

Herman Gulch



UPDATE



We sampled Herman Gulch on September 14, 2022 with a team of ten CPW and USFS staff.

Herman Gulch: stocking history

Water Name	Year	Date	Age	Length (in.)	No.
Herman Gulch	2016	9/12/16	0	0.81	4,000
Herman Gulch	2017	7/17/17	1	5.05	980
Herman Gulch		9/28/17	0	1.13	9,664
Herman Gulch	2018	7/18/18	1	5.33	997 (Adipose clip)
Herman Gulch		9/26/18	0	1.01	31,776
Herman Gulch	2019	7/17/19	1	5.35	938 (VIE tag)
Herman Gulch		9/23/19	0	0.9	32,108



The table here is showing the stocking history of Herman Gulch, following the chemical reclamation in September 2015.

- Stocked just under 1000 Age 1 fish 2017, 2018, and 2019
- Stocked Age 0 fish 2016, 17, 18, and 19; increasing from 4,000 fish in 2016 to 32k in 2019, an increase that was largely driven by increased availability of fish from spawning efforts

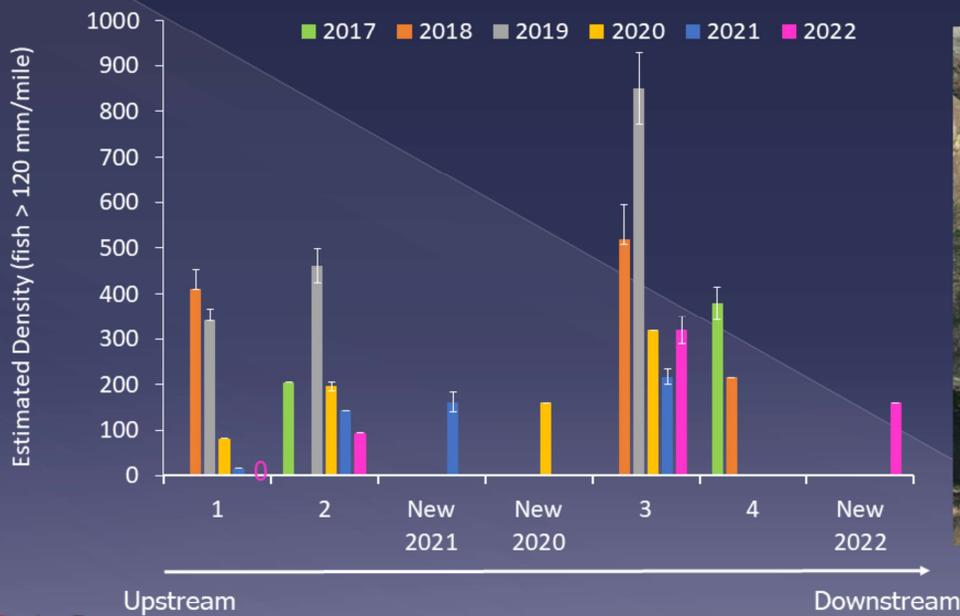
Herman Gulch: Population Estimates



The map shows sites in Herman Gulch that we have sampled over the past 5 years

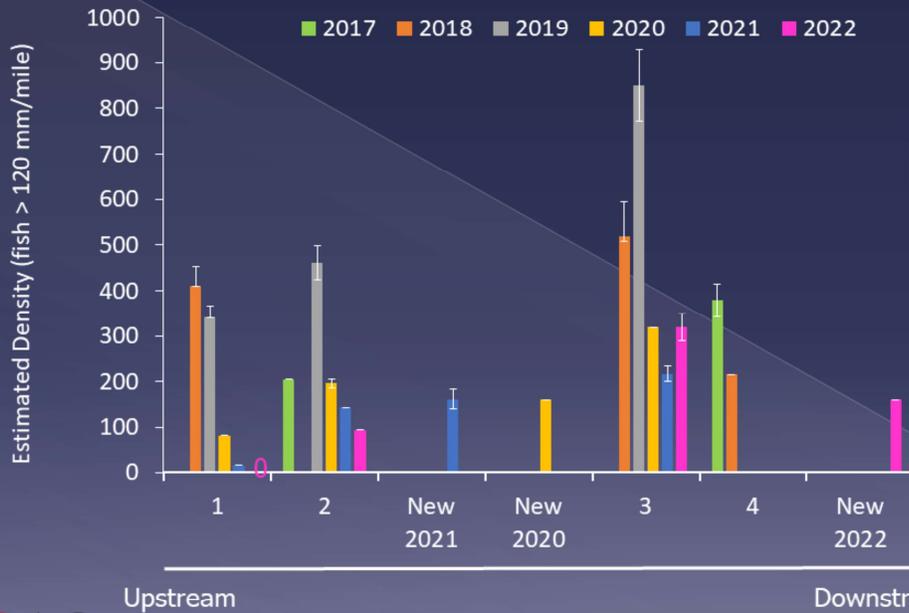
We sample via multiple pass removal electrofishing to generate estimates of abundance and density in terms of fish/mile and assess size and age structure of population. Sites with the pink arrows are sites that we are now consistently sampling annually, but we are doing a 4th "random" site to test for bias from repeated sampling. These random sites are shown here as New 2020, New 2021, new 2022.

