible and something that is easily accessible is not remote. These are opposite meanings. Is the public health and safety endangered by our highways as evidenced by hundreds of deaths each year. Are you advocating highway removal? Get Real Here Folks!

Page 21.

Table 6. The currents are not unpredictable. They are just the opposite, and very predictable. Upstream floating debris is irrelevant. There will always be floating debris, even if dams are removed.

Paragraph Three. This insurance figure is a wild exaggeration and cannot be used to justify Dam removal.

6.5 HYDROLOGY

Page 22.

Paragraph One. There are absolutely NO abandoned mine lands adjacent to the flood plain of the West Fork in the sections effected by these three dams. Your contention that dams do not effect the adjacent land uses is contrary to the facts. Dam removal will be a major change for owners of lots with cabins and piers, boats, power boats, and related investments. In some places the river serves as a fence for cattle - parallel fences will need to be built. Agricultural uses for watering livestock and irrigation will also be effected.

Page 23.

Paragraph Four. The Mount Claire gauge station is no where near 14 miles upstream from Clarksburg. You have not done your homework.

Page 24.

Last Paragraph. This is ridiculous and leads to a false estimate. You can't accurately measure distance by contours on a topo map. These maps are notoriously inaccurate. The pools are actually as much as seven miles long. If you'd bother to actually measure the actual river rather than guess and estimate while sitting behind a desk, you might discover a little about the West Fork River.

Page 25.

Table 10. This table is not accurate. Measure back from the dam to the first riffles and you will discover the length of the dam's pool Your estimates are not even close.

Paragraph One. You have to be completely oblivious to the real, actual West Fork River to state that undisturbed reaches are difficult to locate. Get out from behind your desk and you might learn something. You cannot even manage to measure the pools nor figure out where they end. You do not have the knowledge needed to write this Environmental Impact Statement.

6.6 INVASIVE AND EXOTIC SPECIES

Page 26.

You should include all species present in the Ohio and Mon. Rivers even those that haven't yet been identified in the West Fork. There is a good probability they will eventually make their way here.

Page 27.

Paragraph Five. You state that the dams provide no barrier to invasive Asian Clams but contradict yourself by claiming that the dams are a barrier to the mussels. This is not logical. You state that dam removal will facilitate the spread of the Zebra Muscle by removing slack water. This is nonsensical.

6.7 PROPERTY VALUES

Page 28.

Paragraph One. Not true. The West Milford dam was originally built for milling. Statements on property values is merely speculation.

Paragraph Two. More idle speculation. The signs are a non-issue and irrelevant to property values.

Paragraph Three. Your claim of no decrease in property values is highly doubtful. That property values will be the same when there is no opportunity to boat and swim is foolish. Docks without water will be useless. Docks without sufficient water to operate a boat will be useless. You also claim that there is no significant trash problem. Statements like this come from taking clues from the literature rather than the author getting the facts on the ground!

6.8 RECREATION AND EDUCATION

Page 29.

Paragraph One. You fail to describe fairly or fully the advantages of existing conditions. You are much too biased in your preconceived agenda for dam removal. You completely fail to even mention swimming as a recreational use of the river.

Paragraph Three. The signs are of very little concern. Just wait to see the ugly and unsightly garbage and junk visible after dam removal.

Paragraph Four. This liability insurance issue is way overblown and completely exaggerated. The real figure is but a few percent of your wild exaggerations. You cannot justify spending hundreds of thousands of federal dollars to save the Water Board a few thousand dollars, so you exaggerate costs.

Paragraph Five. This is false, and again a failure to observe the facts on the ground Without the dams, water levels will be much lower and especially with low flows in dry years very much lower.. There will not be enough water to float the boats. Only very light craft will be able to navigate. Most boat fishing is done by older people, they will be cut out. Only young fit people willing to exert themselves will be able to canoe or kayak. The river is not " one long continuous pool," at present. After dam removal, the pools will be separated by miles of riffle areas. This will make boating more difficult rather than less. Wildlife viewing will not be improved by dam removal. This is false. Scenic attribute will not be improved either. This is propaganda or at best subjective opinions.

Last Paragraph. Not True. Access will be much more difficult when the water level is lowered and further out away from the riverbanks.

The Army Reserve Engineer Company located in Clarksburg has a boat launching site just out of sight in the picture shown with this section. It is used in training using their water craft. There is no mention of this in the Draft

Page 30.

