USGS LAKE REDSTONE TRIBUTARY MONITORING

Water Year 2019

- Only 2 months, August 2019 – September 2019
- Installed stream gaging equipment
- Data Collection: Discharge Only

Water Year 2020

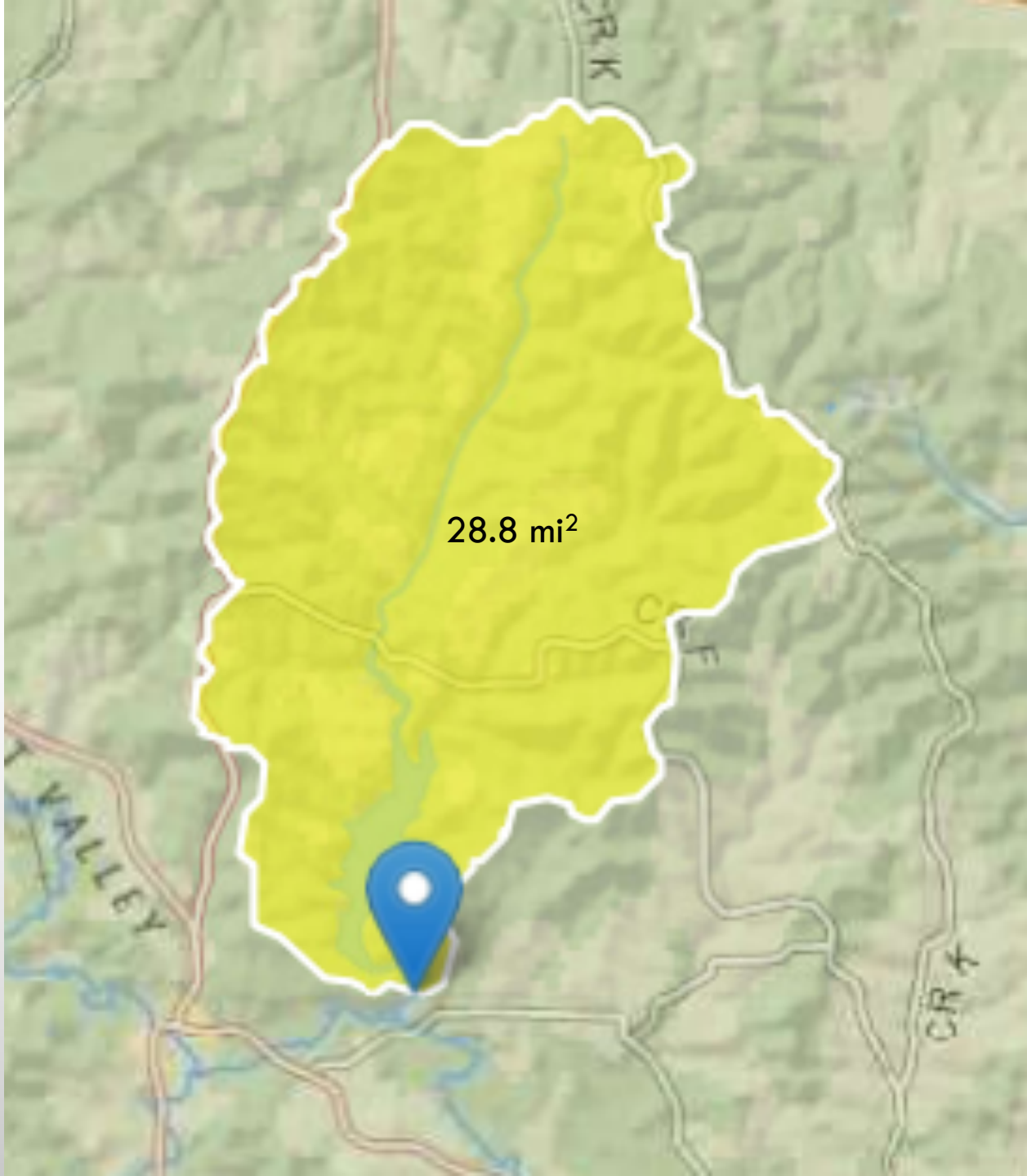
- Full year, October 2019 – September 2020
- Data Collection: Discharge Only

Water Year 2021

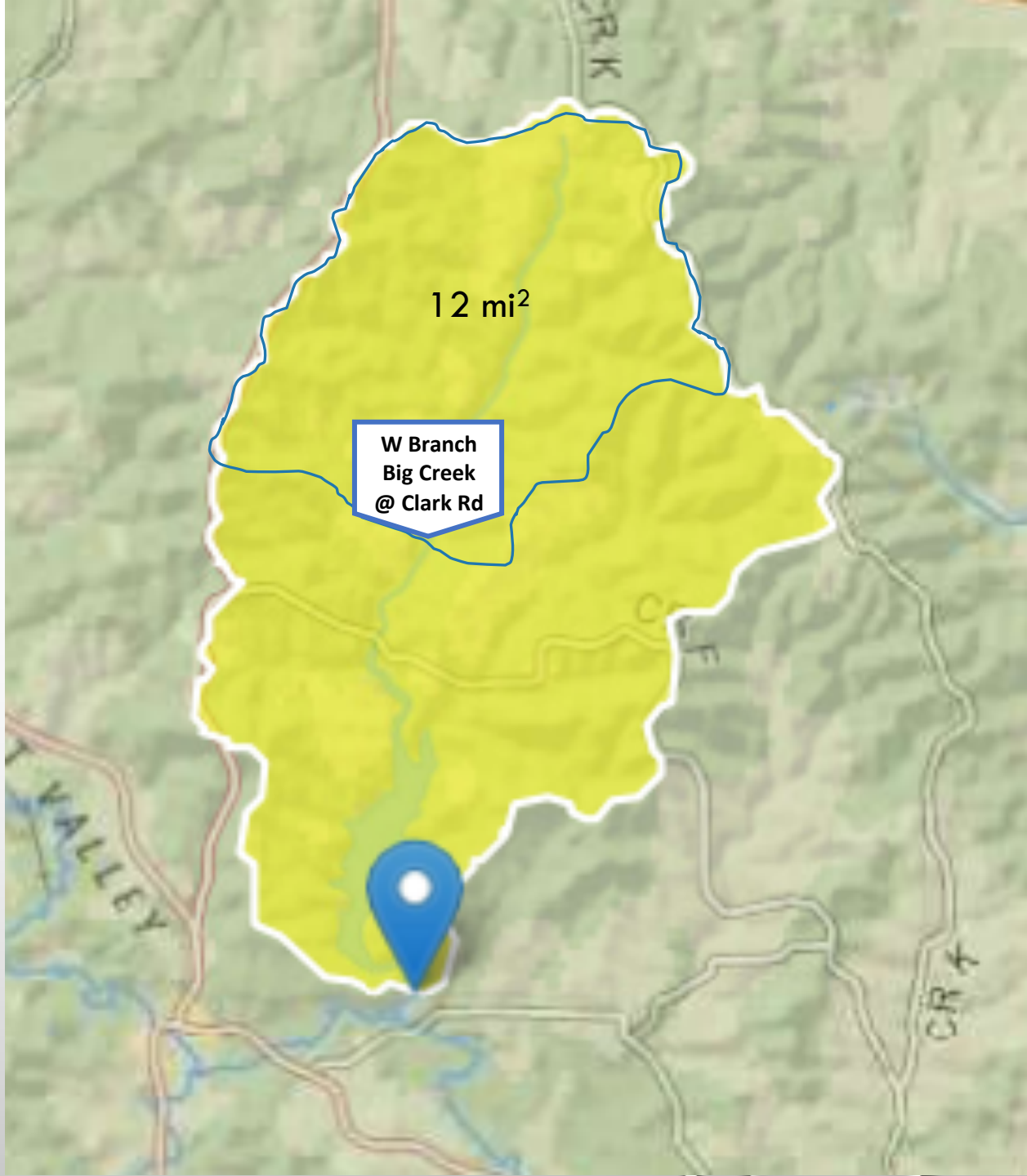
- Full year, October 2020 – September 2021
- Installed auto-samplers to collect TP and SS samples
- Data Collection: Discharge + Concentrations = Loads

