Low Discharge/Streamflow Rate Below El Vado Dam Chama River, New Mexico ~ January 1st, 2012

Observations of the effects of lowered water levels on the brown trout redds (spawning beds).

On December 20th, 2011 the streamflow/discharge of water from El Vado dam on the Chama River was dropped down from 400 cubic feet per second (cfs) to 100 cfs. At approximately 12pm on December 30th, the streamflow/discharge of water from El Vado dam was reduced from a streamflow/ discharge rate of 100 cfs to 42 cfs. Previous to December 20th, the streamflow/discharge had been held steadily at 400 cfs for 35 days.

On January 1st, 2012 (New Year's Day) Shane Parker-Kast and I went fishing on the Chama river, below El Vado dam. The flow rate was still at 42 cfs, approximately 48 hours after the reduction from 100 cfs on December 30th. What we observed, due to the extreme drop in water levels, was the drying out and complete devastation of many of the brown trout spawning beds (redds).

Both Shane and I are professional fly fishing guides and have been guiding and fishing every fall, below El Vado dam, for the last 7 years. From about the middle of September, 2011 through to January 1st, 2012 we have been on this section of the Chama at least 2 to 3 times every week and have observed the exact locations of where the brown trout were spawning. During the time period in November when the streamflow/discharge was at 400 cfs, we observed that the fish moved higher up towards the edges of the water (into cleaner gravels) to make their redds. These are the areas of the river that were so badly affected by the discharge schedule that was implemented on the Chama (below El Vado dam) this past fall during the height of the brown trout's spawning cycle.

We took quite a few pictures, some of which are shown in the following pages. I have made some notation on the images in an attempt to show exactly what is what, so to speak. I have also included streamflow/discharge graphs from the USGS for the time periods discussed.

Please feel free to contact me at anytime if you need more information or have any questions.

