

RESTORATION OF THE BIG WOOD RIVER

INTRODUCTION

Development along the Big Wood River (BWR) has dramatically reduced the river's normal hydrologic function and damaged its habitat for fish and other wildlife. Cottonwoods, willows and other native vegetation and the woody debris that gave the river its name have been removed from the river, jeopardizing bank stability and eliminating shade. Over 51% of the river's banks have been altered to protect properties, bridges and roads. Over time, this has had the effect of increasing the velocity of the river, altering the natural channelization and sediment transfer processes and preventing the river from accessing its normal floodplain, increasing flood damage potential. Development and forest fires have also adversely impacted the river and its tributary streams, polluting the river, increasing sediment deposition and preventing fish from accessing their historic spawning grounds. Finally, increased water withdrawals and recent drought conditions have reduced summer flows and increased water temperatures. The BWR is a wonderful asset for our valley, but its health has been severely impacted. We need to fix it.

The expected outcomes of any major restoration effort must be tempered by recognition of the human constraints - residences, roads, bridges, irrigation diversions and other infrastructure - imposed on the BWR due to human settlement. The BWR is also an extremely dynamic river that, as the saying goes, "is going to do what it's going to do". Even the best technology cannot predict with certainty what will happen in and around the river under severe spring flood conditions. Anything we do has to be recognized as temporary, to some degree. But while we can never restore the BWR to the pristine condition it was before we humans came to enjoy this beautiful valley, recent studies indicate there is a lot we can do to alleviate the harm we have caused to the river in terms of restoring its natural hydrology and habitat for trout and other wildlife. Below are a list of studies that are consistent in recommending similar strategies and guidance for how to address restoration of this important economic, recreational, and iconic resource.

STUDIES

Big Wood River Atlas, Cardno and Ecosystem Sciences, 2020, 93 pages with multiple Exhibits

This major study is the most recent and most comprehensive study of the BWR. It was commissioned by Blaine County, including diverse stakeholders and jurisdictions, to provide guidance in administering the SAP process. It covers the 42 miles from the SNRA to Stanton Crossing, was designed to accomplish five objectives:

1. Build community trust and collaboration over river management issues
2. Understand historic and current processes
3. Develop a flood risk management framework that supports the connectivity of floodplains

4. Develop a decision-making framework to identify and evaluate projects that work to restore natural river processes, and encourage aquatic habitat formation
5. Assist river managers with identifying best management practices for development within the river

The study points out that, as a trout fishery, the BWR is “a significant contributor to the economic health of the valley”. The most critical factor limiting the trout population is the amount and quality of fish habitat, with trout densities in unaltered reaches 8 to 10 times greater than altered reaches (cover impaired or having rock revetments). The study emphasizes the importance of large woody debris in providing good habitat for trout and improving the river’s hydrology. Large stable log jams played a major role in the development and maintenance of the pre-development meandering channel system described in an early study by C. Rapp (see below). This type of channel system is more resilient to disturbances such as flood, fire and large sediment events and creates a more complex mosaic of habitat types that support fish. The study recommends reintroducing large wood to the river but only after proper geomorphic and engineering analysis. Other factors noted in the study as influencing channel form behavior and habitat are (a) sedimentation (which is reduced in fast flowing entrenched sections causing excessive build up in slower sections), (b) riparian vegetation (which reduces the risk of flood, erosion and bank failure and improves aquatic habitat and water quality), and (3) rock revetments or “riprap” (which adversely affects stream morphology, degrades fish populations and exacerbates flooding and erosion).

The study recommends removal of riprap where deemed not critical, modification of existing riprap to achieve greater hydraulic complexity and limiting construction of new riprap, warning that riprap “does not eliminate the potential of an area to be re-captured by the river or be subject to future bank loss.” In terms of steps to be taken to maintain and restore the river, the study recommends projects in the following priority:

1. Protect remaining intact functional floodplain through acquisition, easements or legislation
2. Reconnect channels where evidence shows that removing confinements such as riprap and levees would open-up “prior channel occupation”
3. Reconnect floodplain processes in areas where development has encroached into the floodplain and embankments have been constructed restricting access to the floodplain
4. Restore riparian vegetation where it has been removed or modified to the point of compromised function
5. Use flood fence and engineered LWD (large woody debris) jams to stabilize “dynamic channel planform” (control sediment in a way that reduces flooding and channel erosion while improving habitat)

