



**UPPER ENTERPRISE RESERVOIR
2021 TREND NET SURVEY**

**Report prepared by:
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BACKGROUND: Upper Enterprise Reservoir has historically been managed as a put-grow-and-take rainbow trout (RBT) fishery maintained by stocking 25,000 five-inch fish in the spring (Table 1). Golden shiners and green sunfish were present in the reservoir during the 1980s and 1990s but were eradicated during a rotenone treatment in 2002. The reservoir became a two-tier fishery with the introduction of smallmouth bass in the 1990s. Smallmouth bass produced a valuable sport fishery, so they were reestablished after the 2002 treatment and again in 2010 after draining and dam repairs. Increases in brood production facilitated attempts to add diversity to the Upper Enterprise fishery in recent years and included stocking Bonneville cutthroat trout from 2013 to 2019, as well as Kokanee salmon beginning in 2020 (Table 1). (The cutthroat trout quota was cancelled due to a lack of observed survival.) UDWR owns a conservation pool in Upper Enterprise Reservoir that helps maintain trout survival and growth during most years, though the reservoir can be affected by extreme and extended droughts. Southern Utah experienced large variations in climate and snowpack in recent years, with severe drought interrupted only temporarily by a record snowpack in 2019.

The fishery at Upper Enterprise Reservoir is monitored by trend net surveys on odd years. Since 2011, a new gill net design recommended by the American Fisheries Society (AFS) has been utilized. The random placement of differing mesh sizes is intended to avoid “leading” fish into the net and, thus, reduce bias in the net catch – as opposed to nets previously used for decades (“DWR” nets), which comprised of graduating mesh sizes. In most waters, catch rate trends observed since 2011 indicate that the AFS nets catch about 50% fewer trout than did the DWR nets, though the reduced catches are still sufficient to provide measures of population dynamics. Surveys conducted in Upper Enterprise Reservoir from 2011 to 2019 showed that the new nets caught, on average, 57% of the RBT that the old style sampled.

METHODS: Four experimental gill nets (three floating and one diving) were set in Upper Enterprise Reservoir on March 31, 2021, and were allowed to fish overnight. Nets measured 6 ft x 80 ft, with eight panels of randomly-arranged mesh size (1.5”, 2.25”, 1”, 0.75”, 2.5”, 1.25”, 2”). Net locations have generally been consistent for 20+ years of sampling (Figure 1), though the southeast floater (SEF) was moved to the southeast cove in 2021 because the middle south cove, where it was previously set, was consistently too low or empty during recent drought years. Fish caught were removed from nets on the morning of April 1 and all fish were measured to the nearest mm (total length) and weighed to the nearest gram. Trout body condition was measured by the calculation of Fulton’s K_{TL} (generated from total length [TL]) :

$$K_{TL} = (Weight/Length^3) \times 100,000$$

Results of the 2021 survey were compared with those from historic trend net surveys.

RESULTS: A total of 58 RBT was collected in four nets at Upper Enterprise Reservoir on April 1, 2021, for a catch rate of 15 trout per net-night (Table 2). While the catch rate was lower than the long-term mean for AFS nets (Table 3), it represented an increase over the low observed during the last survey in 2019 (Fig. 2). RBT made up 100% of the total net catch and biomass sampled. Only two of the RBT sampled were stocked in spring 2020 (Fig. 3) and averaged 320 mm (12.6 in) in total length (TL), 504 g (1.1 lb) in weight, with a mean condition (K_{TL}) of 1.54 (Table 2). All of these values were the highest ever observed for RBT stocked the previous year (Table 3, Fig. 4). The majority of RBT collected were stocked prior to 2020 and averaged 399 mm (15.7 in), 767 g (1.7 lb), with a mean K_{TL} of 1.20 (Fig. 5). Mean length was higher than the long-term mean for older fish, while weight and condition were among the highest ever observed

(Table 3). The largest RBT observed measured 480 mm (18.9 inches) and weighed 1,330 g (2.9 lbs.). No smallmouth bass, cutthroat trout, or Kokanee salmon were observed in the survey.