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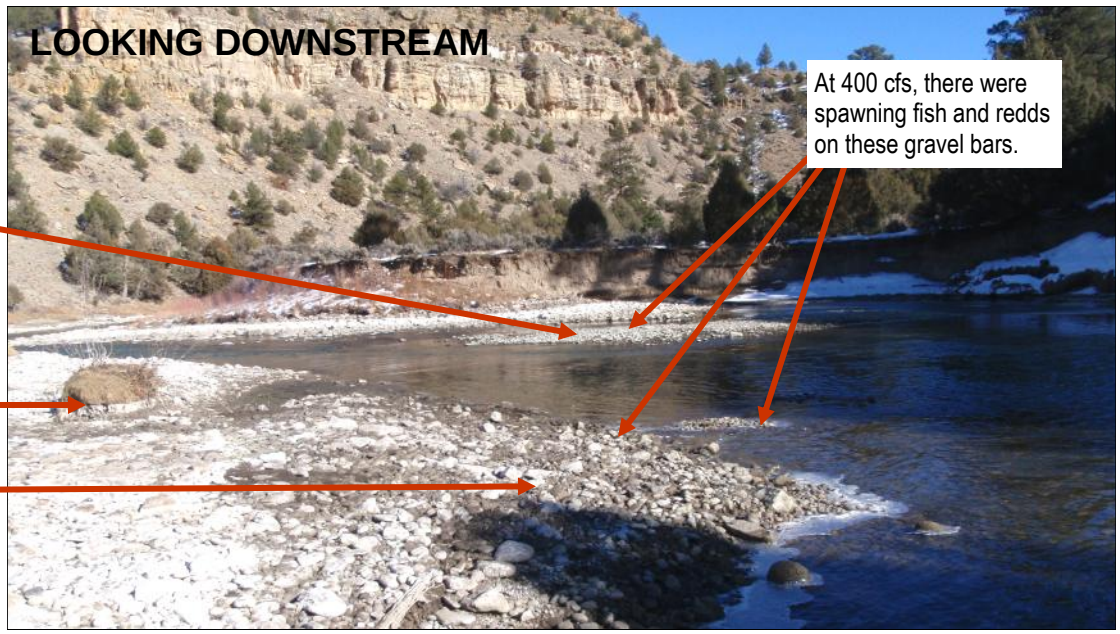
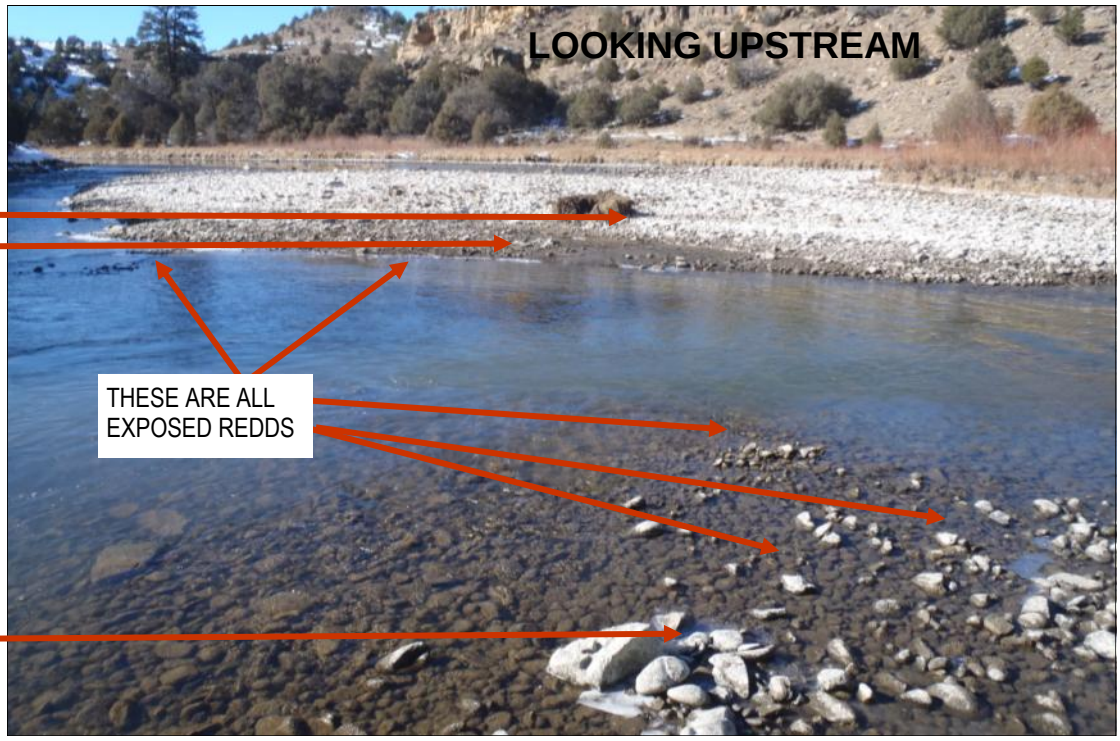
Brown Trout Below a Redd
Chama River ~ December 14th, 2011

Area 1

This section of the river is one of the most heavily utilized areas for brown trout spawning and redds on the Chama River. In this area, during the time period in November and December when the streamflow/discharge was at 400 cfs, we observed large numbers of spawning brown trout. At this higher flow level (400 cfs), a large number of the redds were way up on the gravel beds, close to the water's edge. Due to the reduction of the water flow/discharge to 42 cfs, many of these redds are now dried out or in very shallow, stagnant water. Some of the redds that are in the shallow water are covered with ice due to lack of water movement. All the photos below were taken on January 1st, 2012 with streamflow/discharge from the dam at 42 cfs. At 400 cfs, there was up to 16 inches of water covering the exposed gravel bars in the photos below.





Area 1 (close-ups)

The photos below are close up images of exposed and/or compromised redds in the areas pointed out in the images on page 2. All the photos below were taken on January 1st, 2012 with streamflow/discharge from the dam at 42 cfs.

This gravel bar was covered with 14 to 16 inches of water at 400 cfs. There were many brown trout spawning and redds on it. Now at 42 cfs, the bar is mainly dry or covered with 2 to 3 inches of water. As well, due to the reduced water levels and less velocity of flow, there is substantial ice formation as well. Note: this photo was take at 2:15 in the afternoon. The ice is substantially thicker in the night and early morning hours.

The arrows are pointing to existing redds.