*All data in presentation is preliminary USGS data unless noted otherwise

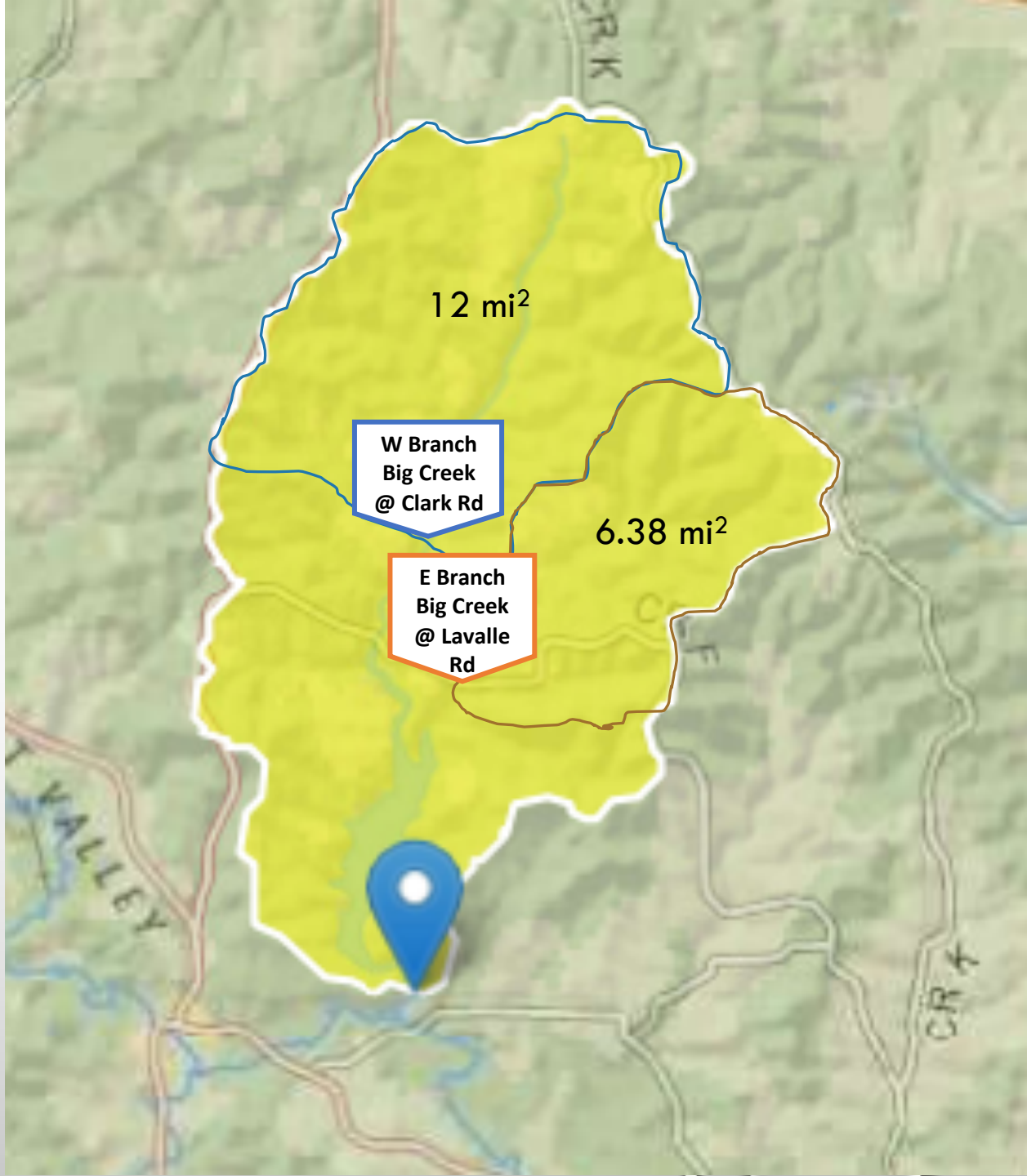
LAKE REDSTONE DRAINAGE AREA = 28.8 MI^2



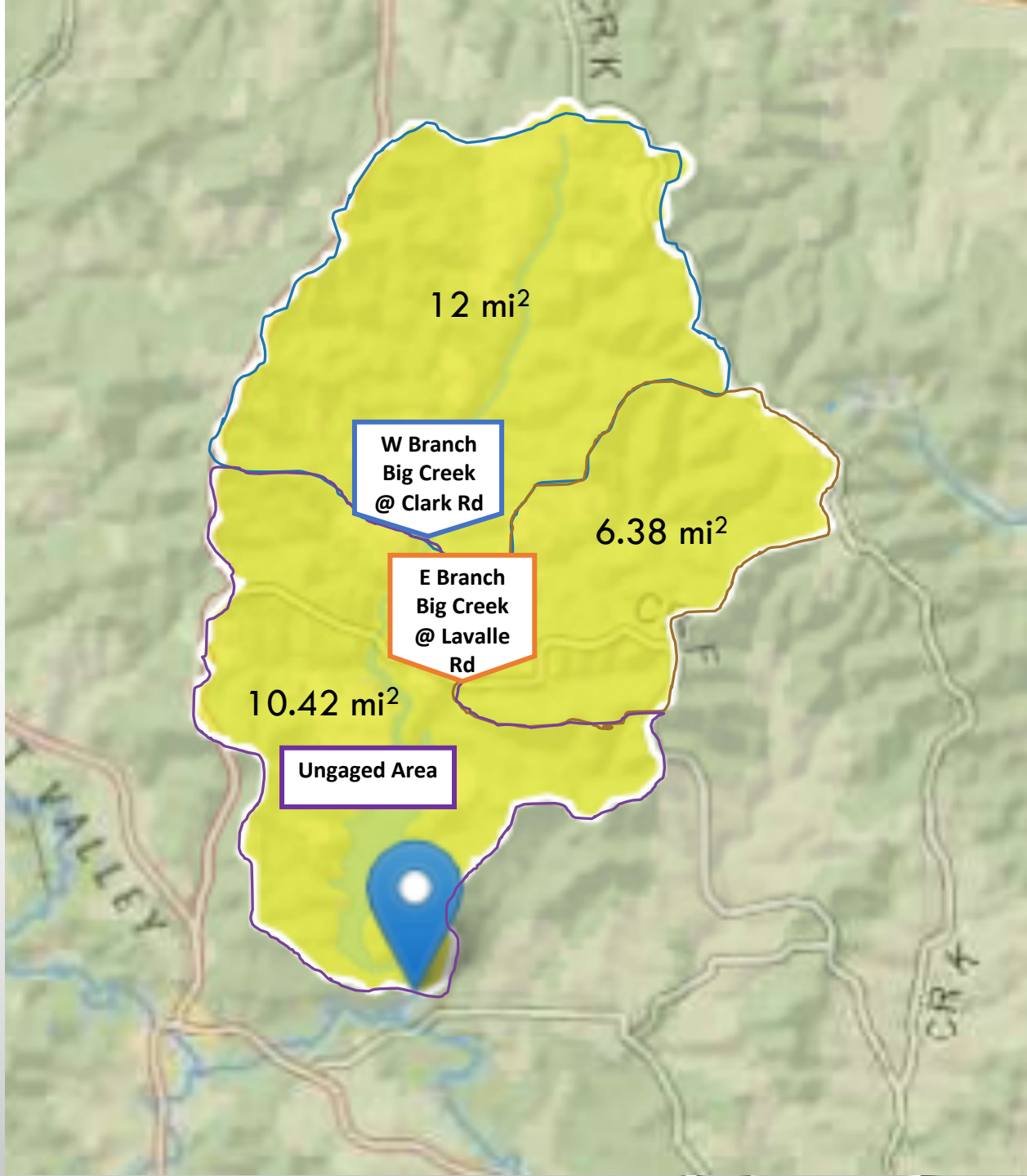
W BRANCH BIG CREEK @ CLARK RD DRAINAGE AREA = 12 MI^2



