



The Road 5658 culvert was surveyed with the FishXing model in 2003. In order for FishXing to rate a culvert as passable (i.e. **Green** rating) to adult and juvenile trout at base (15 cfs) and high (95 cfs) flows, the culvert must meet certain physical criteria related to constriction ratio, outlet vertical leap height, and culvert slope. The performance of the Road 5658 culvert as it pertains to these criteria is discussed below:

- (1) Constriction ratio (culvert diameter divided by bankfull channel width): For ideal fish passage, ratios should be close to or more than 1. Forest Service Region One fish passage standards consider constriction ratios  $< 0.50$  to be potential barriers to the upstream passage of juvenile trout. The constriction ratio of the Road 5658 culvert is 0.79 (culvert diameter = 12 feet; bankfull channel width = 15.1 feet). This means that the culvert pinches the bankfull channel down to approximately 80% of its natural width (Photo 3). As a result of this constriction, water velocities inside the culvert barrel are accelerated and the substrates have been scoured out of the upper half of the culvert barrel (Photo 4).
- (2) Outlet vertical leap height (vertical length between the culvert outlet and the water surface immediately below the outlet): Forest Service Region One fish passage standards consider outlet vertical leap heights  $> 0.34$  feet to be potential barriers to the upstream passage of juvenile trout. The outlet vertical leap height of the Road 5658 culvert is 0.41 feet. This situation is being maintained by a woody debris jam about ten feet below the outlet that is currently functioning as a grade control structure. The drop in channel grade on the downstream side of the debris jam is 2-3 feet in height (Photo 7). This means that once the debris jam fails, the resulting headcutting and channel down-cutting that occurs will scour the rest of the substrate out of the culvert barrel, which is likely to create a vertical drop on the outlet considerably higher than what currently exists.
- (3) Culvert slope: Forest Service Region One fish passage standards consider slopes  $> 1\%$  with no baffles or weirs for fish passage to be potential barriers to the upstream passage of juvenile trout. The slope of the Road 5658 culvert is 1.97%. The bottom of the culvert barrel consists of corrugated metal with no baffles, weirs, or sediment retention plates (Photo 4).

Based on the criteria described above, FishXing predicts that the Road 5658 culvert is a barrier to juvenile cutthroat trout passage at base (15 cfs) and high (95 cfs) flows (i.e. **Red** rating), and offers borderline (i.e. **Gray** rating) passage to adult cutthroat trout at base and high flows. Bull trout were not modeled in FishXing because swim speed data was unavailable; however, bull trout are weaker swimmers than cutthroat trout. Therefore, if FishXing predicts that a culvert is a barrier for cutthroat trout, it is assumed to also be a barrier to bull trout.

- C. Brief Project Description: 1-2 excavators and a work crew would divert Little Blue Joint Creek through a clean-water diversion consisting of some combination of a lined ditch, flexible pipe, or temporary culvert; remove the road fill and the existing culvert; install a new 19.0 foot wide X 8.3 foot high X 60 foot long bottomless arch; divert the stream back into its channel; rip-rap the abutments (about 15 lineal feet of rip-rap on each end); and apply a gravel aggregate surface on the road approaches to the stream crossing. Seeding, mulching, fertilizing, and planting shrubs would stabilize and revegetate the areas of bare soil created by construction. The work would likely be restricted to periods of low stream flows between May 15<sup>th</sup> and September 1<sup>st</sup>. However, that work window could be extended by the project fisheries biologist if agreement is reached with the U.S. Fish and Wildlife Service. The job would take 2-3 weeks to complete. The new arch would be installed in a stream simulation manner, meaning that the structure would be sized large enough to pass the 100-year flood with debris, and it would maintain a fish-passable natural stream bottom throughout its length. The new arch would provide suitable year-round passage for all sizes and species of aquatic organisms. Engineering design drawings are attached with this application.

**The Forest Service is authorizing the collection of funds from FWP under the authority of, and thus subject to, the terms and conditions of the Cooperative Funds Act of June 30, 1914 USC 498, as amended by Public Law 104-127.**

D. Length of stream or size of lake that will be treated: Removing the Road 5658 culvert and installing a bottomless arch would affect < 100 feet of Little Blue Joint Creek immediately above and below the road crossing.

E. Project Budget  
Grant Request (Dollars): \$15,000

Contribution by Applicant (Dollars or In-kind): \$101,000

Contribution from other Sources (Dollars): We presently have no guaranteed contributions from any other sources. We will apply for \$5,000 from the Ravalli County Resource Advisory Committee (RAC) in 2014. We should know by the end of 2014 if we have been awarded any RAC funds. Based on our past track record, we are reasonably confident that we will be awarded at least some of the funds we request.