This image shows a redd that has been almost completely exposed by the reduced flows. At 42 cfs there is a maximum of 2 inches of water covering the redd, at its deepest point. As well, with the lack of water flow velocity, this spawning bed has begun to silt in and the gravel is no longer clean.

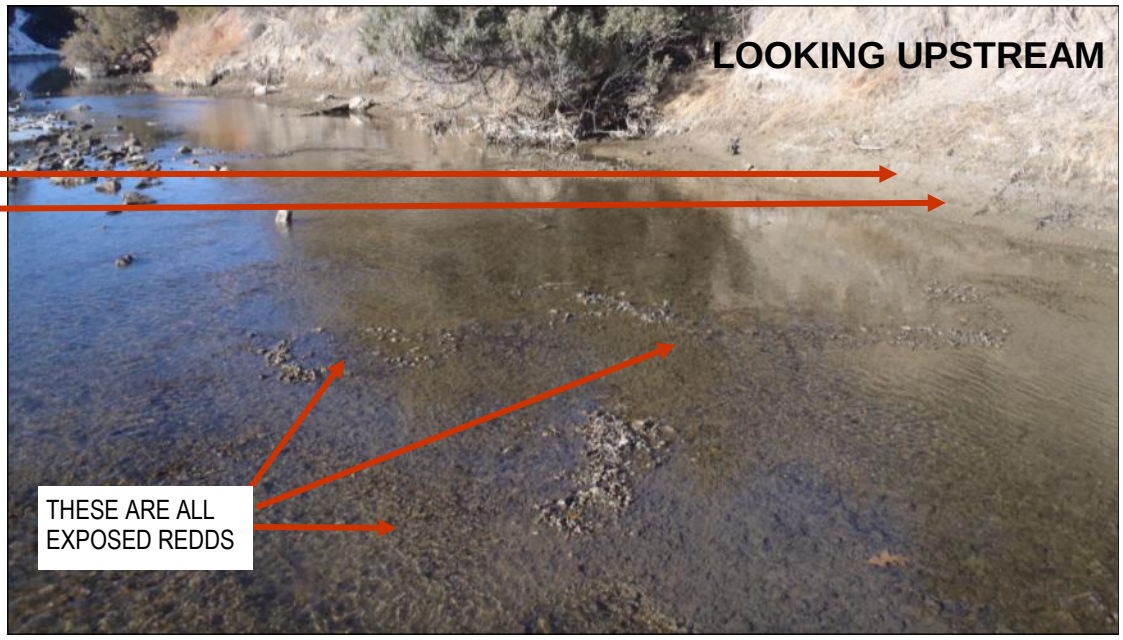
This gravel bar was covered with 16 to 18 inches of water at 400 cfs. It is completely covered with brown trout redds (note the many depressions and patches of finer, clean gravels). As one can see, now at 42 cfs, there are many exposed spots on the bar and there is very little water flow over the rest of it. Though not completely dry, these redds are at the risk of exposure to freezing, lowered oxygenation, silting and predation.

Area 2

Area 2 is located about a ½ mile downstream from Area 1.The scenario in this area is the same as in Area 1. We haven't seen spawning fish and/or redds in this location in past fall spawning seasons, when the streamflow/discharge has typically been much lower. This fall, when the streamflow/ discharge was at 400cfs, the brown trout moved into this spot to spawn and make their redds.
If you look at the river bottom in the photos, you will see that there is perfect "spawning gravel". Unfortunately now, with the extremely reduced flows, these spawning beds are in much less than optimum conditions. All the photos below were taken on January 1st, 2012 with streamflow/discharge from the dam at 42 cfs. At 400 cfs, there was up to 14 inches of water covering the exposed gravel bars in the photos below.

This this is the approximate water height at 400 cfs.