DISCUSSION: The 2019 netting survey at Upper Enterprise Reservoir found that older RBT had experienced poor survival during the drought year in 2018, but postulated that fish stocked in 2018 and 2019 would benefit from the record 2019 snowpack. Results of the 2021 trend net survey confirmed that those RBT survived and grew very well, though fish stocked in 2020 apparently did not survive well. While the 2019 snowpack filled the reservoir for the first time in years, a return to severe drought in 2020 reduced inflows and produced poor environmental conditions that may not have supported yearling RBT. The two younger RBT collected in 2021 did exhibit large size and high condition, however, indicating that those fish that did survive experienced favorable growth similar to that of the older fish. Unfortunately, drought conditions continued to worsen in Utah in 2021, prompting fisheries managers to recommend emergency limit increases at many fisheries to allow anglers to utilize fish before they could be lost to reservoir draining or poor environmental conditions. While the conservation pool keeps Upper Enterprise Reservoir from being completely drained, its history of excessive nutrient load and frequent algae blooms still warranted an increase in harvest to reduce fish density and relieve stress on remaining fish. Trout and bass limits were doubled throughout the summer and fall 2021 and no large fish die-offs were reported during that time. As of January 2022, the snowpack of winter of 2021-22 is above average. If winter precipitation continues and supports improved water level in spring 2022, Upper Enterprise Reservoir should be a priority candidate for excess catchable RBT if they become available. This would help replace the missing 2020 cohort, as well as fish potentially lost to poor conditions and increased harvest in 2021.

The Upper Enterprise RBT quota was reduced to 20,000 five-inch fish in 2021 to accommodate the addition of Kokanee salmon. The salmon quota was not stocked in 2021, however, due to poor hatchery production. Increased interest in Kokanee salmon led to elevated production requests statewide in recent years. However, attempts at increased production yielded less than satisfactory, and variable, survival and requests were not entirely filled in 2020 and 2021. UDWR aquatics staff are working to address the situation and improve salmon production. The Upper Enterprise Kokanee quota will continue to be requested, but it will be diverted to higher priority waters (i.e. Fish Lake) if production cannot meet all requests.

RECOMMENDATIONS

1. Maintain annual stocking requests of 20,000 advanced fingerling RBT and 10,000 fingerling Kokanee salmon at Upper Enterprise Reservoir.
2. Conduct trend net surveys every two years in the spring to monitor trout and salmon. Conduct electrofishing every two to three years in order to more effectively monitor smallmouth bass.