Paragraph Two. Your conclusion that fishing and recreation will be greatly improved is mere subjective propaganda without factual support. Language such as this undermines any claim to objectivity in your Impact Statement. Back on page 18 paragraph 3 you state that dam removal is not likely to cause significant change. Make up your mind.

Paragraph Three. The Rail Trail is completely irrelevant to removal of these dams. The trails do not follow the river in sections where these dams effect the water level. This paragraph is pure, empty propaganda.

6.9 RIPARIAN AND WETLAND AREAS

Page 31.

Paragraph One. Where do you come up with 40 miles? This is false. There aren't even 15 miles of river where the water level is backed up by these three dams. In this paragraph you admit that wetlands and special aquatic sites will be destroyed by removal. However, you have not quantified, or even identified these impacts.

Paragraph Two. You admit these sites have not been delineated or identified but you merely conjecture that they are insignificant. Are you serious that this is an environmental impact statement.

Paragraph Seven. You admit that there will be a loss of wetlands. Yet you try to hide this by saying they will revert to pre-dam conditions. You need to be forthcoming and state explicitly that there will be a loss of existing wetlands.

6.10 SEDIMENT

Page 31

You state as fact here that sediment transport behind the dams is severely restricted and that heavier material is deposited in the headwaters of the pools. Why then did you not sample for sediment except right at the dams? You failed to sample where you know you might find the greatest amount of sediment.

Page 32.

Paragraph One. If the dams remain, sediment stays put.

Paragraph Two. You make an outrageously false claim to state there is only a "small amount of sediment". On page 31 you stated that sediment transport is "severely restricted". If transport is severely restricted and the dams have been there for up to 200 years, how can you be so ignorant to believe there is only a "small amount"? You have failed to actually sample or study the river where sediment is most likely to accumulate.

Paragraph Three. It is false and absurd to say that sediment is mostly small particles. You state and admit on page 31 that heavier material is deposited at the headwaters, but you only sampled at the Dams. You have not done enough testing, which is obvious by the errors you make.

Page 33.

Last Paragraph. You have failed to sample the length of the pools. Your comments are mere conjecture. You state here that sediment has been evenly dispersed and deposited which contradicts your own words on page 31 where you state that heavier material is deposited at the headwaters. You also claimed that sediment transport was severely restricted. Now you say sediment is evenly dispersed and claim that sediment transport has prevented large areas of sediment from forming. You only sampled at the dams and know absolutely nothing about sediment anywhere else. You seem completely ignorant of the massive sediment accumulations at the mouths of nearly all the larger creeks. Your comments here are a farce and a mass of contradictions.

The scarcity of sediment claimed by Gannet Fleming is quite remarkable in view of the hundreds of thousands of tons of suspended material that must have gone down the river in the coal stripping era from 1945 to 1985. Particularly in view of the claim that " some sediment still occurs, but is severely restricted". a significant percent of the drainage area above the dams was stripped, at first with little regulation but with increasing regulation as time progressed.

Page 34.

Paragraph One. Your statement about mobilization of sediment is ridiculous and due to your ignorance of the actual West Fork River and of your failure to sample the length of the pools. This is mere conjecture based on the false assumption of very little sediment. You are very likely to destroy many mussel beds.

Paragraph Five. Disposal of "contaminated sediment" entails: a) rather low probability of discovery before loss from the sediment bank and a high probability of discovery by adverse affect, and b) uncertain dollar cost for removal and a likely high cost.

6.11 THREATENED, ENDANGERED, RARE AND DECLINING SPECIES

Page 34

Paragraph One. In the West Fork, given the massive unregulated strip mining for several decades preceding the documented decline in mussel species diversity, it is quite likely that the dams did not cause the decline but rather mussel decline is likely due to the effects of mining. The period of greatest threat from siltation must surely have been in the period of stripping. The real threat to benthic organisms is the certainty of decade by decade increase in population with its discharge of water conditioners, water purification agents, (i.e., chlorine), preservatives in food, and other consumer products, and the vast array of drugs disposed by flushing. Further, the release of products associated with manufacturing, transportation, and disposal of industrial and consumer goods into waterways.

Paragraph Seven. Existing Conditions have not been adequately studied, your comments are conjecture based largely upon wishful thinking. We may well have endangered or candidate species in those dam pools. The only basis for assuming otherwise is your reliance on the WVDNR database. You need large scale rigorous studies to determine the presence of rare species.