E BRANCH BIG CREEK @ LAVALLE RD DRAINAGE AREA = 6.38 MI^2



UNGAGED DRAINAGE AREA = 10.42 MI^2

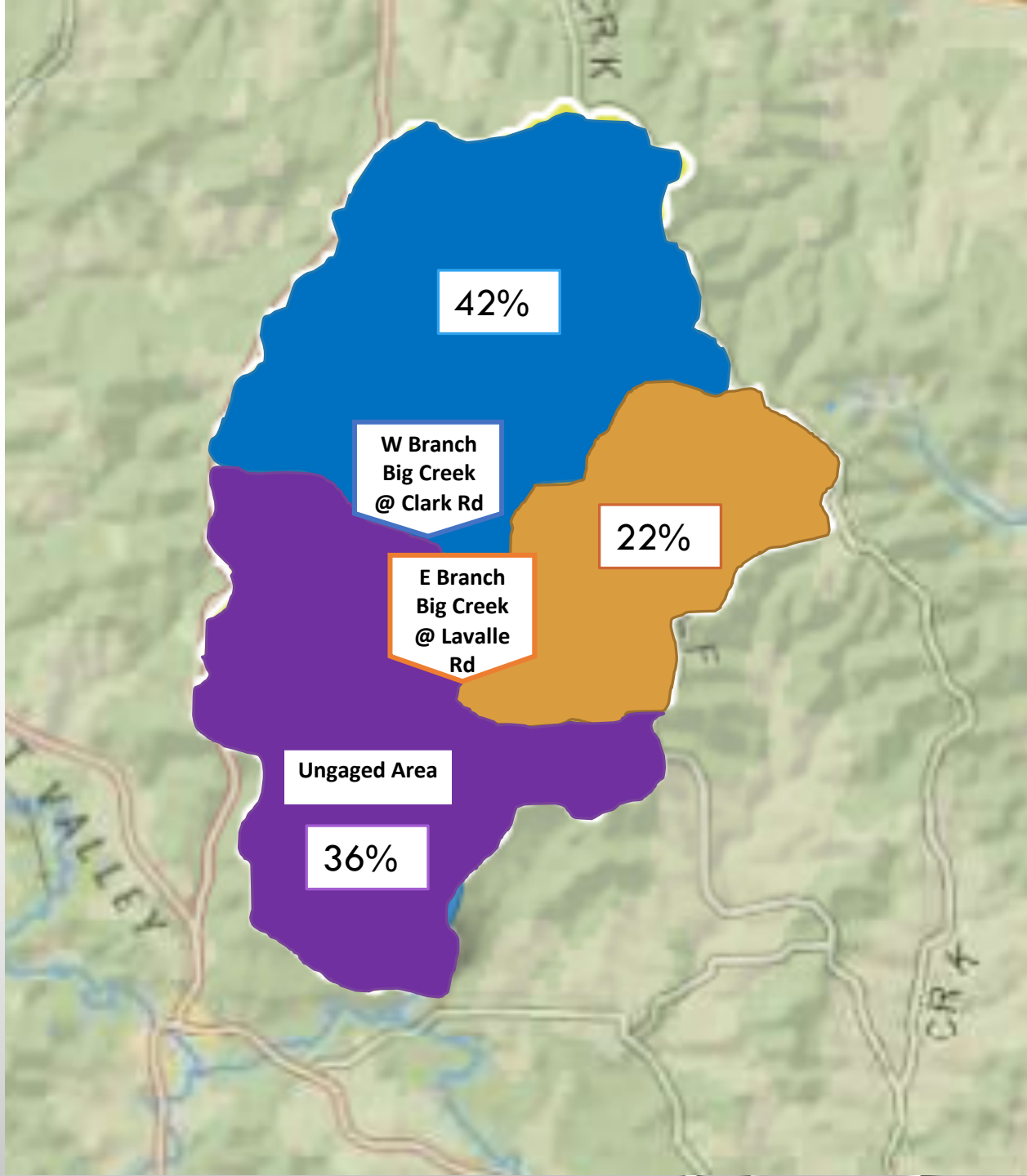


DELINEATED LAKE REDSTONE DRAINAGE AREA

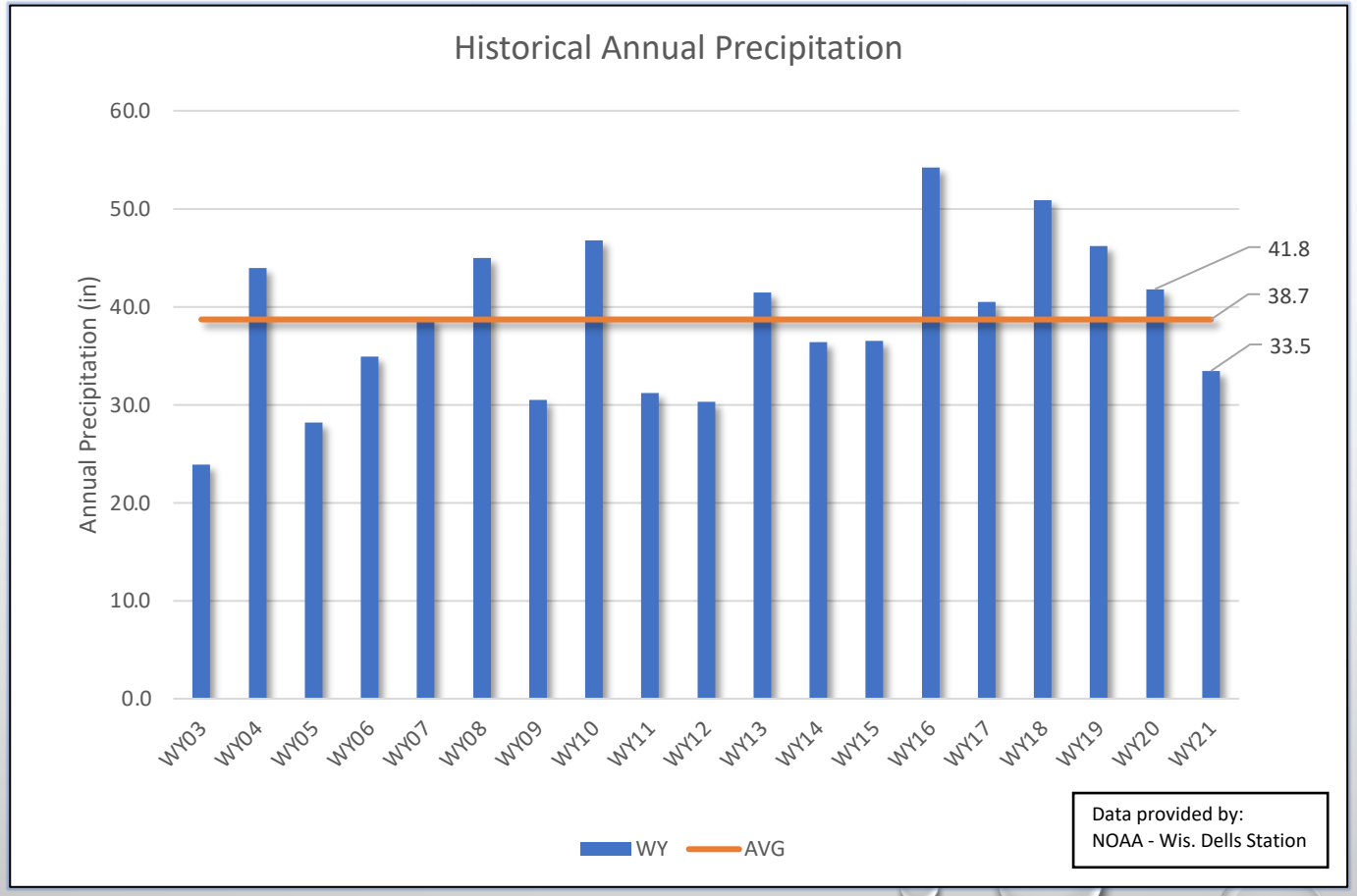
W Branch Big Creek @ Clark Rd = 12 mi^2 = 42%