Herman Gulch: Population Estimates



This graph is showing those same sample sites along the x axis, in order from upstream to downstream. The estimated density for fish greater than 120mm/mile is on the y-axis, with error bars representing the 95% confidence interval. Not surprisingly, we generally see increasing abundance across all sites except for site 1, resulting from annual fish stocking that occurred from 2017 to 2019. Subsequent to 2019, when fish stocking ceased, densities decreased considerably, but have remained relatively stable for the past three years. This is all with the exception of Site 1, where our estimate has decreased all the way to zero. This site is at just under 12,000' elevation and is above timberline. Prior to the 2015 reclamation, this site held average numbers of fish, but also had the largest fish in the entire system. We did some additional spot shocking outside of our sample reach and did turn up one very large, 12" fish in 2022.

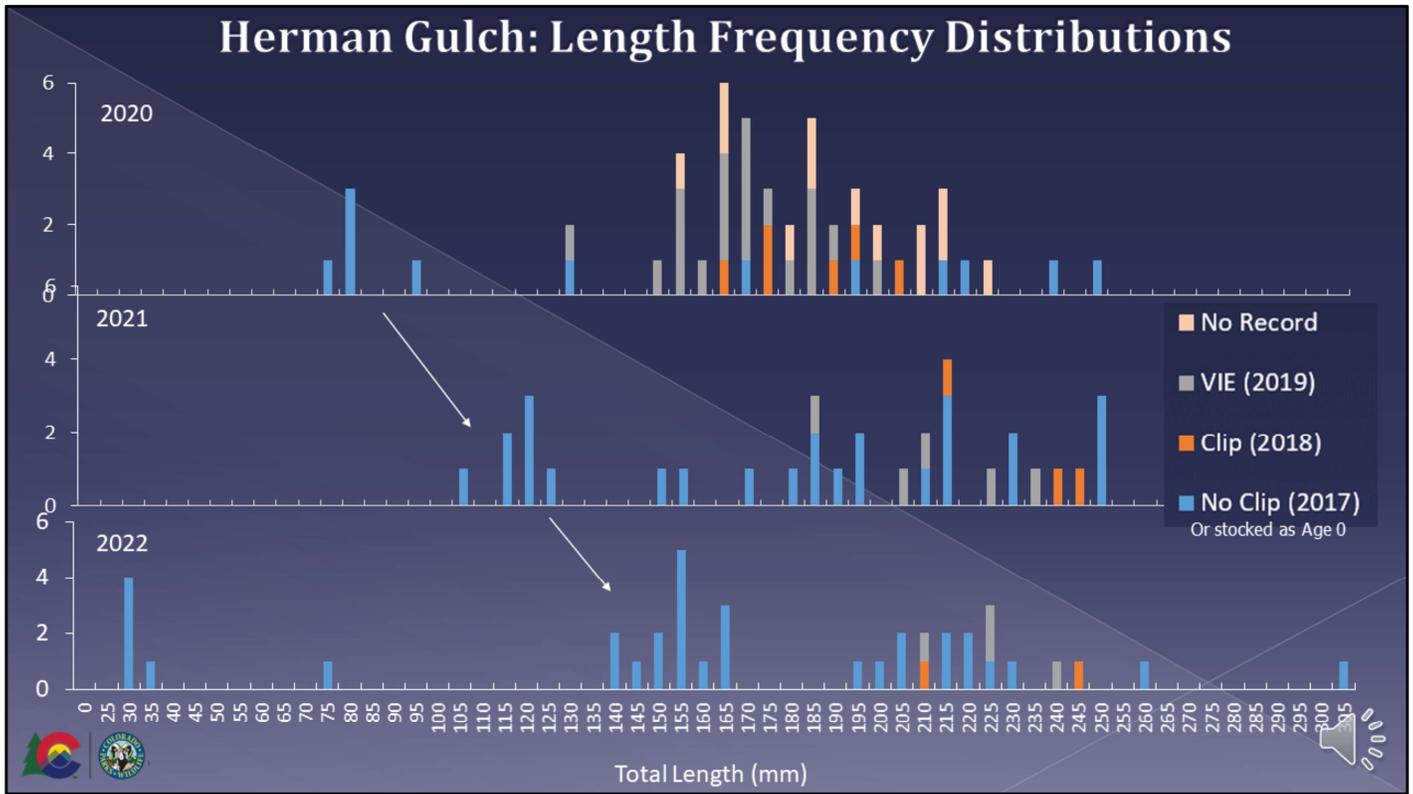
Herman Gulch: Population Estimates



Year	Density (fish/mile)	Est. Total Number
2017	292	1022
2018	382	1337
2019	551	1929
2020	189	662
2021	134	469
2022	143	500

