The Bighorn River and its associated reservoirs provide diverse fishing opportunities most notably as a world class Brown and Rainbow Trout fishery. Angling pressure has steadily increased since 2005 in the Bighorn River System as measured by the MTFWP mail survey. The survey information is available online at [http://fwp.mt.gov/fishing/anglingData/anglingPressureSurveys](http://fwp.mt.gov/fishing/anglingData/anglingPressureSurveys). The survey divides the Bighorn River system into five sections moving from upstream to downstream; Bighorn Reservoir (Montana portion), Yellowtail Afterbay Dam, a small reregulation dam at Fort Smith, the upper trout section from Afterbay Dam to Bighorn Fishing Access Site, the lower trout section from Bighorn Fishing Access Site to the confluence of the Little Bighorn River, and the warm water section from the Little Bighorn to the Bighorn Confluence with the Yellowstone River. Figure 1 graphically presents the data since 2005; the trout sections have seen increased pressure while the other three sections have been fairly stable.

![Figure 1. Angler effort by angler days on the Bighorn River System in Montana 2005 to 2013.](image-url)

MTFWP fisheries objectives for the upper trout section are to manage this as a world class high abundance and size structure wild fishery. This can be done through water management in cooperation with the Bureau of Reclamation, the Crow Tribe and the State of Wyoming. Additional information for state-wide fisheries management can be found in the MTFWP State-Wide Fisheries Management Plan [http://fwp.mt.gov/fishAndWildlife/management/fisheries/statewidePlan/](http://fwp.mt.gov/fishAndWildlife/management/fisheries/statewidePlan/).
The trout sections of the Bighorn River are evaluated annually with population estimates and size distributions. The upper river (near 3 Mile Access) is sampled in May and June while the lower trout section (near Mallards Landing) is sampled in September. The 2015 estimate for the upper section resulted in a calculated total of 4,504 Brown and Rainbow Trout of all sizes per mile. Brown and Rainbow Trout were estimated at 3,031 and 1,884 per mile, respectively. A better estimate for comparison is reducing the estimate to trout eight inches and larger as a high degree of error can happen when including smaller fish. The results for Rainbow and Brown, just Brown, and just Rainbow over eight inches were 4,284, 2,898, and 1,752 per mile respectively (Figure 2). Since there was little change from the total estimates and eight inches and greater estimates it means smaller fish didn’t make up a very large portion of the population this year. However, young fish are typically underestimated as the targeted habitats sampled by boat electrofishing support larger fish rather than small fish. Estimates for the lower section near Mallards Landing Fishing Access Site in 2015 resulted in combined, Brown, and Rainbow Trout estimates of 924, 584, and 342 trout per mile, respectively for all sizes. The estimate for eight inch and greater size trout combined, Brown, and Rainbow Trout was 862, 519, and 342, respectively. Brown Trout less than eight inches were sampled as shown by the difference in estimates from all Brown Trout to 8 inch and greater Brown Trout. But the Rainbow Trout estimated between sizes didn’t change. No young-of-year Rainbow or smaller yearling Rainbow were sampled. The body condition of both Rainbows and Brown Trout was exceptionally good in the fall. Yearling Rainbow Trout were likely greater than 8 inches and represented the bulk of fish caught from 8 to 11 inches.
Figure 2. Upper Bighorn River annual trout population estimates for Brown and Rainbow Trout and combined trout.

The river was expected to have reduced flows in early July of 2015 just as Rainbow Trout would be emerging from their redds. However before the trout emerged, flows were increased to 14,000 cfs. These high flows may have resulted in a general loss of this year class of Rainbow Trout or they were in habitats not sampled, or they may have been” flushed” downstream of the sample sections and may return with time to the more preferred habitat in the upper trout sections. No Rainbow Trout young-of-year were captured during sampling at the Two Leggins Fishing Access Site in November of 2015. However a large brown trout was sampled near the dam see photo 1 for details. Sampling in 2016 may help answer the question if Rainbow Trout recruited from the 2015 water year.

