



# Side Channel Reconnection Progress Report

**OCTOBER 30, 2023**

The Bighorn River Alliance is pleased to report that during the last two weeks of September it completed its most significant investment to date in the long-term health and productivity of the river. Portions of five disconnected or low-functioning side channels were modified to:

- **Improve Their Connectivity To The Main Stem**
- **Improve Aquatic Habitat Conditions & Angling Opportunities**
- **Increase Longevity Of Side Channel Connections**

Although the original plan was to address as many as 12 channels this fall, a last minute permitting issue over wetland impacts allowed the Alliance to proceed on only five channels, with the remaining seven channels now scheduled for completion in 2024. When combined with the two channels reconnected in 2021, there are now a total of seven channels that have been addressed between the Three Mile FAS and the St. Xavier bridge (*see Figure 1*)

NAME	RIVER MILE	LATITUDE	LONGITUDE	LENGTH IN FT	LENGTH IN MILES
Rattlesnake	79.1	45.3523	-107.8701	1100	.21
Above Rattlesnake Island	79	45.3519	-107.8670	800	0.15
Juniper	76.4	45.3639	-107.8293	1800	.34
Cline's Channel	74.5	45.3872	-107.8122	7,729	1.46
African Queen	73.3	45.3988	-107.8044	2,493	0.47
Across from Turtle Rock	68.6	45.4506	-107.7518	1,135	0.21
Saint Xavier Bridge	67.9	45.4600	-107.7507	3,085	0.58
			TOTAL	18,142	3.42

Figure 1

The process leading up to this project has involved over three years of research. It began with examination of historical imagery together with new topographic data that became available in 2017. That effort led to the identification of 48 presently disconnected or low-functioning channels that indicated favorable benefit to cost relationships and appeared feasible for reconnection. The next step was to select two, Rattlesnake and Juniper, as prototypes, which were successfully reconnected in the fall of 2021. Based on the success of these two pilot channels, an additional 12 channels were prioritized, designed, and are the subject of our current work. Each channel presented its own unique set of challenges, and was strategically addressed by implementing one or more of the following approaches:



## RECONNECTION OF SEVERED SIDE CHANNELS

Several of the prioritized side channels are completely severed from the mainstem Bighorn River during minimal flow releases out of Yellowtail Dam. Much of the work to restore connectivity to these channels involves removing gravel deposits and vegetation that has established at the heads of the channels. A good example of this approach is the Saint Xavier Bridge channel (see Photos 1 and 2).



*Photo 1. Saint Xavier Bridge side channel at 2865 cfs (pre-construction)*



*Photo 2. Saint Xavier Bridge side channel at 2558 cfs (post-construction)*

## IMPROVE AQUATIC HABITAT CONDITIONS & ANGLING OPPORTUNITIES

Opportunities to improve aquatic habitat and promote side channel use by fish during extremely low flows were identified during the initial field investigation phase of the project. These opportunities included a) modifying the channel bed to increase pool habitat complexity and holding water, and 2) deepening channel segments that were overly wide, critically shallow, and limiting fish movements during low flows. Examples of these channel modifications were pursued in Cline's Channel -- channel narrowing and pool creation on the left, channel narrowing on the right.



*Photo 3. Deep pool feature with adjacent gravel bar constructed on African Queen channel (post-construction, 3006 cfs)*



*Photo 4. Narrowed and deepened riffle in Cline's channel (post-construction, 2865 cfs).*

## INCREASE LONGEVITY OF SIDE CHANNEL CONNECTIONS

Several other side channels remain connected year-round but are prone to eventually becoming disconnected due to gravel deposits causing increasingly shallow entrances and severe angles of departure relative to the mainstem river. There were three general approaches to this problem.

- **In some cases, the channel entrance was narrowed there by increasing velocity and preventing undesired gravel deposits following high flow events. Work at the channel across from Turtle Rock illustrates this approach.**





Photo 5. Example of wide, shallow entrance to “Across from Turtle Rock” side channel at 1916 cfs (pre-construction).



Photo 6. Narrowed entrance to “Across from Turtle Rock” side channel at 2868 cfs (post-construction).

- A second approach is to construct an apex woody debris jam feature at the head of the channel to induce hydraulic scour and promote a flow split. The work at african queen channel is an example of this approach.



Photo 7. Entrance to African Queen side channel (pre-construction, 2860 cfs).



Photo 8. Narrowed entrance at African Queen channel w/apex debris jam installed to induce flow split (post-construction, 2866 cfs).

- In other cases, the departure angle from the main stem to the channel was rotated upstream to between a 30 and 40 degree angle and narrowed to increase capture and velocity. Above Rattlesnake Island work is an example of this approach.



Photo 9. Above Rattlesnake Island side channel illustrating nearly 90° departure angle from mainstem river (pre-construction, 2866 cfs).



Photo 10. Above Rattlesnake Island side channel with narrowed channel & modified departure angle (post-construction, 2866 cfs).





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## THE RESULT

The result is that 3.42 miles of Bighorn River side channel habitat that is important to spawning and the rearing of juvenile fish has been restored. Although the principal motivation for this work is habitat restoration, there will also be significant benefits to the angler who wants to get out of a drift boat and wade fish what are likely to be very productive “spring creek” like environments.

While the focus of the project this fall centered on construction, we are mindful that systematic evaluation of the success and sustainability of the reconnections is critically important. To that end, monitoring protocols were developed and applied to the Rattlesnake and Juniper channels that estimate the quantity of habitat created, its sustainability over time, and the ability of both vertebrates and macroinvertebrates to recolonize each channel. An initial evaluation report for these first two channels will be available in early 2024. The protocol will then be evaluated, modified if appropriate and applied to the 5 channels that were constructed in the fall of 2023.

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*A special thanks to (from left to right) Dennis Fischer, volunteer and drone pilot extraordinaire; Jason Gasvoda of JMG Contracting, a very skilled excavator operator; the team leader, Mike Sanctuary of Confluence Consulting, Inc.; and Jim Chalmers overall project manager for the Bighorn River Alliance.*

*Above Picture: Dave Thomas wade fishing Rattlesnake channel in November 2023*