E Branch Big Creek @ Lavalle Rd= 6.38 mi^2 = 22%

Ungaged Area = 10.42 mi^2 = 36%



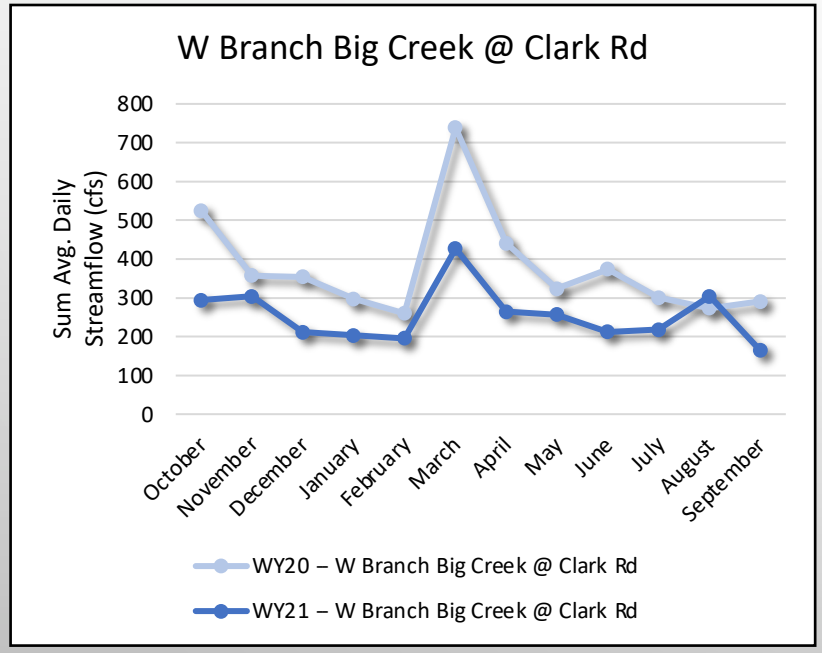
WY21 WAS A DRYER YEAR THAN AVERAGE

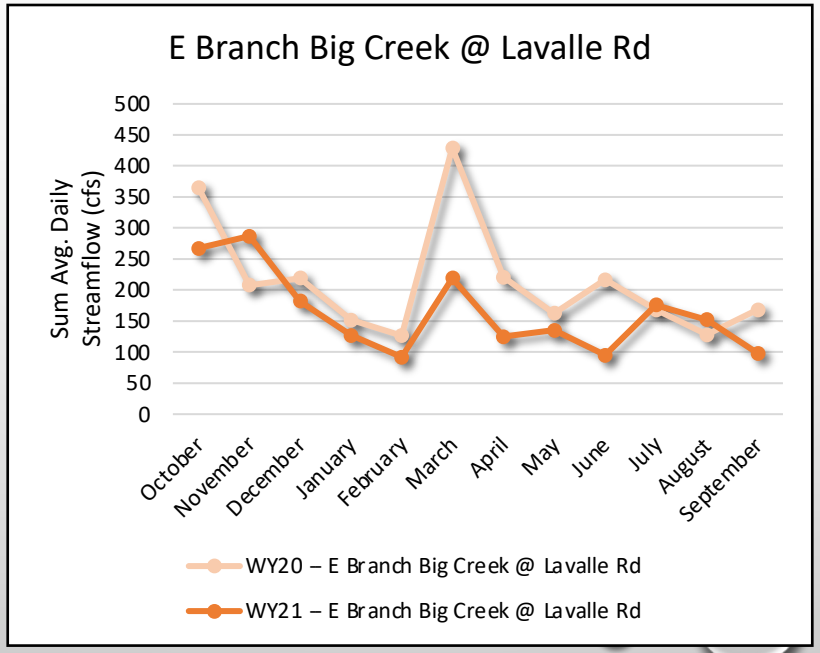


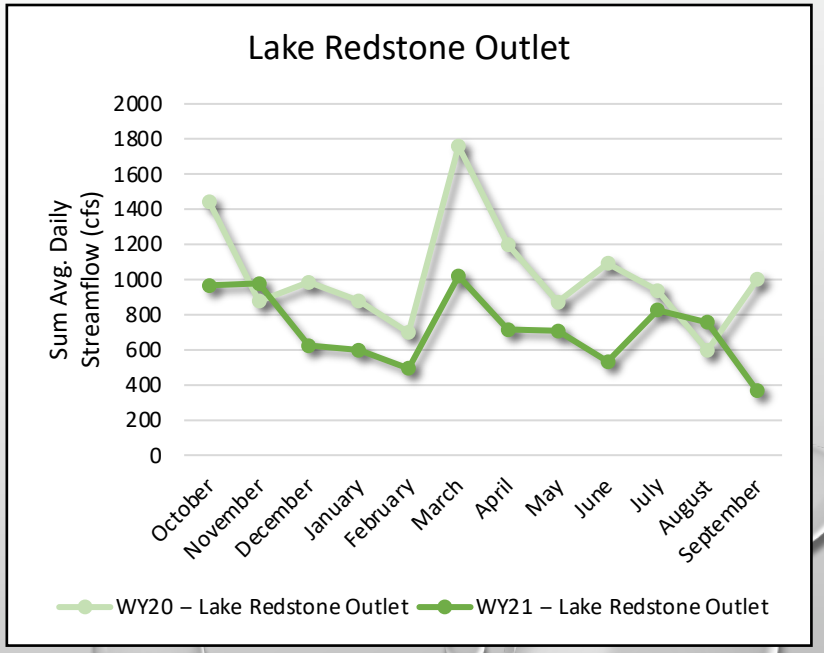
LESS RAIN IN WY21 LED TO DECREASED FLOWS

- WY21 Flow < WY20 Flow at all three monitoring sites

(Light colors = WY20, Dark = WY21)



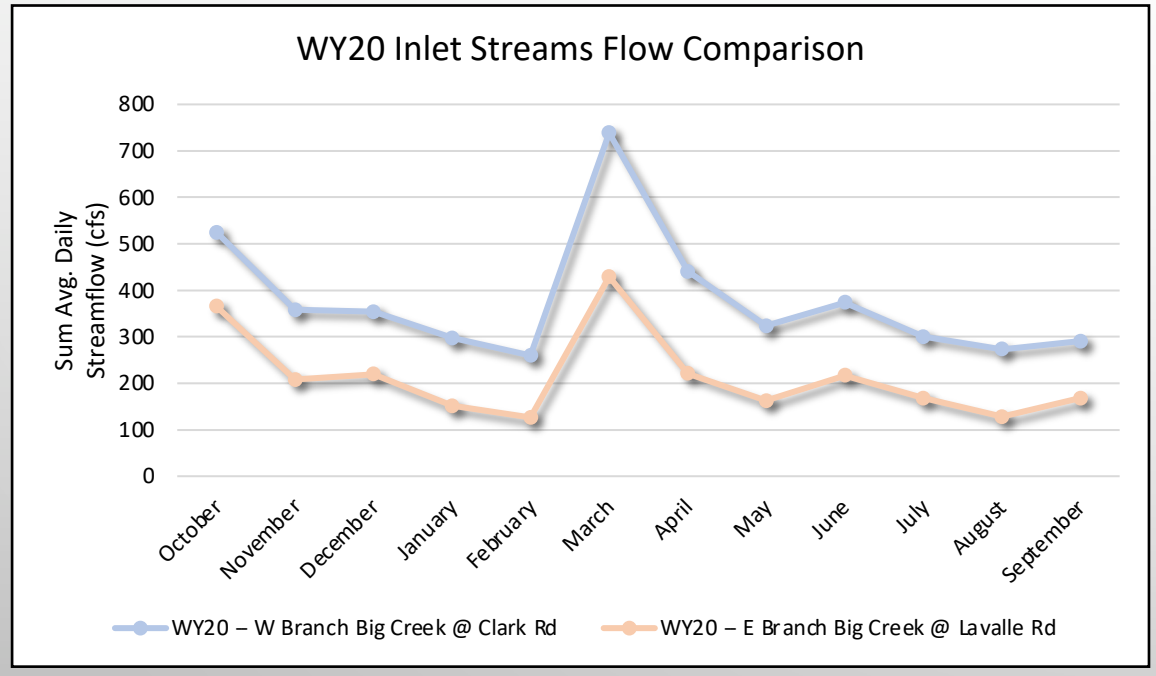


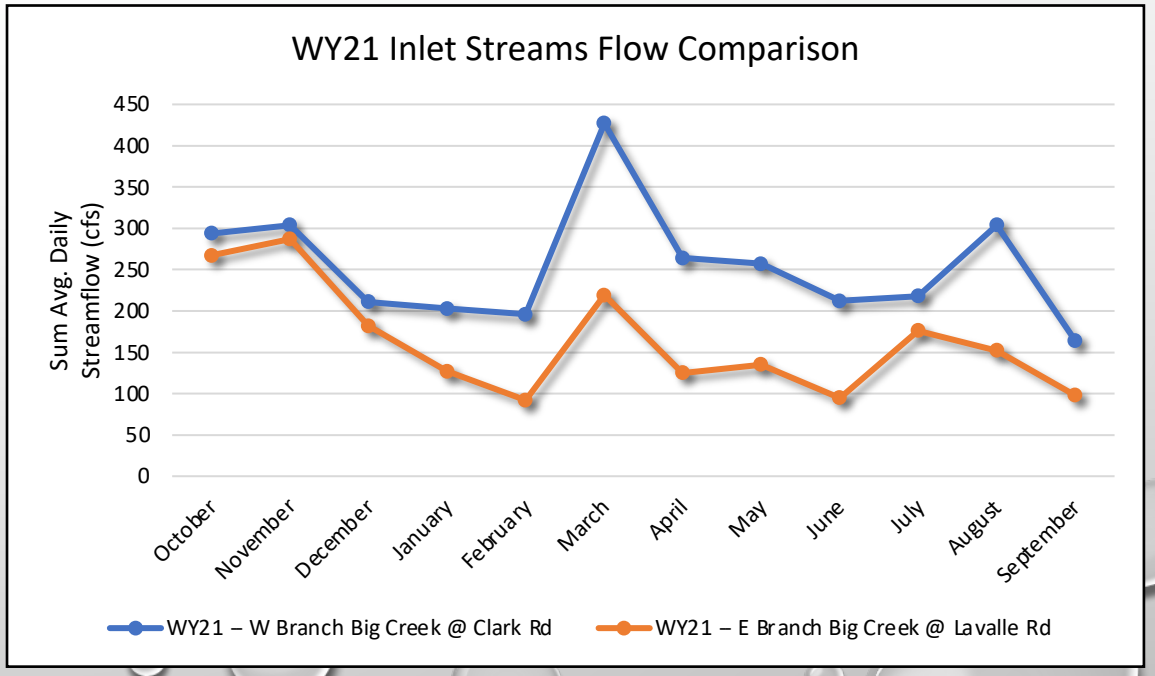


W BRANCH DELIVERED MORE FLOW THAN E BRANCH

- W Branch Flow > E Branch Flow during all months in WY20 & WY21

(Blue = W Branch Big Creek, Orange = E Branch Big Creek)