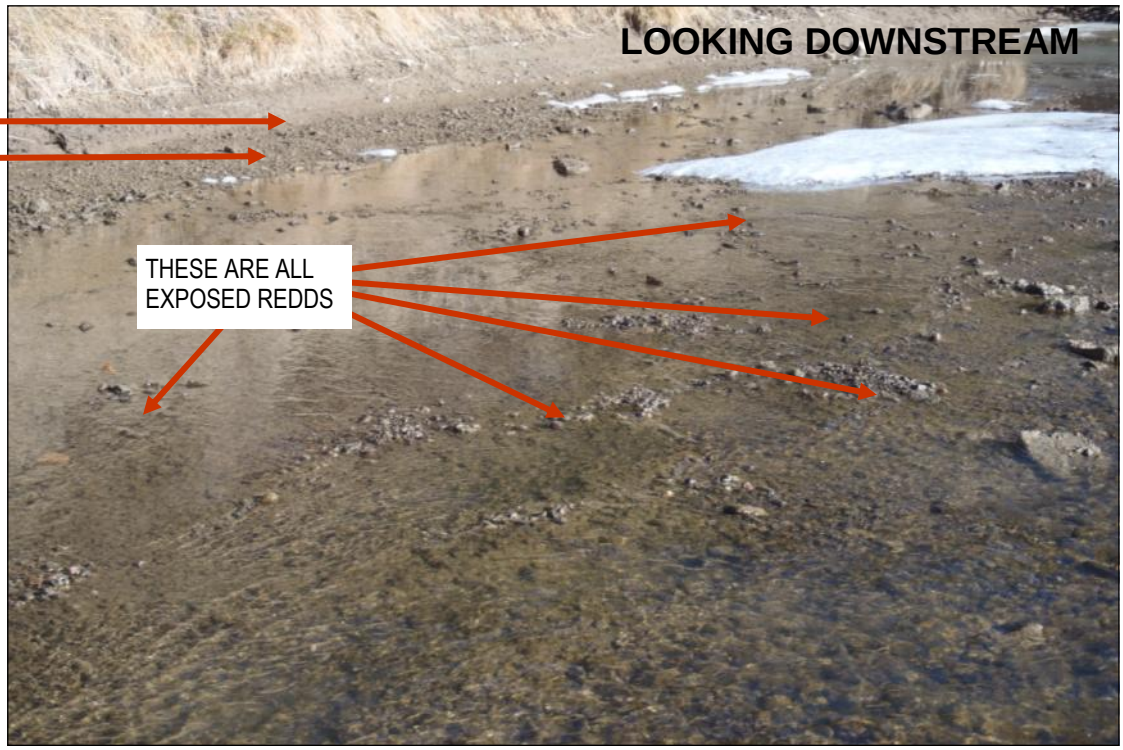
This this is the approximate water height at 100 cfs.



This this is the approximate water height at 400 cfs.

This this is the approximate water height at 100 cfs.

Note the ice and snow sheet sitting on top of the gravel bar. At 400cfs, there was a fair amount of current and 12 to 14 inches of water flowing where the ice and snow sheet is now.