Because this project is expensive and the Forest does not have enough funds to pay for the entire project, we need to cobble together funds from several partners. Getting funds from the Future Fisheries program is an essential step to getting this project done because once the Forest has Future Fisheries funds, it has been able to successfully compete and be awarded the remainder of the dollars from other funding sources. For example, in 2006, 2008, 2009, and 2011, the Forest was awarded Future Fisheries dollars to remove two fish barrier culverts on Meadow Creek (2006 and 2008), a fish barrier culvert on Warm Springs Creek (2009), and a fish barrier culvert on Little Boulder Creek (2011). The culverts on Meadow Creek were replaced with new bridges in 2008 and 2009, the culvert on Warm Springs Creek was replaced with a new bridge in 2011, and the culvert on Little Boulder Creek was replaced with a bottomless arch in 2013. In all of these instances, obtaining Future Fisheries dollars allowed the Forest to cobble together the rest of the necessary funds and implement the project within two years of award.

**Total Project Cost:**

F. Attach itemized (line item) budget – see template. *The budget form is attached to the back of this application.*

G. Attach specific project plans, detailed sketches, photographs, maps, evidence of landowner consent, evidence of public support and/or other information necessary to evaluate the merits of the project. *Engineer design drawings, site photographs, and maps are attached with this application.*

H. Attach land management and maintenance plans that will ensure protection of the reclaimed area. *The Bitterroot National Forest will be responsible for maintaining the new bottomless arch.*

**III. PROJECT BENEFITS\***

A. **What species of fish will benefit from this project?:** Westslope cutthroat trout would be the species most benefited by this project. Bull trout, because they are much less common, would be benefitted to a lesser degree. Non-fish aquatic species such as tailed frogs, Columbia spotted frogs, and boreal toads would also benefit from this project because it would reduce fragmentation of those populations.

B. **How will the project protect or enhance wild fish habitat?:** Little Blue Joint Creek drains a 3,840 acre (6 mile<sup>2</sup>) watershed that is located entirely on Bitterroot National Forest land (see attached maps). The road density in the watershed is 1.8 miles of road/mile<sup>2</sup>. There are 15 road stream crossings in the watershed, but the only one that affects fish is the Road 5658 crossing in

this project. In general, the lower half of the watershed below the Road 5658 crossing is moderately roaded, while the upper half of the watershed above the road crossing is mostly roadless. Most of the watershed was severely burned by wildfire in July, 2000 and the vegetation currently consists of grasses, shrubs, and regenerating conifer seedlings and saplings (Map 3; Photos 7, 8, and 9).

Little Blue Joint Creek is the arterial stream in the drainage and is a spawning and rearing tributary for migratory adult bull trout and westslope cutthroat trout from Painted Rocks Reservoir. Little Blue Joint Creek flows into the extreme lower end of Blue Joint Creek, which enters the reservoir from the west about three miles southwest of Painted Rocks Dam (Maps 1 and 2). Little Blue Joint Creek is a woody debris-dominated stream that averages about 15 feet in bankfull width (Photos 1, 7, and 8). The predominant channel type is Rosgen B4, but there are also inclusions of Rosgen C4 channel in the lower reaches and Rosgen A4 channel in the headwaters. From mouth to headwaters, the typical progression of channel types is C4 to B4 to A4. Large wood and step pools are common habitat features. Most pools are formed by large wood.

Electrofishing surveys indicate that westslope cutthroat trout, bull trout, and brook trout are present in Little Blue Joint Creek above and below the Road 5658 crossing. In August 2011, Bitterroot National Forest biologists conducted a mark/recapture electrofishing population estimate in the first 1000 feet of Little Blue Joint Creek immediately below the Road 5658 culvert. Over the two shocking runs, a total of 203 westslope cutthroat trout were captured (size range 3-9 inches), and the estimate was 139 cutthroat > 5 inches in length per 1000 feet of stream. 19 brook trout (size range 3-9 inches) were captured in the two shocking runs, but not enough recaptures occurred to calculate a statistically valid estimate. One 5 inch juvenile bull trout was captured in the two shocking runs. Brook trout are already present above the Road 5658 culvert at densities that are roughly equal to those below the culvert, so improving fish passage at the Road 5658 crossing is not expected to facilitate invasion of that species into previously unoccupied habitat. Westslope cutthroat trout are common-to-abundant throughout the 2.5 miles of suitable habitat above the Road 5658 culvert, while bull trout are uncommon-to-rare.

Upstream of the Road 5658 culvert, Little Blue Joint Creek contains about 2.5 miles of suitable spawning and rearing habitat for westslope cutthroat trout and bull trout. High natural gradients render that stream fishless beyond that point. Based on our electrofishing data, we know that at least the larger westslope cutthroat trout and bull trout can swim through the Road 5658 culvert, but we also suspect that for the smaller age classes, passage is at least impeded and in some cases blocked.