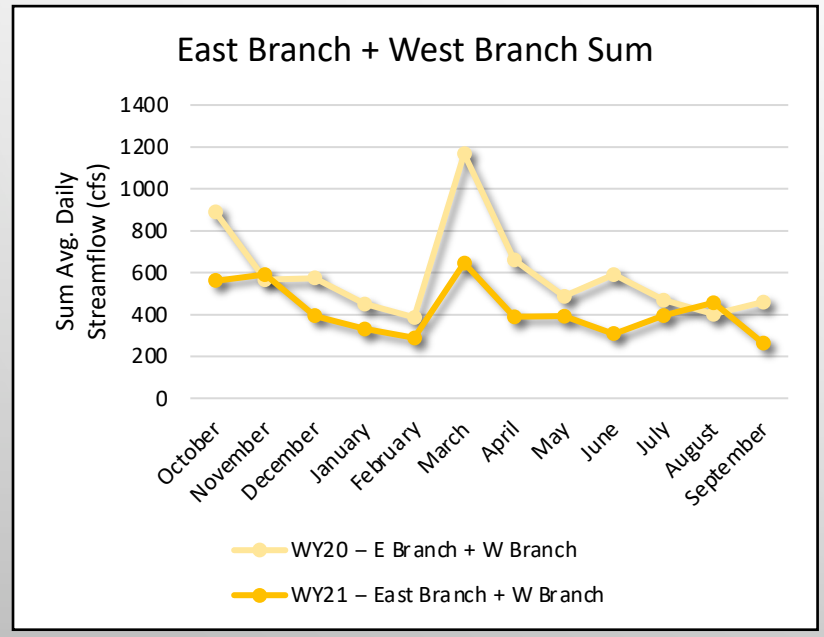


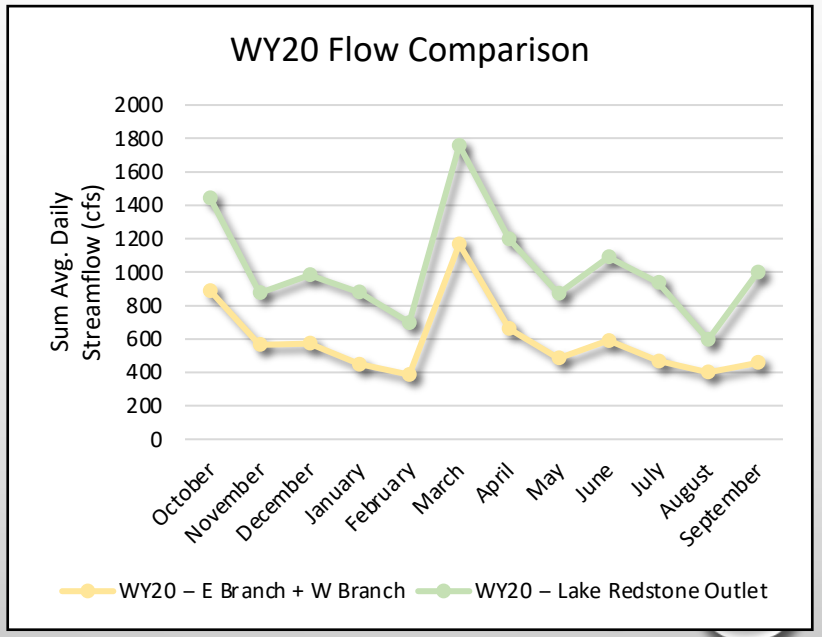


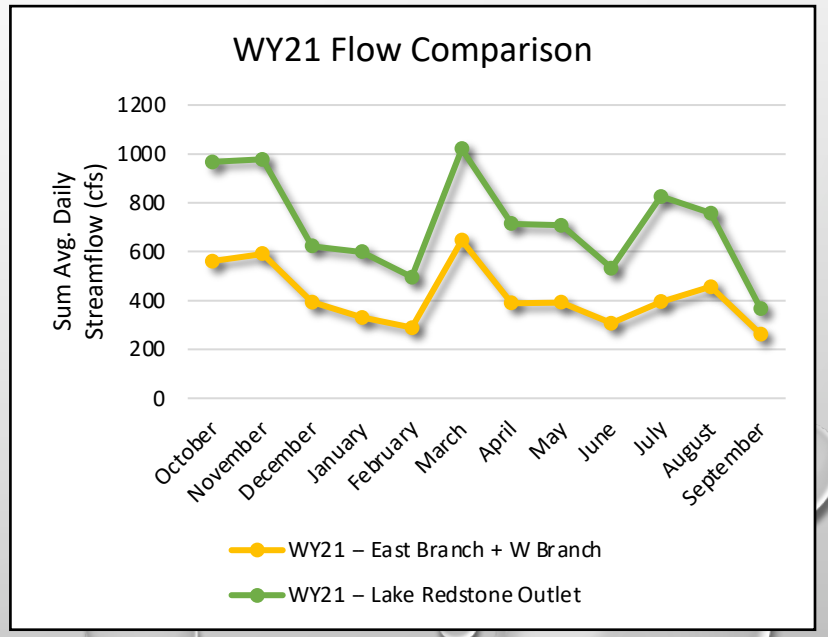
SUM OF FLOW FROM 2 BIG CREEK BRANCHES IS LESS THAN FLOW EXITING LR OUTLET

- E Branch + W Branch Flow < Outlet Flow in all months in WY20 and WY21
- Big Creek Branches only make up ~2/3 of Lake Redstone's contributing watershed, so this makes sense

(yellow = Sum (E + W Branch Big Creek), Green = Lake Redstone Outlet)