7.a. If Riffleshell Mussels are present, dam removal is likely to kill off existing populations. The Banded Darter, one of their host fish, is present and common in the West Fork (table page 77). Also there have been documented findings of Northern Riffleshell in dam pools in water deeper than the West Fork pools behind dams on the Alleghany river.

7.b. The Clubshell Mussel is now in Hackers' Creek. Several of the host fish for this mussel are present and common in the West Fork. Hackers' Creek is fully and freely connected to free flowing water in the West Fork from Weston to Good Hope and to numerous creeks with good water and potential clam habitat. The host fish are present and there are already many miles of dam free, free-flowing habitat directly connected with Hacker's Creek. The Clubshell may already be present behind the dams and could be adversely affected by dam removal. The Northern Riffleshell, or other scarce species, may also be already present and thus could be harmed. Why haven't the Hackers Creek mussels spread throughout all this connected free flowing habitat. Dam removal is likely to have very little, if any positive impact.

Page 35.

Paragraph Two. You really do not know what you are talking about. The confluence of Hackers' Creek and the West Fork is at least 8 miles above the West Milford Dam. You don't even know the location of the mouth of Lost Creek. The host fish are already present and common in the West Fork River.

Paragraph Five. Your quote of GT Watters does not apply to these three low head, run of river dams. You've already , although falsely, claimed there is very little sediment accumulation. Also water quality is excellent with no problems with eutrophication to cause mussel death. The host fish are present and plentiful. This long quote is irrelevant to these particular dams, and should be removed

Last Paragraph. This is false to the point of being fraudulent. Host fish are plentiful, siltation -by your own claims-is not a problem, eutrophication is a complete non issue. Mussels will be negatively effected by a drastic habitat change like what you propose with dam removal.

Page 36.

Paragraph One. There is no assurance and little likelihood that these mussels will spread after dam removal. Where do you get 40 miles reopened. This is ridiculous. At most you have the length of the dam

pools. The river from Weston to Good Hope is already free flowing. The river downstream from Hartland Pool will also be largely unaffected.

Paragraph Two. Mere conjecture and speculation. Dam Removal will result in a net loss of Mussels at least short term. There is no eutrophication. The river well oxygenated. The host fish are already here.

Paragraph Three. You hide the fact that the West Fork already had dams for 100 years before Ortman's survey. If dams predated Ortman, mussel decline must be attributed to other factors.

You speculate " that populations of current species may expand as a result of the project and historic species could potentially be restored to suitable habitat within the watershed." Table 10 lists the River Distance to Upstream Contour- a total of 12.6 miles of impounded water out of several hundred miles of stream. Since the river bottom in these impounded areas is going to be mud until the sediment is eroded away and mud not being a very satisfactory location for mussels, it takes quite a little faith to think there will be any movement upstream and more than minimal downstream movement for these organisms that are particularly at risk.

Paragraph Four. Your table 13 is highly misleading. It lists only 23 original historic species, not 25. It also fails to list two species-Paper Pond Shell and Wabash Pigtoe that are known current species. At present there are 11 current species plus at least one more-the Clubshell-in the West Fork system. Interesting to note that in 1919 only 8 species were identified which is less than current numbers. By this measure the building of additional dams has helped mussel species diversity.

Paragraph Five. The West Milford Dam dates from 1817, one hundred years before the date you provide and 100 years before the Ortman mussel surveys. Your claim that there were at least 25 different species present in 4 different surveys is either poorly worded or an intentional deception. In none of the 4 surveys were 23 species found--only 23 altogether. You misrepresent the data from Appendix IV. Three of the surveys found at least one species that was not found in any other survey. No species was found in all four surveys. Again, this was 100 years after the original construction of the West Milford Dam.

Since 1980, mussel surveys have identified 11 different species. However these modern surveys were not taken at the same locations as the 4 Ortman surveys. These later surveys were not made nor supervised by a world renowned mussel scientist like Ortman who had a real interest in finding as many species as possible. The latest surveys were made after dam removal was already being considered-perhaps by people with a vested interest in not finding mussels and certainly not by people with the knowledge and expertise of Ortman.

To maintain that only 5 species are now present is false and highly misleading. The most that can be said is that 5 species were located in certain particular surveys at very limited sites. One of the most recent surveys was at the VA Bridge in Clarksburg in the Hartland Dam Pool-not likely prime mussel habitat. This site has been vastly over populated with ducks which are predators of young mussels. The other recent survey was at Lightburn in a free flowing section of the river, connected with the Hackers' Creek Clubshells and not impact by dam pools. The dam pools seem to be better mussel habitat than this sample site.