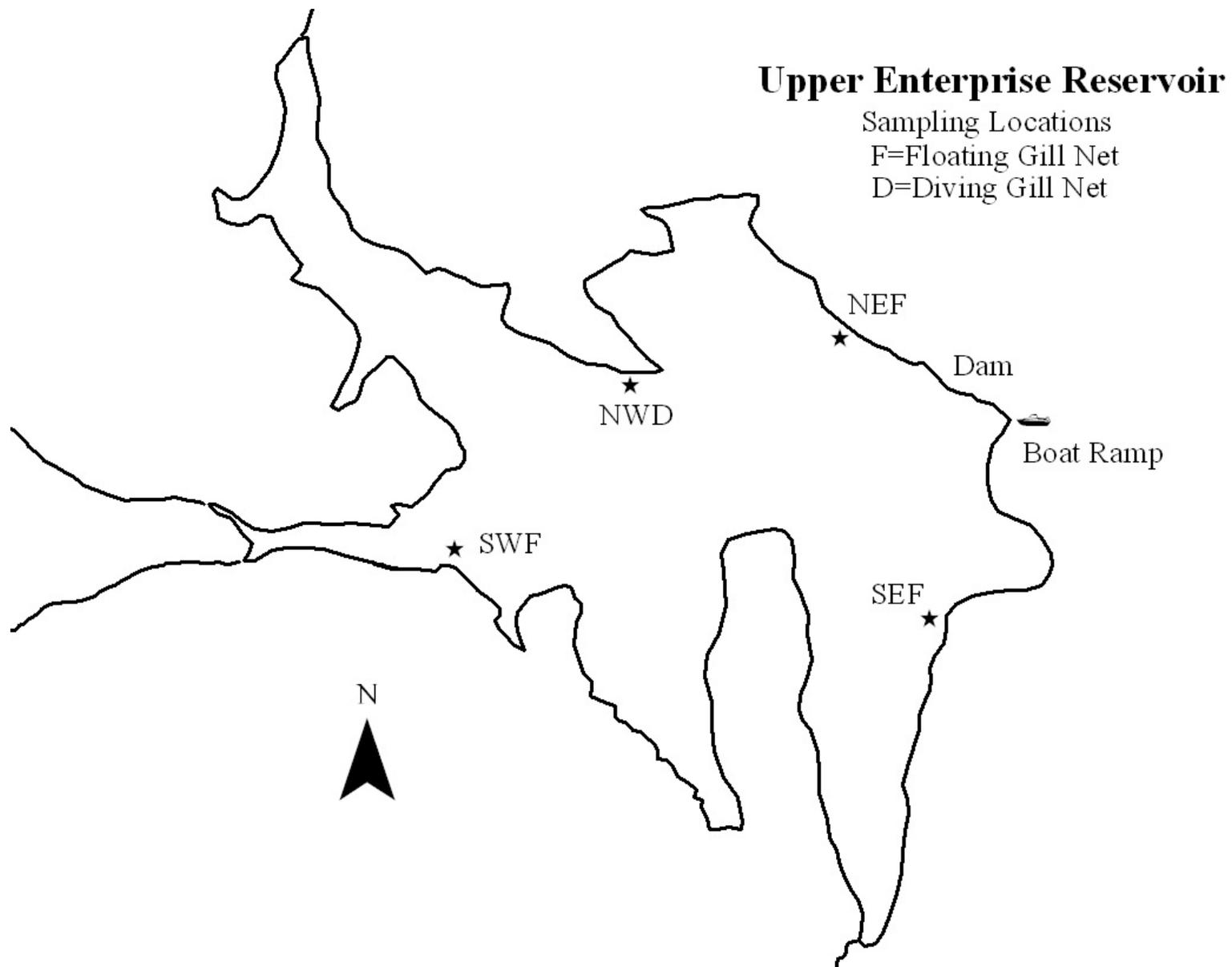


Figure 1. Locations of gill nets set at Upper Enterprise Reservoir during trend net surveys.

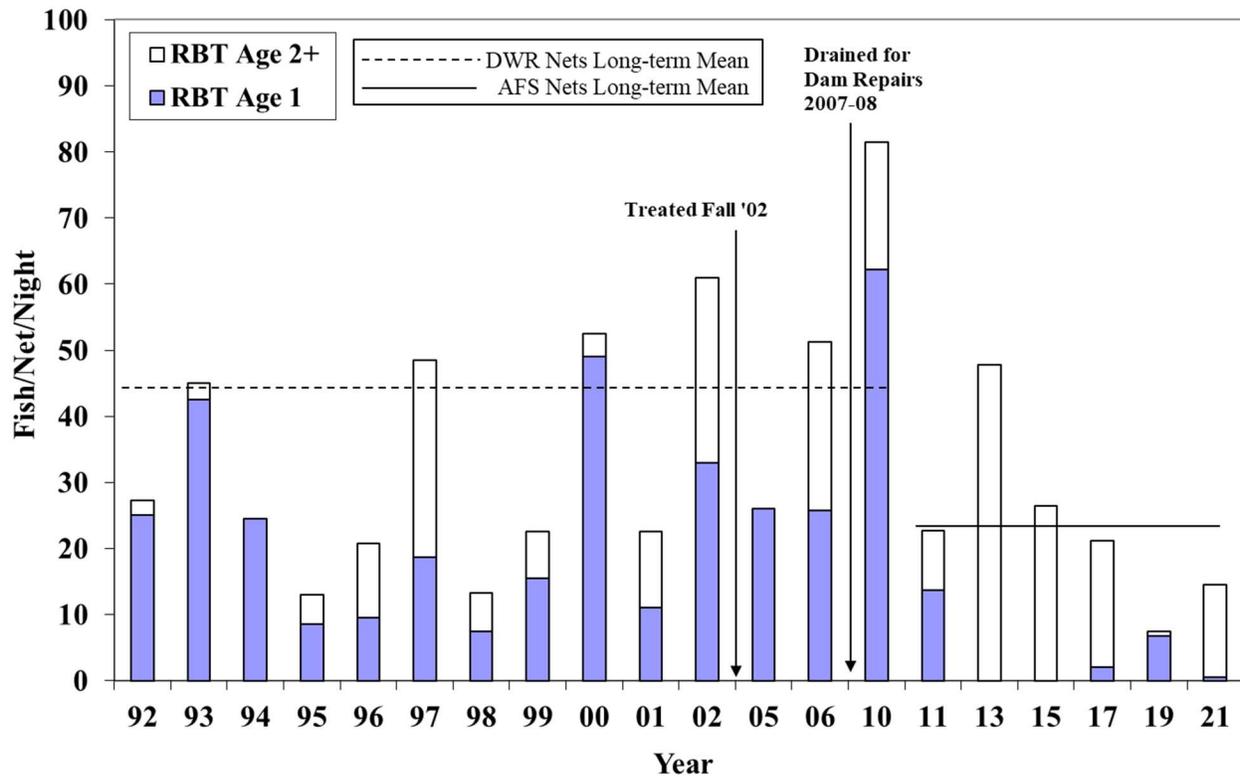


Figure 2. Trout catch rate during spring trend net surveys at Upper Enterprise Reservoir, 1992-2021. Cohorts were indistinguishable in 2013.