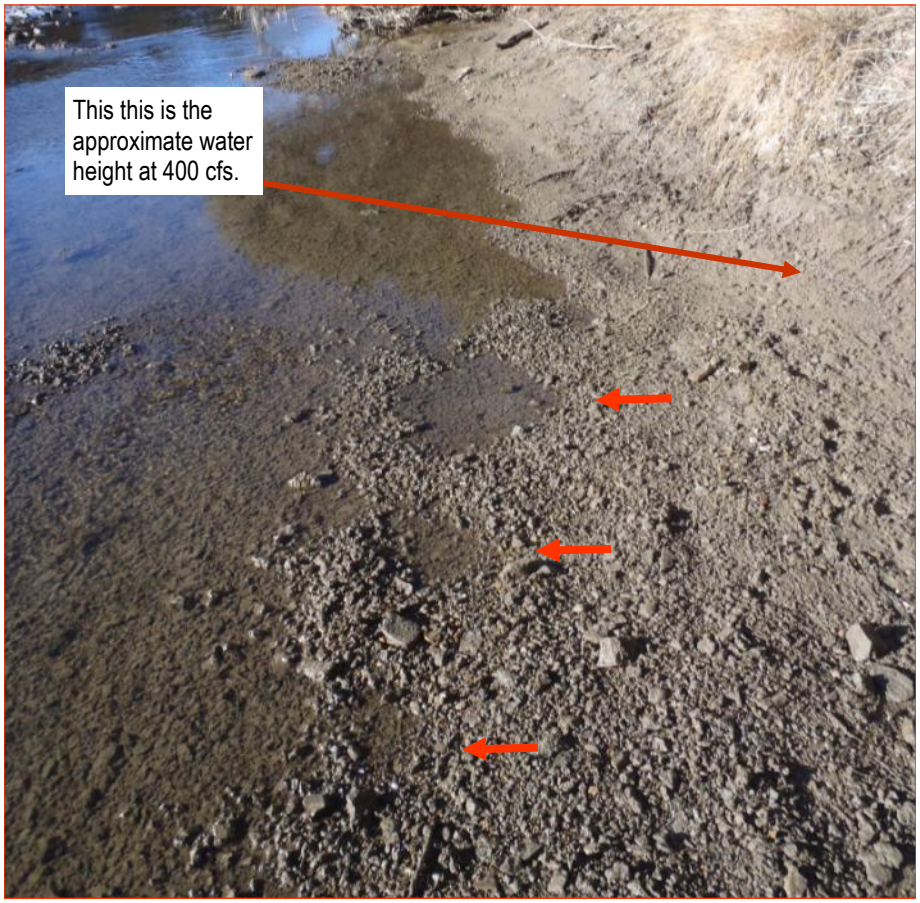


Area 2 (close-ups)

The photos below are close up images of exposed and/or compromised redds in the areas pointed out in the images on page 4. All the photos below were taken on January 1st, 2012 with streamflow/discharge from the dam at 42 cfs.

This photo shows the perfectly cleaned patches of gravel of 6 separate redds (Note where the arrows are pointing). When the brown trout made these redds, there was about 12 to 14 inches of water flowing over them. As one can see, now with the water flow/discharge at 42 cfs, there is no more than 1 to 2 inches of water over them and many of the slightly higher spots are now completely out of water. As well, with the water flow and depth so greatly reduced, ice is forming on the higher areas. This picture was taken at about noontime. Quite possibly during the night, this area could be completely iced over.

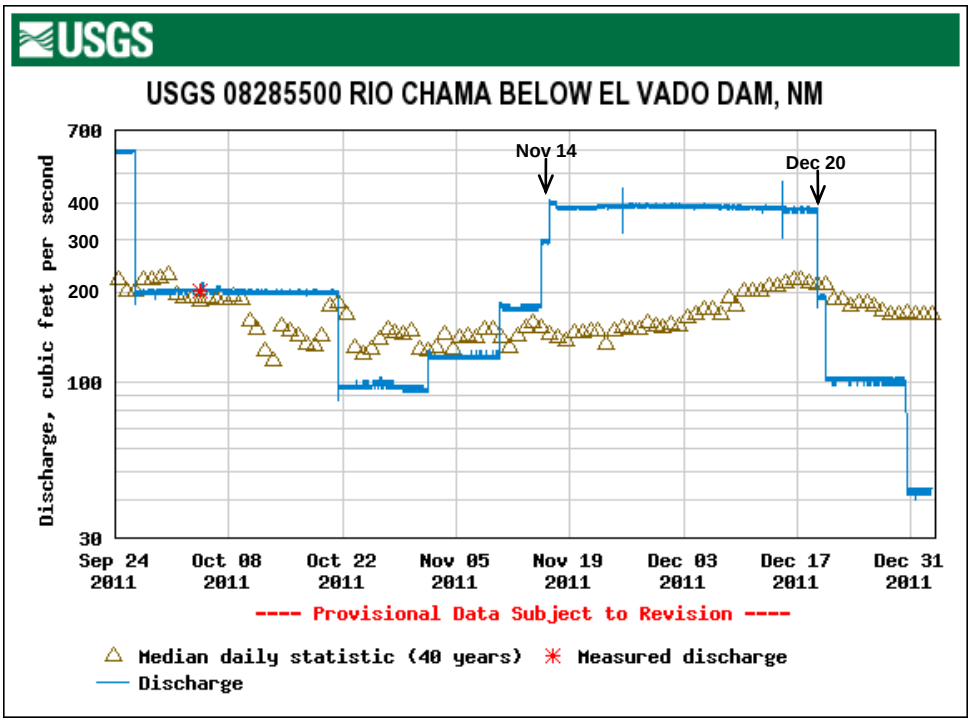
This photo shows 3 completely exposed redds (Note where the small arrows are pointing to the depressions in the river bottom at the lower/center part of the picture). As in the photo above, when these spawning beds were made, there was about 12 to 14 inches of water flowing over them. With the current water flow/discharge at 42 cfs, these redds are basically "high and dry". This photo is a perfect example of what happened this spawning season. At the higher streamflow/discharge of 400cfs, the brown trout moved up into areas where there was great "spawning gravel", made their redds and deposited and fertilized their eggs. Unfortunately these fish were unaware that the streamflow/discharge would be reduced by approximately 90% (400 cfs down to 42 cfs) within a few weeks after they had spawned.