- C. **Will the project improve fish populations and/or fishing? To what extent?:** Yes. This project would help strengthen the westslope cutthroat trout population in Little Blue Joint Creek, which over time could contribute to improved recruitment of juvenile cutthroat trout in Blue Joint Creek and Painted Rocks Reservoir. The same is true for bull trout, but benefits would be to a lesser degree because that species is much less common in the project area. In 2011, Montana Fish, Wildlife, and Parks angler use surveys estimated that Painted Rocks Reservoir received 829 angler days, with the majority of that being residents. Painted Rocks Reservoir is a very popular summertime recreation area, particularly for boaters. It receives a light amount of ice-fishing by local residents in winter. There are no official records for angler use on Little Blue Joint Creek. It is probably lightly fished by a few local residents who desire a small stream fishing experience. There is a hiking trail that parallels the stream for several miles.
- D. **Will the project increase public fishing opportunity for wild fish and, if so, how?:** It will not affect angler access, but it has the potential to increase juvenile trout recruitment in Painted Rocks Reservoir. Refer to the answer to question C above.
- E. **If the project requires maintenance, what is your time commitment to this project?:** The new arch will be maintained by the Bitterroot National Forest. All stream crossing structures on the

Forest are maintained and inspected on scheduled intervals by Forest engineers.

- F. **What was the cause of habitat degradation in the area of this project and how will the project correct the cause?:** The cause is the impediment to upstream fish migration at the Forest Road 5658 culvert. The problem will be remedied by replacing the existing culvert with the bottomless arch.
- G. **What public benefits will be realized from this project?:** As described above, the project will be another incremental step in improving the health of the native trout fishery in Painted Rocks Reservoir and the upper West Fork Bitterroot River watershed.
- H. **Will the project interfere with water or property rights of adjacent landowners? (Explain):**  
No. The project will not affect water rights or private property rights.

**Each approved project sponsor must enter into a written agreement with the Department specifying terms and duration of the project.**

#### **IV. AUTHORIZING STATEMENT**

I (we) hereby declare that the information and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.

Applicant Signature: ***Michael J. Jakober***                      Date: ***January 8, 2014***  
Michael J. Jakober  
Bitterroot National Forest south zone fisheries biologist

Sponsor (if applicable): ***Chris Clancy***                      Date: ***January 8, 2014***  
Chris Clancy  
Montana, Fish, Wildlife and Parks fisheries biologist

**\*Use extra paper, if necessary. Incomplete or late applications will be returned to the applicant.**

Mail To:                      Montana Fish, Wildlife & Parks  
   Habitat Protection Bureau  
   P.O. Box 200701  
   Helena, MT 59620-0701

Revised 9-28-01

## Budget – Little Blue Joint Creek Road 5658 Culvert Replacement

Budget Category	Expense per Category	USFS In-Kind Match	Other Federal Funds	Other Matching Funds
Salaries & Benefits (\$): <ul style="list-style-type: none"> <li>• Forest Service design (A&amp;E contract)</li> <li>• Forest Service contract preparation (USFS GS-12 @ \$425/day) (USFS GS-7 @ \$200/day)</li> <li>• Forest Service contract prep and contract administration (USFS GS-11 @ \$400/day)</li> <li>• Permit acquisition (USFS GS-11 @ \$400/day)</li> <li>• Post-project monitoring (USFS GS-11 @ \$400/day)</li> </ul>	\$12,000  4 days = \$1,700 10 days = \$2,000  20 days = \$8,000  1 day = \$400  4 days = \$1,600	\$12,000  \$1,700 \$2,000  \$8,000  \$400  \$1,600		
Contract Cost (includes): <ul style="list-style-type: none"> <li>• Equipment &amp; Labor</li> <li>• Mobilization</li> <li>• Materials</li> </ul>	\$90,300	\$75,300	\$5,000  (Ravalli County RAC – will apply for this in 2014)	<b>\$15,000</b> <b>(FWP Future Fisheries)</b>
<b>TOTALS</b>	\$116,000	\$101,000	\$5,000	\$15,000

## Road 5658 Culvert Information Measured for the FishXing Model

Type of culvert = corrugated squash pipe

Width of culvert = 144 inches (12 feet)

Height of culvert = 96 inches (8 feet)

Mean bankfull width of Little Blue Joint Creek near the culvert crossing = 15.1 feet

Constriction ratio (culvert width/bankfull width) = 0.79

Length of culvert = 55 feet

Inlet gradient = 4.93%

Residual inlet depth = 0

Outlet pool depth at culvert outlet = 0.30 feet

Outlet vertical leap height = 0.41 feet

Culvert slope = 1.97%

Substrate in culvert barrier = upper half of barrel is scoured bare; lower half of barrel contains wall-to-wall gravel/cobble substrate that is being maintained by a woody debris jam below the outlet

Channel gradient upstream of culvert = 4.40%

Channel gradient downstream of culvert = 15.00% (steep drop in channel grade has formed as a result of the aggradation of gravel substrate on the upstream side of the woody debris jam below the outlet)

FishXing prediction for juvenile trout at base (15 cfs) and high (95 cfs) flows = **Red** (barrier)

FishXing prediction for adult trout at base (15 cfs) and high (95 cfs) flows = **Gray** (borderline)