The study lists the criteria used by Blaine County in permitting stream alterations (SAP) and states that, while providing “some key guiding principles”, these criteria lack engineering standards to demonstrate adherence to the criteria. The study recommends that future applications include:

- (a) analysis of hydraulic modeling to demonstrate no adverse impacts on flood elevations and velocities (using guidance provided by FEMA, USACE, NORFMA (the Northwest Regional Floodplain Management Association) and others,
- (b) review by a qualified independent geomorphologist of the impact of the project on erosion, sediment, transport and migration potential,
- (c) an assessment by a qualified fisheries biologist of the impact of the project on fish habitat and how to mitigate these impacts, and
- (d) in the case of projects involving the installation of large woody materials, an evaluation of the risks of the installation on river hydraulics in accordance with established guidelines.

The study goes on to describe each of 22 reaches of the river between the SNRA and Stanton Crossing in terms of sinuosity, gradient, width, bankloss (between 2004-2015 and 2015-2017) and bank stabilization, includes one map depicting the current channel, the historic channel migration zone (HCMZ), flood zones and the location of rock armoring, levees, bridges and irrigation diversions, and another map showing zones of recent and potential erosion, and also evaluates the reach in terms of restoration potential.

Other previous studies commissioned that support the recommendations of the Atlas study:

Effects of Stream Alterations on Rainbow Trout in the Big Wood River, Idaho, Russell F. Thurow, Fisheries Research Biologist, IDFG, 1988.

A biologist with the Idaho Department of Fish and Game (IDFG) prepared this study of the condition of the BWR as a fishery. It found that, while the BWR “may be a shadow of its former fishery”, it still had a respectable wild rainbow population with growth rates comparable to the Henry’s Fork and Silver Creek. A significant finding was that unaltered reaches contained 8 to 10 times the fish densities of stretches where rock revetments (riprap) had been installed and/or cover and woody debris had been removed. The study recommended restricting further stream alterations (especially riprap which destroy fish habitat diversity and “create adverse hydraulic impacts”), maintaining riparian buffer zones and restoring channel stability and “natural floodway overflow channels”. The study concludes that the future of fish populations in the BWR will be dependent on our ability to: (1) halt the continued, insidious loss of habitat and (2) restore degraded areas.

Big Wood Fishery Assessment, Wood River Land Trust, May 23, 2005

A staff member of the Wood River Land Trust (WRLT) analyzed the existing studies and research to identify the factors that limited the health and productivity of the BWR. noting the “vital role” the river has “in our vibrant local economy”. The assessment suggests the following steps: (1) educating the public and policy makers on the value of the floodplain and factors influencing fish habitat, (2) restoration measures between the Glendale Diversion and the North Fork (specifically mentioning re-vegetation of banks, use of anchored woody debris and monitoring) and (3) adoption of local ordinances and state laws to regulate development of the floodplain.

Geomorphic Assessment of the Big Wood River, Cynthia Rapp, Consulting Geomorphologist, December, 2006, 71 pages

A study prepared for the WRLT describes the transformation of the BWR due to development from a meandering system characterized by multiple channels running through a forested floodplain to a system of (a) multiple “braided” channels with bare bars (49%), (b) straight channels (36%), and (3) a few remaining meandering sections (16%). Channels have become more “entrenched” meaning they are restricted with higher flow velocities and with limited access to the river’s natural floodplain. Entrenchment increases flood risk. The study advises that bank hardening activities (e.g., riprap) “do not provide a long-term solution posed by flood and erosion hazards”, but actually contribute to the problem. The study makes no specific recommendations for renovation projects, but recommends additional studies.