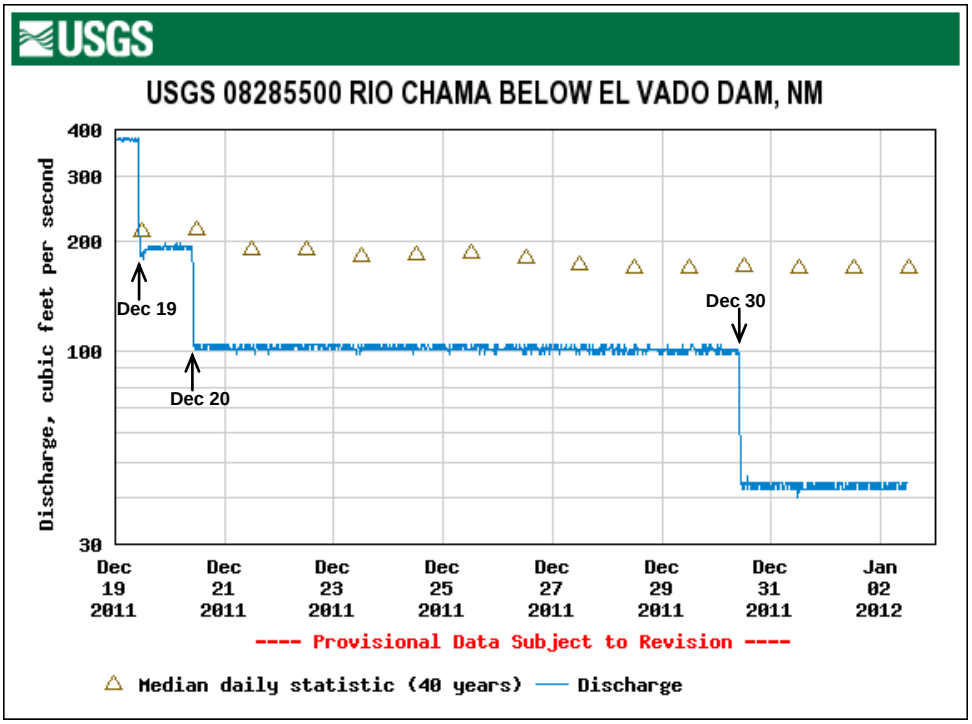
El Vado Dam Streamflow/Discharge ~ Fall, 2011

The charts below are from the U.S. Geological Survey and are of real-time water data. They can be found at this website: http://waterdata.usgs.gov/nm/nwis/current?

This graph shows 100 days of discharge rates for the time period from September 24th, 2011 thru January 2nd, 2012 (100 days). This time period covers the full extent of the spawning season for brown trout on the Chama River below El Vado Dam. The height of the spawning season, when the fish are up on the redds, is typically from the latter part of October through the end of December. The increase in streamflow/discharge to 400 cfs occurred on November 14th, 2012 and was held there steadily until December 20th, 2011. This 35 day period of 400 cfs occurred through the most intense period of the brown trout's spawning cycle. It is interesting to note that the median flows (a 40 year average) for the same time period are consistently between 120 cfs and 220 cfs.



This graph shows 14 days of discharge rates for the time period from December 19th, 2011 thru January 2nd, 2012 (14 days). This is when the streamflow/discharge was decreased from the 35 day period of 400 cfs to the December 30th, 2011 amount of 42 cfs. It is interesting to note that on December 19th, the streamflow/ discharge was cut by 50% from 400cfs to 200 cfs without any ramp-down. December 20th, it was cut again to 100 cfs creating a 75% total reduction of streamflow within a 24 hour period. Then on December 30th, the streamflow/ discharge was reduced to 42 cfs. This added up to a 90% total reduction in streamflow/discharge within 11 days - directly after the brown trout spawning cycle was finished.