Water management on the Bighorn can be difficult at times with shortages of water seemingly and/or imminent and high water events with flows over 8,000 CFS occurring in 6 out of the last 8 years. The eight year drought from 2000 to 2007, when reservoir elevations and river releases were low to the detriment of both areas from a recreational use and fisheries perspective, continues to weigh heavily on current water management decisions. The trout sections experience the highest recreational use in the Bighorn System in Montana and its success relies on water management. Recommendations have been to maintain the river at 2,500 cfs as a preferred minimum fishery flow to support both fall spawning
Brown Trout and spring spawning Rainbow Trout. Studies indicate the best flows would be greater than 2,500 cfs to about 3,500 cfs. Occasional flushing of the river for side channel maintenance was recommended by a US Bureau of Reclamation study with recommended flows for several days between 6,000 and 8,000 cfs. Knowing the river and reservoir needs couldn’t be met with regular flows reaching 3,500 cfs the preferred minimum has been set at 2,500 cfs since the 1980’s. This flow can’t be met all the time, but a productive and stable fishery can be sustained with flows between 2,000 and 2,500 cfs, which has been called a water savings minimum flow. The absolute minimum fishery flow to provide some degree of recreational fishing is 1,500 to 2,000 cfs. This has not always been met particularly during the last drought. The fishery is greatly reduced in numbers of fish per mile as flows decrease. The boat ramp at Horseshoe Bend on Bighorn Reservoir in Wyoming has become inundated with over 25 feet of silt since the late 1960’s. The bottom of the ramp is at 3590 feet above sea level but the current minimum launch elevation is 3617, and 3620 may be needed to efficiently use it. Recreational boaters from Wyoming recommend the reservoir remain at 3620 or higher with a full reservoir at 3640. Wyoming Game and Fish recommends the reservoir be at 3620 or higher and rising in the spring to facilitate fish movement in and out of the reservoir for spawning and rearing. Since the lower river is managed by the reservoir it is important the reservoir holds water for all users. The timing of when and how much water to store and release is an ongoing discussion with the stakeholders, which is lead by the US Bureau of Reclamation with two annual meetings and many monthly and weekly calls each year. Figure 3 was generated to demonstrate several points. This graph displays the annual upper trout section estimate for combined Rainbow and Brown Trout over eight inches long in fish per mile overlaid with the average annual reservoir elevation in feet above sea level, and the average flow at the Saint X Bridge USGS gauging station measured in cubic feet per second (cfs). It also includes lines showing the objectives of 3620 feet in the reservoir and 2,500 cfs in the river. The left axis covers both river flow in cfs and number of fish per mile and the right axis is used to display the reservoir elevation in feet above sea level. The time period of 1992 is used as it shows the system coming out of a drought in the late
1980’s with higher flows in the later 1990’s followed by the record drought for the reservoir from 2000 to 2007 followed by higher inflows in the 2010’s. Overall outside of the extreme drought the average annual reservoir elevation was over 3620 feet and the average annual river flow at or over 2,500 cfs despite different operational guidelines prior to 2008 for river and reservoir operations. The goal for the reservoir is to fill it annually; this hasn’t changed and is a benefit for all. The graph also shows the river and reservoir conditions are tied to each other meaning the ability to release water is dependent on the amount of available water. Visually comparing the river flows, reservoir elevation and population estimates, it is evident that they all show similar patterns. A full reservoir and higher flows result in more fish per mile in the trout section. Conversely, as shown in the drought, low reservoir elevations and low flows result in fewer trout in the Bighorn River. Low elevations in the reservoir can also mean reduced recreational opportunity since all the ramps are out of service as the reservoir reaches 3580, which occurred in the spring of 2002. A study for the USGS by Kimberly Dibble and associates evaluating western tailwater trout fisheries found water conditions to be a large driver for both rainbow and brown trout fisheries.

Figure 3. Trend comparison of average annual Bighorn River Flows at the St. X Gauge, average annual Bighorn Reservoir elevations provided by USBOR with annual MTFWP trout Estimates. The background has the minimum goals for discharge (2,500 cfs) and reservoir elevation (3620 feet above sea level).
On a side note, Girard Rainbow trout were available from FWP hatcheries in 2015 and were planted in the Afterbay Reservoir. Girard Rainbow are more piscivorous than Arlee Rainbow and live longer than the average Rainbow. All of the Girard Rainbow were marked by removing their adipose fins. FWP crews will evaluate if the fish recruit in the reservoir and if they show up in the river below the dam. If anglers catch an adipose clipped Rainbow in the Afterbay Reservoir or Bighorn River below Afterbay the Billings Fish Staff for FWP would appreciate hearing about the catch. If possible, getting photos with the date and location the fish was caught and a length and weight would be helpful and appreciated.