Also, the methodology, the sample sites, the rigor, the expertise, and other aspects of these studies was so different as to make comparison between them of extremely limited scientific validity.

Paragraph Six. The surveys that show no mussels at Shinnston and Gypsy are reflective of environmental problems other than these three dams. You have not taken into consideration the pollution from the DuPont Spelter operations. Since these sites are completely removed from the three dams considered for removal the Shinnston and Gypsy surveys are irrelevant.

Last Paragraph. Before any serious consideration of dam removal, the affected stretch of the West Fork must be fully and rigorously surveyed for mussels, fish, and other organisms to determine existing ecological conditions with some degree of scientific certainty rather than mere speculation and conjecture. Otherwise, dam removal may well cause more harm than good.

Page 37.

Table. The insert is a fraud. These figures only indicate species found at particular survey sites. These are not reliable figures for the actual number of total species present in the West fork River. Your survey sites are not from the needed locations and are largely irrelevant to the three dams.

6.12 WATER QUALITY

Page 38.

Paragraph Three. There is NO eutrophication problem in this section of the West Fork. So long as Stonewall Jackson Dam and Stonecoal Dam are functioning, this will not be a problem, as releases from these dams keep water moving in the river. You admit that water quality is excellent. Just state that fact and leave the eutrophication issue alone-it is irrelevant and used merely as a scare tactic.

Page 39

This table is seriously flawed, with trend dates improperly selected for completely different time spans. This cherry picking of dates allows one to produce whatever trend he desires. The trends produced here are quite unreliable.

Page 40.

Paragraph One. You state that if the dams remain there will be no change in water quality, even though population based, pollution related changes are a certainty regardless of the status of the dams. These changes will continue to occur, just as they have in past decades. In view of the consideration in the first paragraph of the previous section(6.11) additional sedimentation in the future will not be much compared to the past- with unregulated strip mining-, without geologic scale development.

Paragraph Two. The claim that there will be only a single flush event of sediment is false. Flush events will occur repeatedly for an unknowable length of time. Why make such remarkably ridiculous statements?

Paragraph Four. This too is ridiculous. There is no thermal pollution. Where is the evidence?

6.13 WATER USE AND SUPPLY

Page 41.

You state there are no official agreements with Stonewall Jackson Dam for maintaining water flow to downstream entities, but you have unfortunately overlooked something with the complete omission of Stonecoal dam. It would be a great disaster for Harrison Power Station to be without water in a dry time, particularly in the heat of summer when electrical demand is great. It is unlikely that Allegheny Energy does not have an implied or explicit agreement to prevent the very large, near state of the art power station from going off line due to shortage of water. Harrison Station has a 2-gigawat generating capacity, of 9.7 for the whole Allegheny Energy system.

If the volume of the river doesn't change after dam removal there will be merely pot holes as above the Good Hope bridge and the Kincheloe areas during summer and fall. There are many riffles one can walk across now.

You neglect to mention any agricultural use of the river, nor costs for agriculture, like fencing, watering, irrigation.

Page 42.

Last Paragraph. This is a fabrication. There is no riffle complex at this location.

6.14 OTHER CONSIDERATIONS

Page 43.

Again there is no riffle complex present. All that glitters is not gold. You may be looking at a reflection or a cloud or perhaps you have doctored or altered the photograph.

Page 44.

Paragraph Three. You state that dam removal MAY include removal of concrete wings. This piece of boilerplate should be obvious, but is no guarantee that there will not be unsightly remains in view from the West Milford Bridge on Route 27 and elsewhere.

Page 46.

Is your proposal to demolish the dams and leave the unsightly concrete rubble behind to spoil the scenery and recreational potential of the river? You must develop plans and budget to remove demolition debris.

PROJECT COSTS

Page 50

The half million dollar cost must be considered a blue sky estimate at a time of great economic uncertainty. There may be a paradigm shift to emphasis on building national infrastructure. War may break out in the middle East . China and Japan may decide to quit financing the governments' debt. Removing dams is a high priority consideration for very few Americans, there is a lot they would rather see done before removing dams.

ENVIRONMENTAL COMPLIANCE

Page 51.

You have not considered the historical and cultural value of the West Milford dam which dates from 1817. What about possible endangered species that may now be living in the Dam pools?