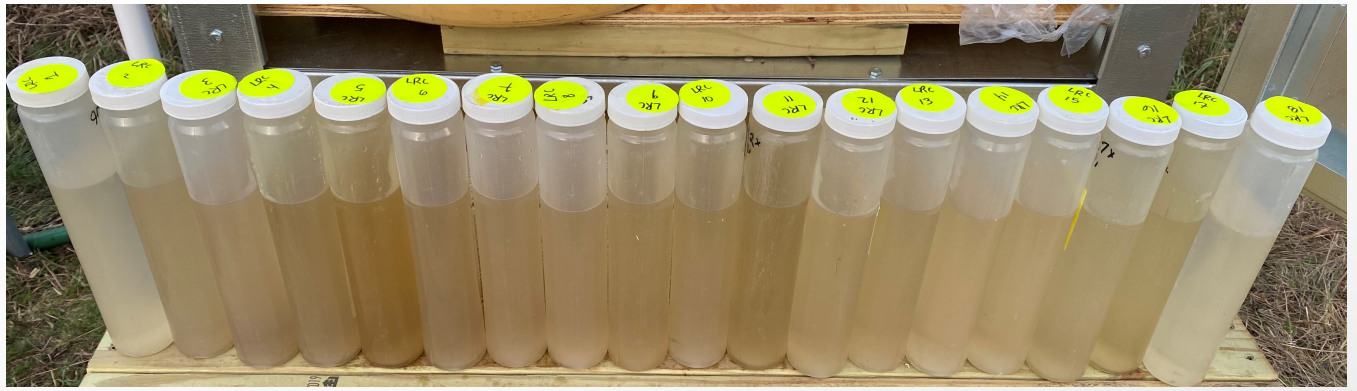


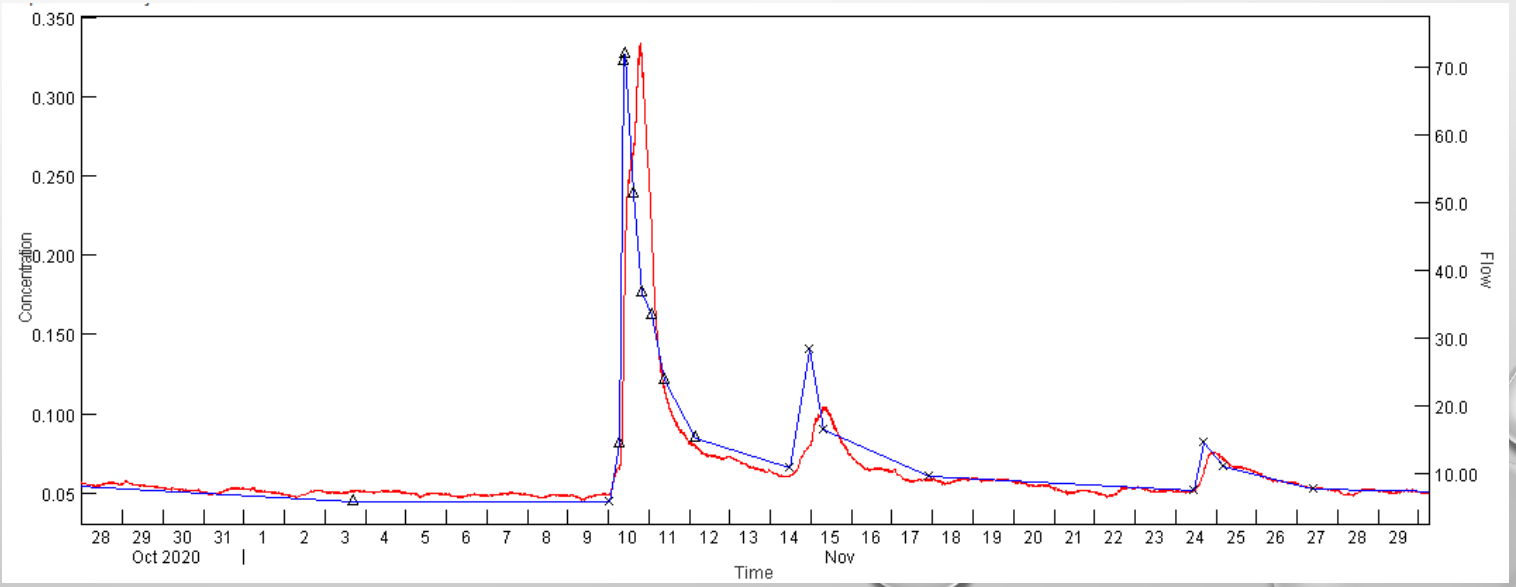




DISCHARGE X CONCENTRATIONS = LOADS

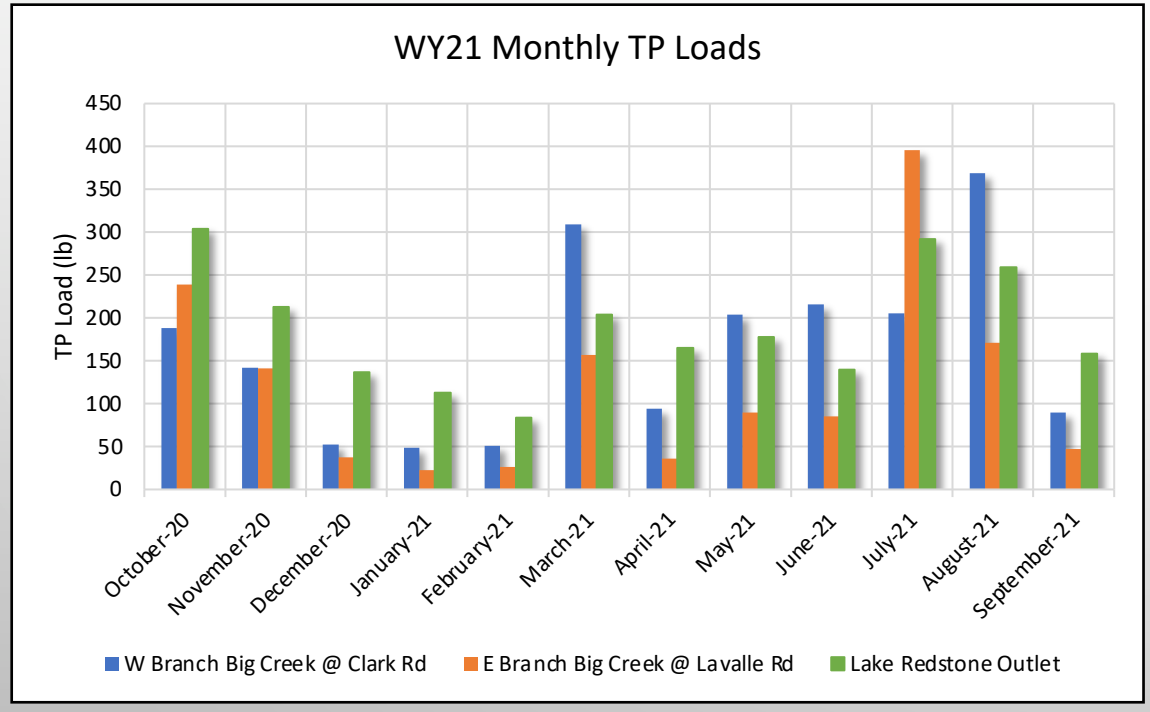
- Autosamplers programmed to collect samples throughout complete range of flow during storm events
- Subset of pumped samples are shipped to UWSP WEAL for TP and SS analysis
- At end of WY, Discharge data combined with sample concentrations + estimates using known stream characteristics to compute daily loading record