Final Geomorphic Assessment Report, Big Wood River, Blaine County, Idaho, Biota Research and Consulting, Inc. (Biota), February 1, 2016, 122 pages

This major study commissioned by Trout Unlimited (TU) along with WRLT, the Bureau of Land Management (BLM) and others, describes the functioning and impaired channel conditions in the main stem of the BWR from the SNRA to Magic Reservoir. Measurements were taken in several sections of the river of geomorphic conditions (i.e., physical features) which were then rated in terms of sediment transport capacity, lateral stability, vertical stability, channel enlargement potential and sediment supply. This technical study describes approaches that can be utilized to improve “flood attenuation” and thereby reduce flood hazard, improve the continuity of sediment movement, increase channel stability and reduce bank erosion, including improving functional channel geometry, utilizing wood revetment bank stabilization techniques instead of riprock, installing rock stabilization with willow bundles where suitable, floodplain improvements, grade control by constructing “hardened riffles” and installing “rock cross vane treatments” to promote scowl pools for energy dissipation and depth and turbulence cover for fish, and establishing set-back requirements for new development. The study concludes with the recommendation that specific river treatments should be applied “in concert to address underlying causes of fluvial system instability” as opposed to applying “the typical Band-Aid approach” of addressing only the “symptoms of system degradation”.

ORGANIZATIONS INVOLVED IN RESTORATION OF THE BWR

Among the most active participants in the effort to restore the BWR to date and the entities that should be expected to participate in further restoration efforts are the following organizations:

WOOD RIVER LAND TRUST

The entity which has been the most instrumental in advancing the cause of preserving and restoring the BWR is the WRLT. Big Wood Valley is blessed with one of the most successful land trust organizations in the country with a highly talented staff of conservationists, an active and committed Board of Directors and an impressive list of conservation accomplishments. One of WRLT's primary missions in the valley is the restoration and enhancement of the BWR. A WRLT staff person wrote the 2005 fisheries assessment which identified the causes of the decline of the BWR as a fishery and recommended the additional studies that followed. WRLT commissioned the 2006 Rapp geomorphic study and is coordinating the Hulen Meadows/Sun Peak Preserve project with the City, the Hailey Greenway and Colorado Gulch projects with the City of Hailey and the several projects going on in and below the Howard Preserve in Bellevue.

TROUT UNLIMITED

Trout Unlimited is a national conservation organization headquartered in Arlington, VA whose mission is "to conserve, protect and restore North America's coldwater fisheries and their watersheds". TU has been committed to the restoration of the BWR for some time and, until recently, had a full-time resident staff person here to coordinate TU's efforts. TU engaged Biota to do its 2015 study (described above), sponsored the Glendale Diversion and Diversion 45 projects, worked with WRLT and TNC on the Rinker Rock Creek Project and worked with the Idaho Conservation League and the USFS on the Deer Creek Restoration Project.

HEMINGWAY CHAPTER OF TU

TU has a very active chapter of locals in the Big Wood Valley with a Board of Directors committed to conservation generally and the BWR in particular. The Chapter holds monthly public meetings on topics of interest to its membership and operates programs for fish rescues, youth and veterans fly fishing, signage at fish accesses in the valley, etc. Board members monitor the SAP processes at the local governmental bodies and assist with river projects. The Chapter coordinated with the residents of the Lane Ranch Subdivision on the fish ladder project on Elkhorn Creek and raised the funding for it through a highly successful fundraising campaign. The Hemingway Chapter is exploring with WRLT establishing a collaborative effort to restore the BWR and authored this memorandum.

THE NATURE CONSERVANCY

TNC is a global conservation organization dedicated to conserving lands and waters. TNC has a substantial presence in Idaho, including a regional office in Hailey. While TNC has not itself sponsored any renovation projects on the main BWR, its staff collaborates with TU and the WRLT on all aspects of the restoration effort. TNC is a prime participant in the Rinker Rock Creek Ranch Project. It also owns the Silver Creek Preserve which depends on water flows from the BWR (the aquifer that supplies the springs forming Silver Creek is closely associated

with the BWR's aquifer.) TNC's strong interest in efficient usage of BWR water explains its promotion of the Wood River Water Cooperative as a means of achieving this objective.