MONITERING

Page 53.

Paragraph Three. This paragraph is different in both tone and substance from nearly all the rest of the Impact Statement. Someone wrote this who has a measure of impartiality and common sense. This person should be the one who writes your Impact Statement. It is here clearly stated that dam removal will be likely to cause mussel death. It is clearly stated that it may take decades before there is any positive effect on mussels. It is also stated that the feasibility of re-introducing mussels is unknown. These honest evaluations contract your wildly exaggerated claims about the supposed benefits to mussels in the rest of the document.

NEPA.PUBLIC PARTICIPATION

Page 54

You attempt to cover-up and hide the fact that public sentiment by the local population is overwhelmingly opposed to dam removal. This fact should be stated explicitly in the Impact Statement. You should provide a transcript of all verbal public meeting comments. You have hidden the hundreds of signatures by local residents on petitions opposing dam removal. These petitions against dam removal should be mentioned and considered.

You also demean and belittle the opposing views, and fail to elaborate or give more than a very brief and biased summary.

Page 55.

Table 18. In this summary you should state that these people were opposed to dam removal.

West Milford Treatment Plant comments are met with mere speculation in the Draft.

Seasonal Water Level comments are not addressed. Water levels will be drastically lowered with dam removal. In dry seasons the flow will provide for merely a small creek sized stream compared to the large deep pools we have now.

Soil Erosion comments are rebutted with falsehood. You state throughout the Draft that the slow moving pools will be replaced with riffles and free-flowing conditions. Now you refute yourself.

Exposed Trash response is also false. It is certain beyond any doubt that trash will be exposed. You are oblivious to actual river conditions and thus have no funds or planning to clean up the mess. The river is a catch all for dumping by people who have no pride in our state. The river is full of every kind of appliance, auto and truck tires and all sorts of other junk.

Last Comment response concerning low flow killing aquatic life is simply wrong. Compare your propaganda to the more measured and reasoned language of paragraph 3 page 53. In your table on page 19 you list just as many instances of fish harmed by dam removal as those which might benefit. When a deep water pool is turned into a riffle there will certainly be a die-off of some organisms. Your claim that there is no species dependent on the dams is preposterous. The West Milford Dam has been there for 200 years. It is quite possible that certain species-perhaps endangered or even unknown -have adapted to the present environment. A 37 cubic foot per second flow, spread across the width of the West Fork is a mere trickle compared to the present pools of water-small lakes actually -behind the dams.

Page 56.

The Muskellunge comment response untrue. Musky will be seriously negatively effected as proven by your own data in Table 5 page 19.

The comments concerning low water levels are not explained. What were these comments? You fail to state them but merely respond with mention of Stonewall Jackson Lake which is under no obligation to maintain high water levels in the West Fork. You fail to address the issue.

What are the "prefer no action" comments? It is unlikely that these comments simply state "prefer no action". You are trying to hide the actual comments.

Your response to the last comment about increased water velocity is absurd. Water in riffles moves faster than water in a pond. There will be no reduction in head, there will just be a spreading out of the fall of water over a series of riffles instead of the entire drop occurring right at the dam. You responded to a valid concern with falsehood.

APPENDIX

Page 65.

The Town of West Milford was not among the groups receiving notice of the meeting. It is also likely that the Town of West Milford has not been sent a copy of this Draft Environmental Statement.

Page 67.

There is no indication here that the West Milford Dam was given any special consideration as a historic site dating from 1817.

Pages 77 to 78.

Note that the host fish for both the Club Mussel and the Northern Riffelshell are present and common in the West Fork River. There are already miles of suitable habitat directly connected to the Hacker's Creek populations. What factors are stopping their dispersal into all this suitable habitat? Removing dams, that do not interfere with this present lack of dispersal, will make little difference.

Page 79.

This isn't science, it's quackery. There have never been 23 species found at any location. Six different species were identified in only one Ortman survey but none of the other 4 surveys. Only 8 species were revealed in the 1919 survey, but 11 in the 1980 survey. Did mussel diversity expand from 1919 to 1980 with the dams in place? Altogether 12 species have been found in modern surveys.