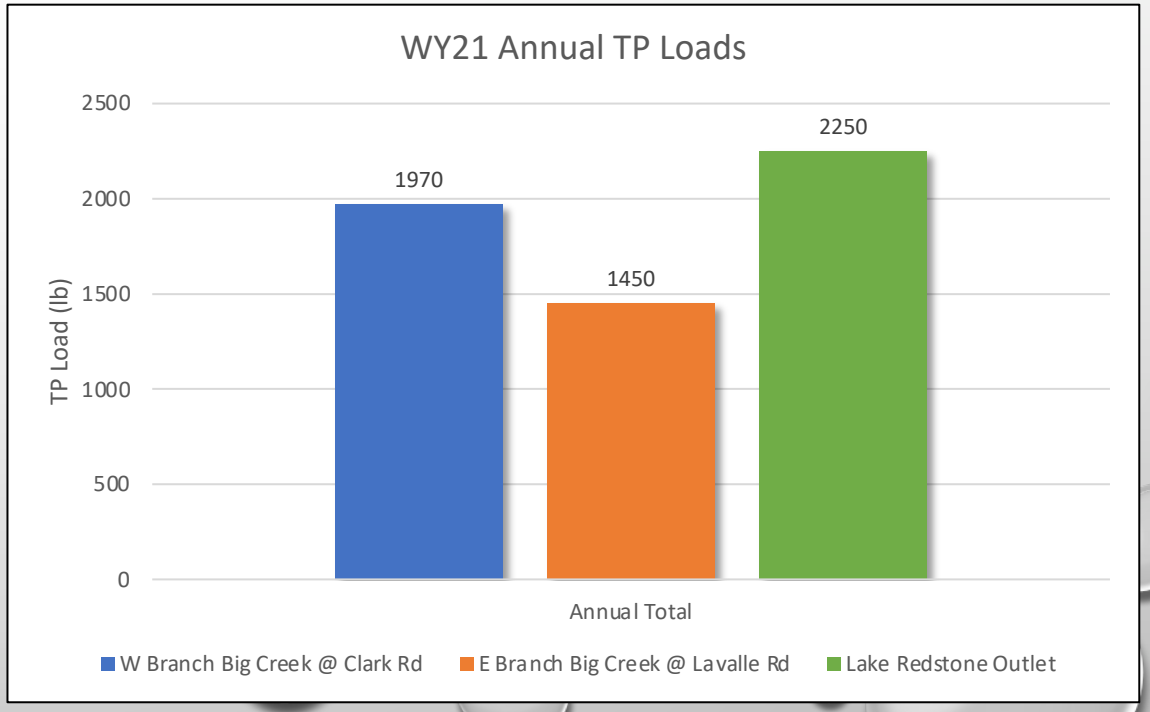




MEASURED WY21 TP LOADS

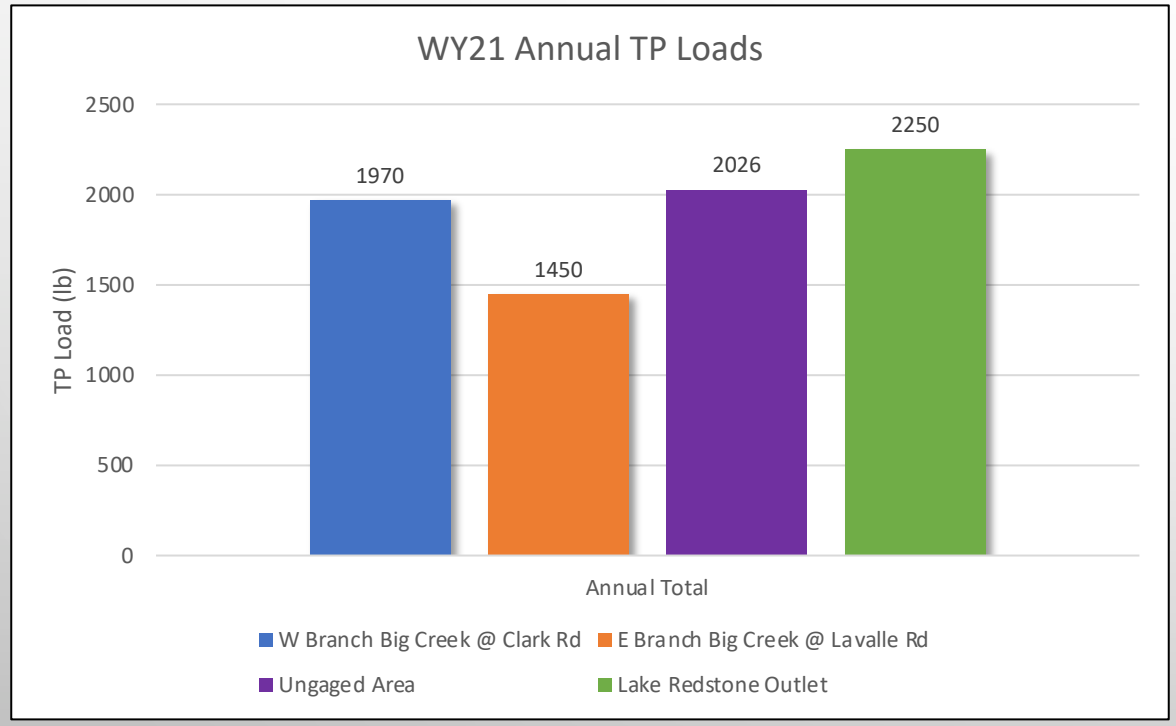
- WY21 TP Load Measured at USGS Sites: LR Outlet > W Branch Big Creek > E Branch Big Creek
- (E Branch + W Branch) > Outlet

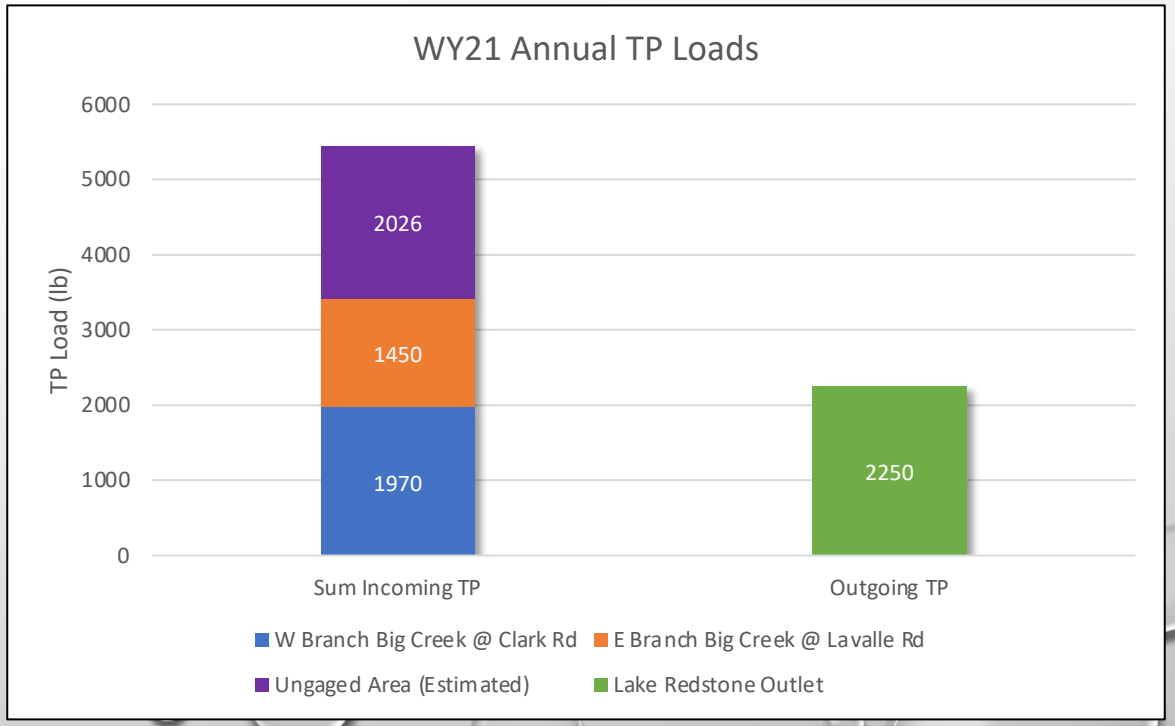




ESTIMATED UNGAGED WY21 TP LOADS

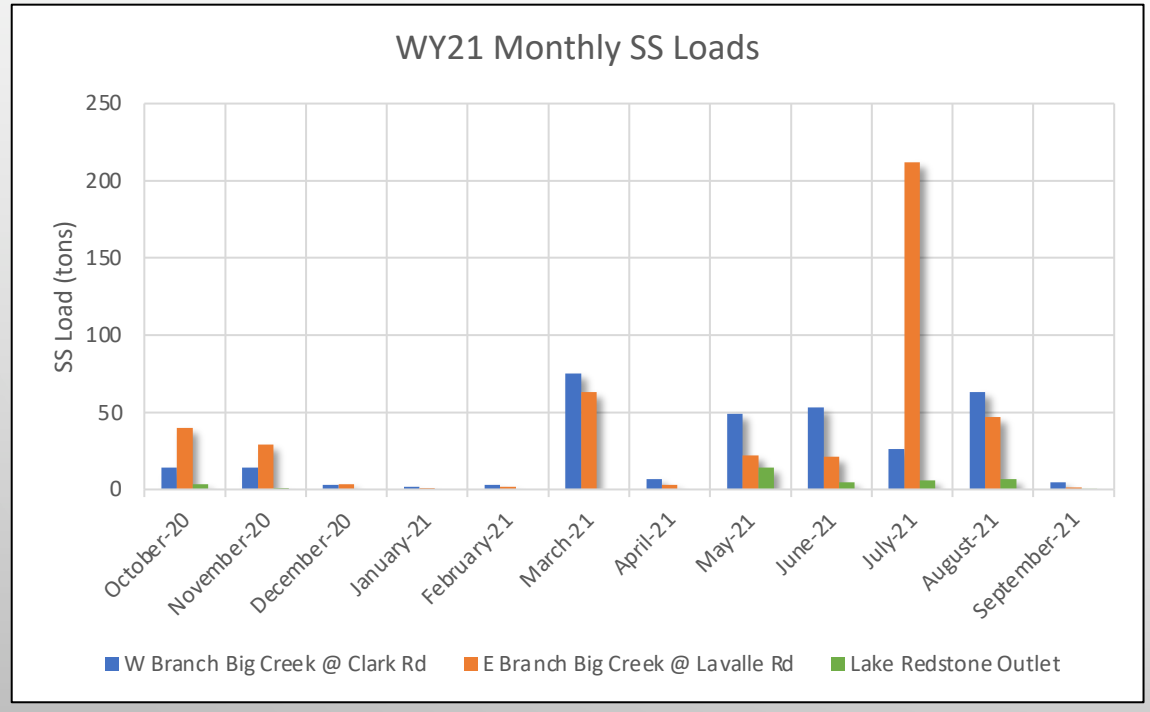
- Estimated Ungaged Flow = Avg Inlet Flow per mi^2 X Ungaged Area = 2920 cfs
- Estimated Unaged TP Delivered = Avg Inlet TP lb delivered per cfs X Ungaged Flow = 2026 lb