LOCAL GOVERNMENTS

The BWR runs through four political subdivisions in the valley: Blaine County and the Cities of Ketchum, Hailey and Bellevue. The BWR's second most important tributary, Trail Creek, runs through the City of Sun Valley. A primary role played by these governmental entities relating to the BWR is the approval of any construction within the high water marks of the river or the Floodplain District. Any such construction requires a Stream Alteration Permit (SAP). The County commissioned Cardno's *Big Wood River Atlas* to help in evaluating SAPs. The County and all three Cities have demonstrated strong commitment to the restoration of the river, with Ketchum actively promoting the Hulen Meadows/Sun Peak Preserve project, Hailey working actively with the WRLT on the Hailey Greenway restoration and Bellevue an active proponent of the several projects in its jurisdiction.

STATE GOVERNMENT

The Idaho Department of Fish and Game (IDFG) closely monitors the BWR watershed as part of its mission to preserve, protect and enhance trout populations and other wildlife species in Idaho. IDFG is a source of information and expertise on trout habitat and populations that is critical in all efforts to restore the BWR. It's concern for restoring the BWR is exemplified by the 1988 Thurow (a fisheries biologist with the IDFG) report which recommended actions to restore the BWR to its former status as one of Idaho finest trout fisheries. IDFG, along with the Idaho Department of Parks and Recreation, has also been a source of grant funding for some of the completed projects. Any project in the BWR requires approval of the Idaho Department of Water Resources (IDWR) which administers all water uses in Idaho, both residential and agricultural.. The IDWR also works through Flood Control District #9, the local district established under the Idaho Flood Control District Act (Idaho Code §§ 42-3103 *et seq*), to promote flood control projects and provide funding therefor.

FEDERAL GOVERNMENT

A number of Federal agencies are involved with the BWR. The US Forest Service (USFS) owns and administers 60% of the land in the BWR basin and a significant amount of the land abutting the river above Hulen Meadows. The USFS was a partner on the Deer Run Watershed project. The Bureau of Land Management (BLM) owns and administers 20% of the land in the BWR basin and the public land in the area of the Hulen Meadows/Sun Peak Preserve. USFS and BLM have valuable resources that could be utilized in the restoration of the BWR such as fisheries biologists, hydrologists and other experts. The US Army Corp of Engineers (USACE) must sign off on any project in the river pursuant to Section 404 of the Clean Water Act. USACE's Hydrologic Engineering Center (HEC) in Davis, California, has developed very sophisticated software (RAS) which can be used to model how alterations in rivers should affect a river's hydrology. This software is being used in the Hailey Greenway Project and would seem to be helpful in analysing the impact of other proposed interventions on the BWR. The Federal Emergency Management Agency (FEMA) promulgates standards and procedures relating to flood control. Its requirements and guidance is reflected in the SAP process. As the Federal agency which studies and provides scientific information about natural resource conditions, the United States Geological Survey

(USGS) provided valuable data (and photos) used in several of the studies of the BWR described above. In 2016 the USGS, in collaboration with the IDWR, issued its *Groundwater Flow Model for the Wood River Valley Aquifer System* which models ground and surface water movement in the Big Wood Valley.

WATER DISTRICT 37 AND THE CANAL COMPANIES

Water rights on the BWR are administered by Water District 37, a legal entity established pursuant to state statute which also administers water from Silver Creek and the Little Wood River. It's Watermaster is Kevin Lakey who oversees water rights and distribution and is also responsible for record keeping, measurement and general district management. Several canals, Hiawatha, Broadford Slough/Rockwqell, Cove, District 45, Glendale Canal and Broadline Bypass, take irrigation water from the BWR and these canals and their diversions are controlled by various canal companies.

WOOD RIVER WATER COOPERATIVE

TNC, WRLT and TU were instrumental in forming the Wood River Water Cooperative (WRWC), a collective which includes representatives of all users of BWR water - the County and municipalities, residents, farmers and conservationists. WRWC is designed to create a management framework to coordinate water use which considers the best interest of all users.

FLY SHOPS AND THE LOCAL FISHING INDUSTRY

The trout fishing available in the Big Wood Valley is a strong attraction for tourism and a significant inducement for many who choose to live here. While the BWR is only one of several rivers and streams in the area renowned for excellent trout fishing, due to its proximity to so many residents, accessibility through numerous public accesses and its appeal as a reliable place for beginners as well as experienced fishermen to catch fish, it is critical to the local fishing industry.