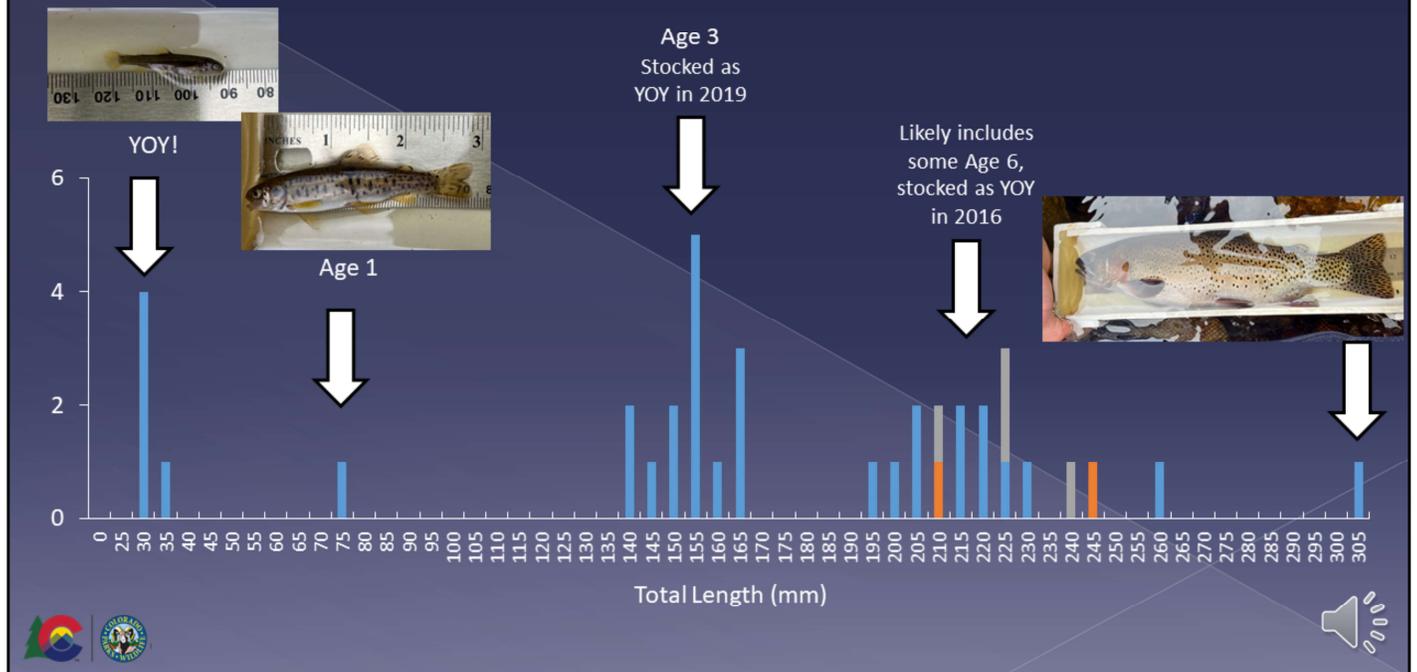


Each year we average the estimated density of fish > 120mm from our sample sites (n=4 in 2022), and then extrapolate the average across the entire occupied section of stream (3.5 miles) to generate an estimate of the total number of adult fish in the population. In 2022, we estimated 500 adult fish, which has remained relatively stable for the past three years, following declines when the stocking of Age 1 fish ceased.



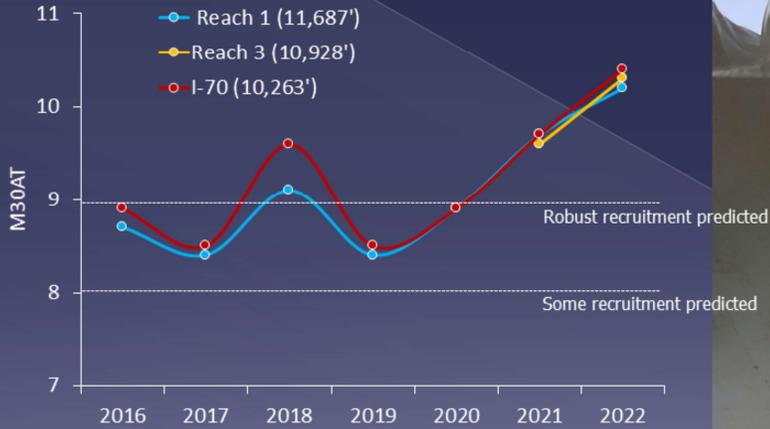
These are length frequency histograms generated from all fish sampled in the past three years. We can identify different cohorts of stocked fish because we marked Age 1 fish prior to stocking. In 2019, all age 1 fish received a VIE mark, those are shown here in gray. In 2018, all age 1 fish received an adipose clip, those are shown here in orange. In 2017 we did not mark fish, and those fish are shown in blue. However, those bars color-coded as blue could also represent fish that were stocked as age 0 or produced naturally in the system. Of note, we see that all cohorts of fish stocked as Age 1 are still represented in the population, but they are decreasing and are almost entirely absent from the system. The cohort in the 75 to 95 mm range in 2020 are age 1 fish and were most likely the result of the last stocking of Age 0 fish in 2019. These fish grew into the 105-125 mm size class as age 2 fish in 2021, and into the 140-165mm size class in 2022. In 2022, we documented both recruitment of fish that were naturally spawned in the system in 2021 (n=1 fish in 75mm length bin), and young of year that were spawned in 2022 (25-30 mm).

Herman Gulch: Length Frequency Distribution 2022