None of the modern surveys was made in a location sampled by Ortman. Also, none of the modern surveys were conducted in a location where water is backed up by one of the three dams. The later surveys were not made by an expert with the same knowledge and thoroughness as Ortman. The 2001 surveys

showing only 2 species were located in free-flowing sections of the West Fork above any of the dam pools. The 2001 survey showing 7 species (El-1805) was made in the same locations as the 1993 survey (E1-91) which identified only 3 species. This gain of 4 species over only 8 years (in the same location) is an indication that the dams are not restricting mussel dispersal. Mussels are not found scattered evenly along any river-even the most pristine. A survey made in certain section may identify just a few mussels only because mussels favor a slightly different environment. This does not indicate that the entire river has only a few mussels. A site slightly upstream or down stream may offer suitable habitat and abound in mussels.

Most of the modern surveys were in locations with no dam impact and thus fail to reflect mussels populations in areas to be drained by dam removal. The E1-980 survey was made in the deep water at the Hartland pool (which dam will not be removed) and is irrelevant as concerns the other three dams. It was made in an area severely over populated with ducks which are a predator of juvenile mussels.

Your charts and data are very misleading , very poor science, pages 83-84 Appendix V-these charts are missing large sections of data. Also the start and stop dates were likely chosen to produce the trend you were looking for. Where are the last 12 years data on dissolved oxygen? At any rate the data shows excellent water quality. The trend lines are manipulated by choice of dates and thus meaningless.

Page 85.

This is meaningless. Where is the West Fork Data.

Page 87.

What is the relevance? There is none.

Page 97.

Sediment. This section is very poorly done. The first place sediment is likely to accumulate is in the headwaters and at creek months-places where you choose not to study. You have hardly scratched the surface in conducting an adequate sediment study. This is obvious since your knowledge and understanding of sediment conditions is severely limited.

CONCLUDING REMARKS

1. A principal worry in this Draft, and apparently the main justification put forward to justify Dam Removal, is the decline of mussels. They are not terribly efficient in spreading themselves or their progeny into new territory, especially upstream. If NRCS is truly interested in promoting mussel species diversity, and not merely using this issue as an excuse for dam removal, a more efficient way to preserve and spread mussels would be to develop methods to artificially propagate and spread these rare species as is being done elsewhere.

2. There is no way to justify Dam removal. The Federal Government should not be in the business of spending many hundreds of thousands of dollars to destroy a valuable asset and resource in order to save the Clarksburg Water Board a few thousand dollars a year in liability premiums. Instead, any surplus federal funds available for this project should be channeled to facilitate the enhancement and preservation of these dams.

3. The needs and preferences of the local citizens must be given much greater attention and consideration. The bias and obvious push for dam removal by the authors of the draft is inappropriate and unacceptable.

4. This project is nowhere near the stage to even write a Draft Impact Statement. The necessary studies have not been undertaken, much less completed. There must be a full investigation of sediment conditions the entire length of the dam pools. The junk and debris status of the river must be honestly evaluated. There must be a rigorous study of the entire effected sections of the river to determine numbers and species of mussels currently present. This Draft is very inadequate and needs to be completely reworked.

5. The hydro power potential of the dams must be investigated before any thought is given to removal. This would entail at minimum a feasibility study by a competent expert in low head hydro power, preferably someone familiar with Archimedes Screw technology.

John Eleyette, President

Bob Rector, Vice-President

- Unavailable -

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August 27, 2010

Mr. Kevin Wickey
State Conservationist
Natural Resources Conservation Service
1550 Earl Core Rd., Suite 200
Morgantown, WV 26505

Re: Draft Environmental Assessment (DEA) for Dam Modifications on the West Fork River

Dear Mr. Wickey:

The West Virginia Division of Natural Resources, Wildlife Resources Section (WRS) has reviewed the Draft Environmental Assessment for Dam Modifications on the West Fork River dated July 2010 and offers the follow comments.

The WRS appreciates the opportunity to evaluate this proposal for removal of these dams for the protection and improvement of the fishery and other aquatic resources.

The stated Purpose and Need for the proposed project is to "restore the connectivity of the West Fork River in order to benefit aquatic species including native mussels and their host fish while improving the habitat of the native fishery. There is also a need to reduce the liability associated with these structures that is currently being borne by the owners – the Clarksburg Water Board (CWB)."

Our evaluation of the project is based on a review of scientific studies reported in literature and the knowledge and expertise of several biologists in various units of the WRS. The literature reported experiences from other state wildlife management agencies that have been involved with dam removal in their states and has led us to conclude that removal of all three dams would result in positive benefits for the River. Connectivity of the stream reaches, along with anticipated improvements in the physical habitat and water quality, are expected to lead to improvements in the sport fishery.