WHAT NEEDS TO BE DONE?

Protect and Preserve. As the studies all recommended and is self-evident, the most important thing we can do for the BWR is to protect and conserve it by taking steps to ensure that no further harm is done, or at least harm is limited.

Rigorous Application of the SAP Process. Blaine County and the Cities are in the forefront of the effort to protect and conserve the BWR through the SAP process which is designed to limit construction in the river which has the potential of increasing flood potential or damaging habitat.

Monitoring. The studies make clear that frequent and careful monitoring of river conditions is absolutely critical to the health of a river. What is needed is systematic and periodic surveys of the river from the SNRA to the Glendale Diversion to evaluate river conditions and habitat (which are continually changing), violations of riparian set-backs, SAP conditions and other

requirements designed to protect the river, and the success (or failure) of completed restoration projects. Disciplined monitoring like this does not take place on the BWR.

Educating Property Owners and the Public. Much of the harm suffered by the BWR was done by people who probably didn't realize that their actions would have a negative impact on the river. Many who live on the river do not understand the critical role the riparian buffer between their property and the river plays in maintaining the health of the river or the negative impact installing riprap has on fish habitat and hydrology. They need to appreciate the fact that the BWR is a highly dynamic stream that becomes more dangerous through interventions that entrench it and diminish the riparian buffer. Enlightenment should make it less likely people will do things that harm the river and participate in restoring its health and the health of the fish and wildlife who rely on it.

Limit Development. Development caused most of the BWR's problems; avoiding development that might negatively impact the river is the best way to conserve and protect the river. Maintaining the river's natural floodplains are especially critical since floodplains are the natural solution to excessive flood damage and development in flood prone areas can only entrench the river further and cause greater flood damage potential. WRLT has played the major role in preserving and protecting native lands in the Big Wood Valley and presumably will continue to do so far into the future. We are also blessed with an abundance of land on and around the river owned and administered by the USFS and the BLM. The studies identify several stretches of the river that are functioning properly and need only to be preserved and protected. The study also identifies the river's natural floodplains. We should strive to conserve these areas.

Promote Efficient Use of BWR Water. Trout and other aquatic creatures need sufficient water to survive and thrive and, especially in the case of trout, cool, well-aerated water. Water flows in the BWR are also critical to Silver Creek since flows in the BWR restore the aquifer on which Silver Creek depends. The Wood River Water Cooperative is working on addressing more efficient and sustainable use of the waters from the BWR and their efforts should be supported as part of the process of maintaining the BWR as a first-class trout fishery.

Restoration Projects. There are projects underway to deal with river problems in popular recreational areas such as Hulen Meadows/Sunpeak, the Hailey Greenway and the Howard Preserve and to fix problems caused by flooding in certain areas like the Division 45 and Glendale diversions and the Della View Subdivision.

Yet, more importantly, restoring the natural function of the BWR needs to be done in the context of the entire BWR watershed and restoration work should be prioritized on a basis that has the restoration of natural river function throughout the watershed on a sustainable basis as the primary objective. Projects need to be undertaken:

- (a) to remove bank armoring where not warranted to protect structures or, where warranted, to "softened" it or set it back from the stream bank to reduce the negative impact on habitat while still providing essential erosion protection,

(b) to reconnect the river to its historic channels by removing riprap and levees, thereby improving sediment transport dynamics, buffering flood response, creating complex, functional floodplains and reclaiming habitat,

(c) to remove and/or configure embankments, levees and infrastructure so the river can be reconnected to its historic floodplain,

(d) to restore the riparian buffer where development has modified or altogether cleared the native riparian forests to stabilize banks from erosion and provide shade, cover and food for aquatic species,

(e) to mimic natural riverine processes by installing rocks, large woody debris and flood fencing to create greater complexity, cover and shade to improve fish and aquatic habitat for trout and other aquatic species, and

(f) to reconnect tributary streams (e.g., Trail Creek) with the main river to restore historic spawning and rearing areas for trout and other fish species.

Prepared by Hemingway Chapter of Trout Unlimited
and Submitted to Ketchum City Council, April 29, 2021