Just looking at the length frequency distribution for 2022, you can see the various cohorts of fish and their origin. Some of the fish greater than 195mm are likely the result of YOY in 2016. We documented survival of these fish to age 1 and beyond, but have not documented survival of YOY stocked in 2017 and 2018, probably because of cannibalism from all of the age 1 fish we were stocking in those same years. We did document survival to age 1 and beyond for the fish stocked as YOY in 2019, and you can see relatively strong representation of those as age 3 fish in 2022 (135-165mm). In fact, fish stocked as YOY seem to be sustaining the now stable population numbers in the system. Now the stage is set for natural recruitment to continue sustaining the population. We'll see if we see more of the 2021 year class in future years as their capture probability increases. Hopefully, the 2022 year class is one we'll be talking about for years to come. Also, of note, We captured a 303mm (12 inch) fish while spot shocking upstream of our site 1.

Herman Gulch: Temperature Maximum 30 Day Average Temperature (M30AT)



The Maximum 30 Day Average Temperature (M30AT; the average of the 30 warmest consecutive days) has been shown to be an excellent predictor for recruitment of cutthroat trout in streams. M30AT less than 8C is too cold to support recruitment, but values between 8 and 9C may support marginal recruitment. M30AT values above 9C are then predicted to support robust recruitment. 2021 and 2022 produced the highest measured M30AT since we began tracking this in 2016, and we have indeed documented recruitment associated with those warmer years.