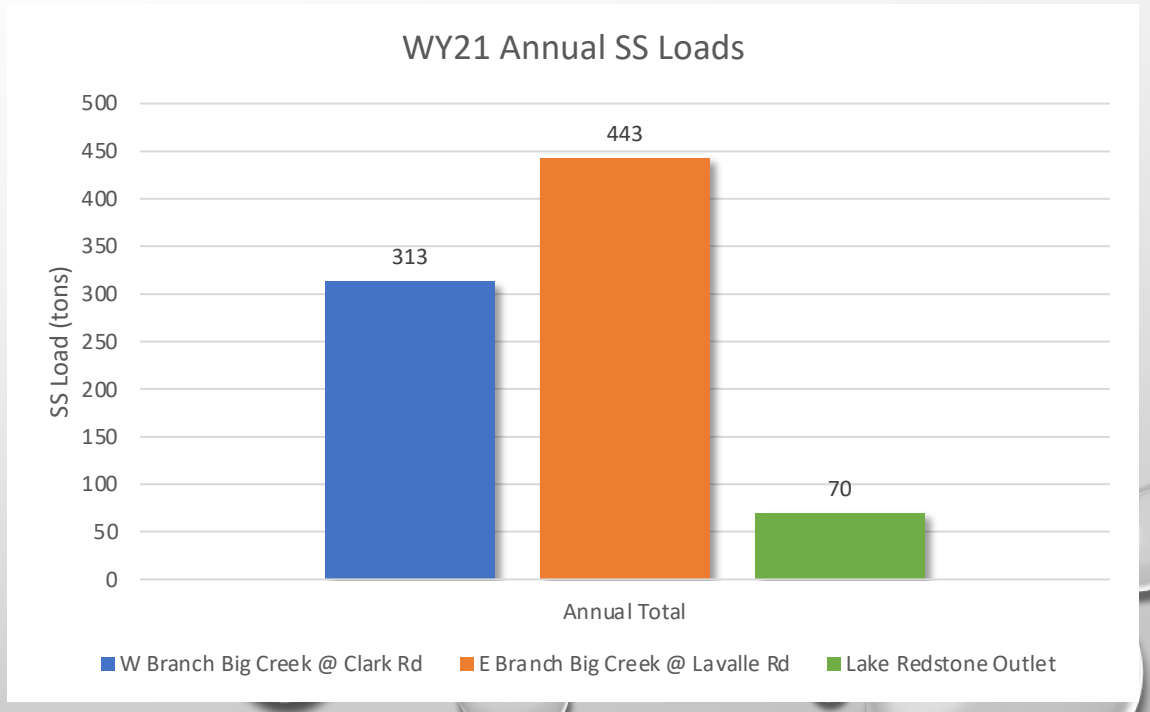




MEASURED WY21 SS LOADS

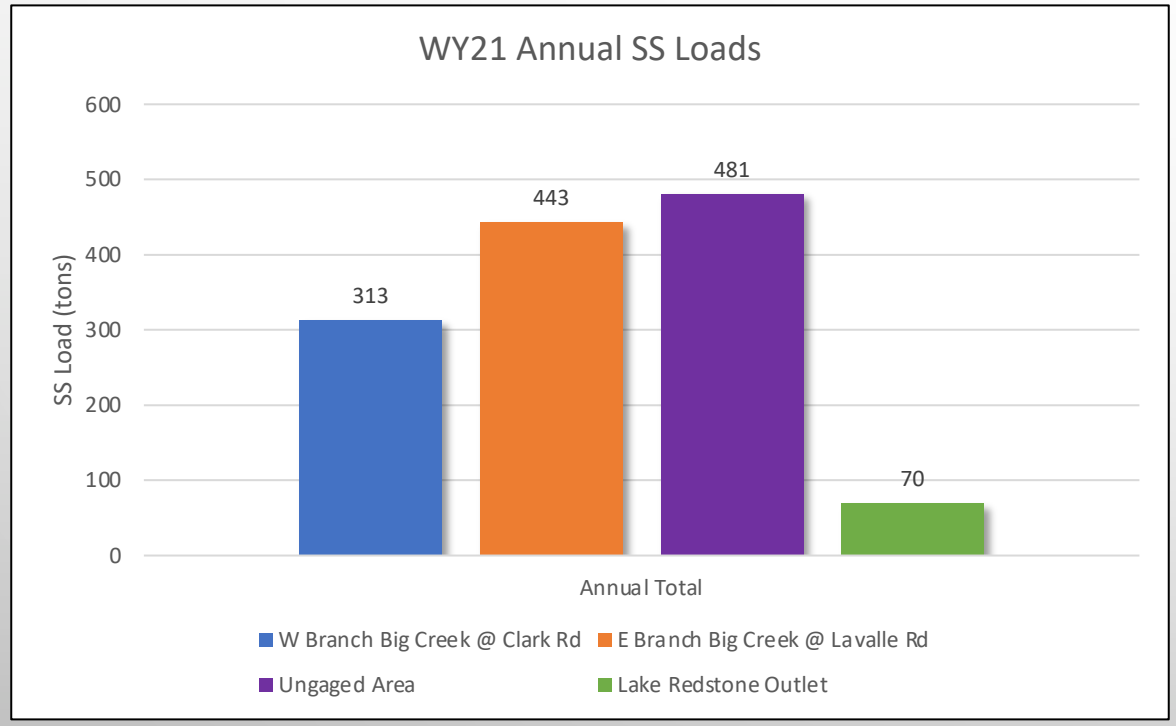
- WY21 SS Load Measured at USGS Sites: E Branch Big Creek> W Branch Big Creek > LR Outlet
- (E Branch + W Branch) > Outlet

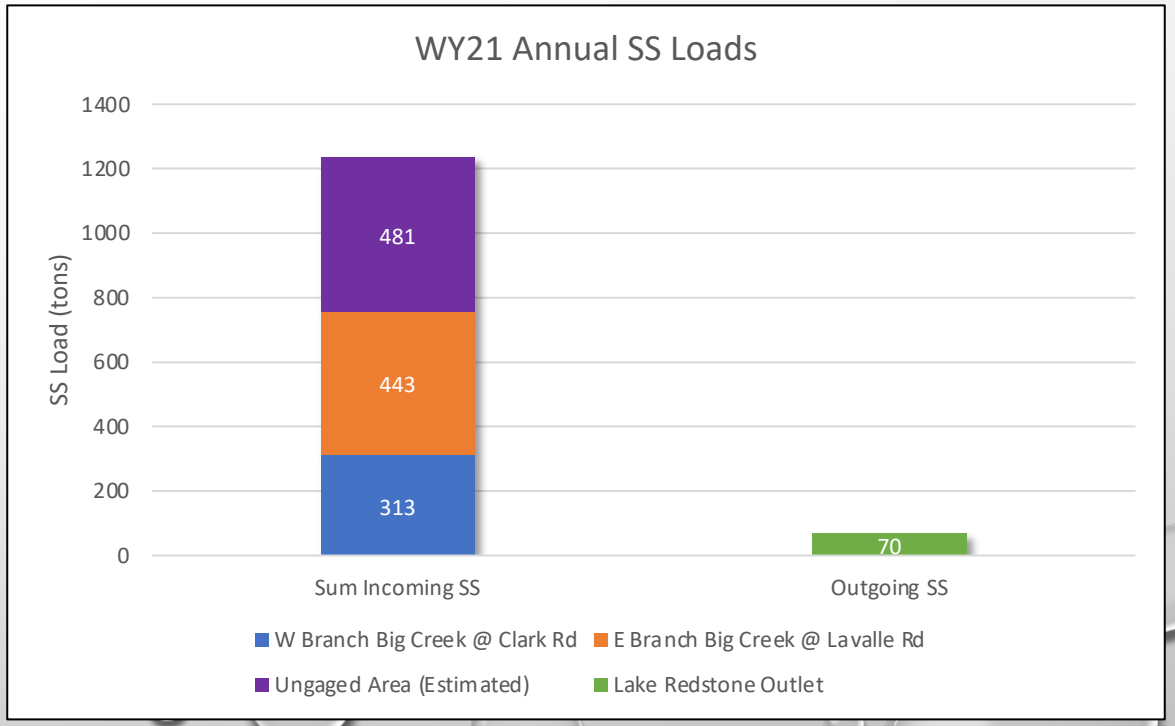




ESTIMATED UNGAGED WY21 SS LOADS

- Estimated Ungaged Flow = Avg Inlet Flow per mi^2 X Ungaged Area = 2920 cfs
- Estimated Unaged SS Delivered = Avg Inlet SS ton delivered per cfs X Ungaged Flow = 481 tons





FINAL THOUGHTS

- There are more accurate ways to account for the ungaged contributions
  - Need to examine land use
  - Need to account for septic

- This is just one year of data so it's difficult to compare to modeled loads; would need long term dataset to compare the values.

- Recommended monitoring plan moving forward:
  - 2-3 years of high intensity discharge and load data collection
  - After that, could cut down to just one inlet stream + outlet. And could reduce number of samples per year.
  - Eliminate SS analysis at Outlet starting this year