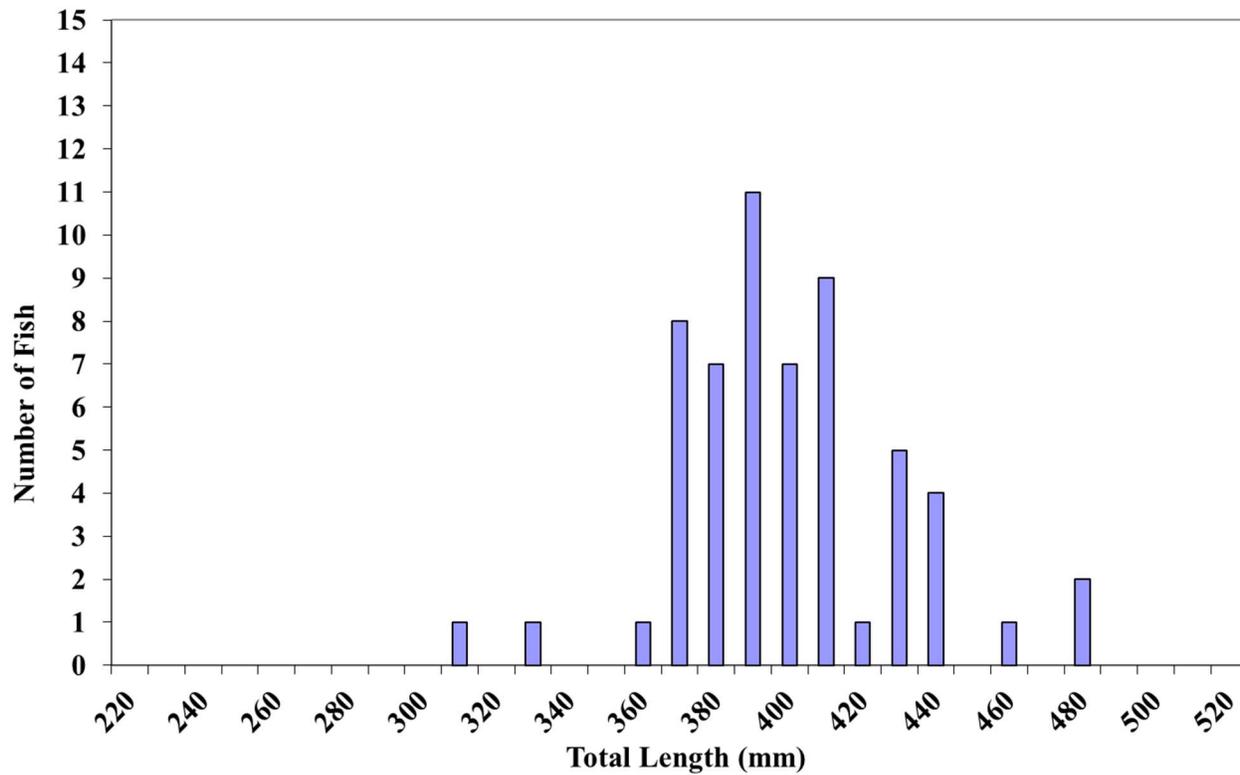


Figure 3. Length distribution of rainbow trout collected at Upper Enterprise Reservoir on April 1, 2021.