Synopsis

Why is the streamflow/discharge from El Vado Dam of such concern and importance to the health and success of the brown trout's spawning cycle? Consider the following:

- For the brown trout's spawning cycle to be successful, a very specific group of criteria must be available and maintained. These are primarily clean water with a consistent and steady flow rate; a specific water temperature range; clean gravel of the right size for redds; well oxygenated water and a silt free environment once the redds have been made.
- In a hatchery, under the most optimum conditions with a constant water temperature of 50 degrees being maintained, brown trout eggs take a minimum of 45 to 50 days of incubation before they hatch. In the wild, the incubation period is much longer, typically 80 to 140 days or more.
- Water temperature must stay between 35 and 55 degrees for brown trout eggs to survive.

At the end of September, the streamflow/discharge from El Vado dam was reduced from 700 cfs to 200 cfs and it was maintained at this level. Then on October 21st, the flows were reduced to 100 cfs where they were held and maintained in the 100 cfs to 180 cfs range. This created large areas of clean, dried out gravel, above the water level of 100 cfs. During this time period we observed brown trout starting to make their redds. Between November 13th and November 14th the streamflow/discharge was increased to 400 cfs (where it was held for 35 days). Immediately after this flow increase, we started to notice brown trout moving up higher into the afore mentioned clean gravel, making redds and spawning. Then in the period between December 20th and December 30th, the flows were reduced to 42 cfs - a 90% reduction of water in the river from the 400 cfs flow period! Consider the following effects this had on the brown trout's spawning cycle:

- Any of the eggs in redds that were above the 42 cfs water level will be killed instantly by being dried out and/or freezing.
- Any of the redds that are still under water at 42 cfs will be affected by an extremely reduced flow rate. This causes a lack of oxygenated water which is a primary requirement for a successful hatch rate of trout eggs. Excessive siltation to the clean gravel in the redds also occurs at very low flows. This exacerbates the low oxygen problem and smothers the eggs.
- With the greatly lowered level of water over the redds, the eggs are subject to high mortality due to freezing and lower than optimum water temperature levels. We witnessed many redds in shallow water with heavy ice formed above them.
- If the flows are increased again to much higher levels it will create another problem of "blowing out" any of the already stressed redds/spawning beds that were lucky enough to make it through the 90% streamflow/discharge reduction.
- Considering the typical incubation period for brown trout eggs in the wild (80 to 140 days or more) there is absolutely no chance that any of the eggs laid in the Chama river below El Vado dam have hatched before the streamflow/discharge was reduced to 42 cfs.

In essence, this fall's (2011) management of the streamflow/discharge below El Vado dam has created the "perfect storm" of conditions for the destruction of the brown trout's spawning cycle. Hopefully, some of the redds made earlier in the season and/or the ones that are in the deepest sections of the river will not be too adversely affected by the discharge schedule that was implemented. Hopefully, in the future, the powers that be who govern water demands and dam releases on the Chama River, will take into consideration the health of the trout population and the overall ecological health of the river - before they take any actions that could have such adverse consequences as the ones in the fall of 2011.

So What Can We Do About It?

The best way that we, as individuals, can do something to help the situation on the Chama River is to become involved. On May 10th, 2011 a group called **The Rio Chama Flow Optimization Project** (RCFOP) was formed to address the many issues facing the river. The primary focus of the RCFOP is to band together concerned individuals and organizations and establish a collaborative effort to manage streamflow/discharges in the Chama River system. The project's primary goal is to reinvigorate natural functions of the Chama river while satisfying water management objectives and improving fishing and whitewater recreation. The RCFOP is funded by a grant from the River Ecosystem Restoration Initiative and managed by Rio Grande Restoration.

For more information on The Rio Chama Flow Optimization Project
and to sign up for their newsletters, please contact:

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Chama River Canyon Below El Vado Dam ~ December 27th, 2011