This should improve both species richness and population of other aquatic life such as freshwater mussels and aquatic insects, which will also benefit from expanded and improved habitat. Connectivity is dependent on a functioning Aquatic Life Passage Structure being installed at the Hartland Dam. This will permit upstream movement of species that are now impeded by the Hartland Dam. In our opinion, removal of the upper three dams without habitat improvements will not increase the number of species present in that reach of the West Fork.

The following is a list of technical inaccuracies that should be corrected and/or concerns and questions that the WRS has on specifics of the document.

1. Page 18, Para. 1. The discussion implies that water temps will be cooler after dam removal. The WRS believes that significant temperature reductions of the West Fork is unlikely and, in any case, would not substantially alter the species composition currently found in the West Fork. Also, the expectations that the fish species present after dam removal will be similar to 100 years ago may be overly optimistic. There is significant development in the watershed, a presence of navigation and flood control dams and water quality issues associated with mine drainage which would effect these expectations.

2. Page 19, Table 5. Dam Removal Option Impact to Fish: The WRS agrees that some species may realize improved habitat while others will be diminished. However, stating "significant" increases/decreases is an overstatement considering that these are opinions that don't seem to be supported by documented evaluations of habitat quality. A simple (+), (-) or unknown may be more appropriate. The chart lists post project Muskellunge habitat as a significant reduction. This might be inaccurate. Muskellunge are native riverine fish and do very well in riverine habitats. The habitat will change post project but it is unclear if this change would represent a (+) or (-) of habitat quality for the entire life cycle of the Musky.

3. Page 27, Dam Removal Alternative: The correct scientific name for zebra mussel is *Dreissena polymorpha* not (Corbicula sp.).

4. Page 79, Appendix 6: Flutted Shell was not found in the survey and, therefore, should be removed from the EI 89 column.

5. Page 44, "Alternatively or in conjunction with adding structural measures (i.e., riprap) the banks may need to be graded to lessen their slopes to prevent large scale erosion and cutting of the banks." The Natural Resources Conservation Service (NRCS) and US Fish and Wildlife Service (FWS) should consider the use of rock/log vanes or other structures/techniques commonly utilized in channel restoration projects for bank stabilization/habitat improvement.

6. Page 50, Table 17. Estimated Cost for Dam Removal and Modification: Estimated cost for "Instream Habitat and Restoration Structures" and "Streambank & Riparian Corridor Restoration" seems very low. Less than $17,000 (4.5 percent of West Milford, Highland and Two Lick's budget) is budgeted for instream habitat restoration and streambank restoration. One of the stated goals of the project is to improve habitat of the native fishery, the sponsors should consider formulating an adaptive management plan and possible funding sources if more extensive instream habitat measures/riparian corridor restoration is required.

7. Page 50, Table 17. The estimated cost of the Aquatic Life Passage device on the Heartland Dam is shown as $300,000. The total cost is $120,000. We don't understand why there is such a wide discrepancy between estimated and total cost for the Hartland Dam project and suggest this be resolved.

8. Page 50, "Timing of dam removals should be coordinated with times of low water and low turbidity." This statement may indeed be true but lacks supporting data. Late summer is generally a period of low water and turbidity. However, it is also a time of higher water temperatures, lower dissolved oxygen and consequently higher aquatic stress levels. Late summer also marks the end of the growing season resulting in exposed sediments to not start to rigorously re-vegetate until the following spring. There are many factors to consider when determining the "best" time to remove the dams. Growing seasons, spawning seasons, water quality parameters, sediment transport capacity and constructability are just a few that need to be considered.

The WRS fully supports returning the West Fork River to a continuous riverine habitat. We recognize that some forms of recreation would be reduced or eliminated in the existing pool areas. However, we anticipate other forms of recreation that are equally popular will be created. The WRS will continue to work with personnel from the NRCS and FWS to provide technical information regarding the wildlife resources of the project area and their habitat. The WRS is hopeful that the dam removal plan will be implemented in a timely and efficient manner. If you have any questions regarding our comments, please contact Mr. Danny Bennett of my staff at the Elkins Operations Center 304-637-0245 or dannybennett@wvdnr.gov.

Sincerely,

Burt A. Preston

for Curtis I. Taylor, Chief
Wildlife Resources Section

CIT/abj

NRCS


NRCS