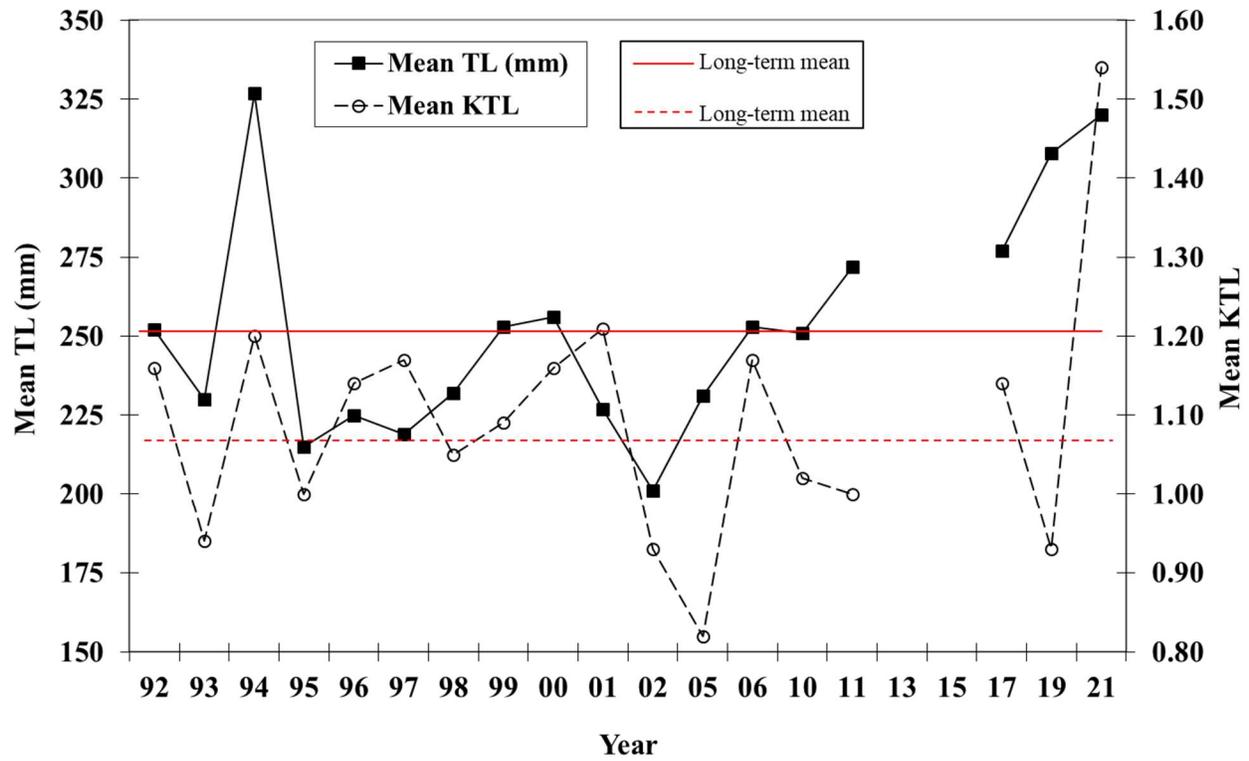


Figure 4. Mean total length (mm) and condition (K_{TL}) of rainbow trout stocked the previous year and collected during trend net surveys in Upper Enterprise Reservoir, 1992-2021.



Figure 5. Rainbow trout collected at Upper Enterprise Reservoir on April 1, 2021.

Table 1. Record of trout and salmon stocking in Upper Enterprise Reservoir for the five years prior to the 2021 trend net survey.

Year	Rainbow Trout		Cutthroat Trout		Kokanee Salmon	
	Number	Size (in)	Number	Size (in)	Number	Size (in)
2016	24,367	6.5	5,137	1.8		
2017	24,236	6.6	5,076	2.1		
2018	25,009	5.0	5,343	2.1		
2019	29,411	5.2				
2020	26,813	5.8			5,038	3.0
<i>2021 Quota</i>	<i>20,000</i>	<i>5.0</i>	<i>---</i>	<i>---</i>	<i>10,000</i>	<i>3.0</i>

Table 2. Summary of the results from the 2021 trend net survey at Upper Enterprise Reservoir.

Water:	Upper Enterprise Reservoir			Catalog #:	VI 786B									
Date Set:	3/31/2021			Weather:	Clear, light breeze									
Date Pulled:	4/1/2021			Water Temp:	45 F									
# Nets:	3 Floaters, 1 Diver			Collectors:	M. Hadley, volunteers									
Summary for Sport Fish														
Species	N	Total Weight (kg)	fish per net/night	Total Length (mm)			Weight (g)			Condition (Ktl)			% total catch	% total biomass
				Mean	SE	Range	Mean	SE	Range	Mean	SE	Range		
Rainbow Trout	58	43.97	14.50	396	4.02	310-480	758	20.4	475-1130	1.21	0.02	0.92-1.59	100.00	100.00
RBT 2020	2	1.01	0.50	320	10.0	310-330	504	28.5	475-532	1.54	0.06	1.48-1.59	3.45	2.29
RBT 2019 & prev	56	42.97	14.00	399	3.66	360-480	767	20.1	547-1330	1.20	0.02	0.92-1.52	96.55	97.71

