



**PIUTE RESERVOIR
2020 TREND NET SURVEY**

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BACKGROUND: The sport fishery in Piute Reservoir has been limited historically by periodic water fluctuation and dense populations of Utah suckers and Utah chubs. While stocked trout have at times performed well in the reservoir, poor survival and growth have been much more typical over the long-term. While water users avoid completely draining Piute Reservoir so as to avoid shunting large amounts of sediment downstream, the minimum pool left does not provide consistently sufficient conditions for successful survival of a trout fishery and may not support any kind of sport fishery. Just during the past decade, the reservoir was mostly drained at least four times (2014, 2015, 2016, 2018). Coinciding with the poor water conditions of the 2010s, Utah suckers came to dominate the Piute Reservoir fish community, comprising up to 99% of fish biomass. This dominance persisted despite repeated reduction to the minimum reservoir level over several years and a rotenone treatment in 2014.

The last ten years have exemplified the major challenges to maintaining a sport fishery in Piute Reservoir, especially through traditional trout stocking practices. Conditions are unlikely to change in the future because Sevier River Water Users have made a concerted effort over the last 15 years to maintain minimum water levels to sustain the trout fishery in Otter Creek Reservoir, located upstream. This effort is fully supported by Utah Division of Wildlife Resources because Otter Creek Reservoir has consistently shown the ability to maintain a high quality fishery as long as extreme water fluctuation is avoided during most years. Piute Reservoir has not shown the same ability due to the presence of Utah suckers and, likely, other environmental conditions like temperature and turbidity. These factors, combined with reduced holding capacity at Utah's fish hatcheries, led to the cancellation of regular rainbow trout (RBT) stocking in Piute Reservoir after 2017 (Table 1). Excess trout produced by hatcheries have been stocked when available. Attempts to establish a population of wipers that could prey on suckers and chubs were also hampered by variable water levels, leading to eventual cancellation of that stocking (Table 2). An annual quota of 50,000 fingerling channel catfish was added in 2019 because regional staff felt that this could be the only species currently available for introduction that might be able to persist in Piute Reservoir under current circumstances.

The fishery at Piute Reservoir has historically been monitored annually through trend net surveys, though the monitoring schedule was shifted to every other year beginning in 2015. Since 2011, a new net design recommended by the American Fisheries Society (AFS) has been utilized in sampling at Piute Reservoir. The random placement of differing mesh sizes is intended to avoid "leading" fish into the net and, thus, reduce bias in the net catch. In most waters catch rate trends observed since 2011 indicate that the AFS nets catch about 50% fewer trout and chubs than did the DWR nets, though the reduced catches are still sufficient to provide measures of population dynamics. At Piute Reservoir, the AFS net catch rate for trout is about 33% that of the DWR style nets, though this time period (2011-2020) also corresponds to a known reduction in trout survival due to water fluctuation and rough fish competition. By contrast, AFS net catch rate for Utah chubs and Utah suckers has been about double that of the old style nets, though this increase likely has more to do with increased abundance than differences in catchability.

METHODS: Six experimental gill nets (four floating and two diving) were set in Piute Reservoir on April 8, 2020, 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 been consistent for more than 20 years of sampling (Figure 1). Fish caught were removed from nets on the morning of April 9 and all sport fish were measured to the nearest mm

(total length) and weighed to the nearest gram. Body condition was measured by the calculation of Fulton's K_{TL} (generated from total length [TL]):

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

Non game fish caught in each net were counted and a sub sample of lengths and weights was recorded.

RESULTS: The nets caught 60 Utah suckers in Piute Reservoir on April 9, 2020, representing 51% of the total catch (Table 3) and 70% of the total biomass sampled (Fig. 2). The sucker catch was dominated by large adults ranging from 450 mm to 540 mm (Fig. 3). The catch rate of Utah suckers (10 per net-night) was similar to the long-term mean caught by AFS nets since 2011 (Table 4, Fig. 4). Utah chubs have been relatively absent from the catch since Utah suckers came to dominate the catch and biomass in 2014 and none were observed in 2020.

Fifty-seven trout were collected at Piute Reservoir in 2020, for a catch rate of 9.5 trout per net-night (Table 3). This was the highest catch observed since 2015 (Table 4, Fig. 5). All but one of the trout caught were RBT (Fig. 6). RBT stocked at four inches in June 2019 made up 84% of the trout catch (Fig. 7) and averaged 300 mm in TL, 369 g in weight, with a mean condition (K_{TL}) of 1.35 (Table 3). The 2019 cohort grew at a mean rate of 0.72 mm/day since stocking. Mean size of first year RBT was similar to that observed during surveys in the last decade (Fig. 8), even though the 2019 cohort was stocked at a smaller size and months earlier than the previous quota. Condition and growth rate were among the highest ever recorded in over 30 years of regular monitoring (Table 4). The remaining RBT sampled were stocked prior to 2019 and averaged 533 mm (21.0 in), 1,988 g (4.4 lbs), with a mean K_{TL} of 1.30 (Table 3, Fig. 6). All values were the highest means ever observed among older RBT cohorts (Table 4). The largest RBT sampled measured 575 mm (22.6 in) and weighed 2,790 g (6.1 lbs) (title page). One brown trout was collected, measuring 390 mm (15.4 in) and weighing 575 g (1.3 lbs).

DISCUSSION: Utah sucker catch was slightly lower at Piute Reservoir in 2020 than during recent years (Fig. 4). Improved water level in 2019 promoted improved feeding and growth for RBT and fish stocked at four inches in June 2019 exhibited exceptional survival that would not typically be expected for small fish stocked in the summer. Trout remain at a low density, though the limited fish available to anglers do represent a high-quality opportunity as long as they persist. Reservoir capacity reached 7% (5,000 ac-ft) in September 2020, so it is possible that some RBT were lost, though the larger fish observed in 2020 showed that some fish have been able to thrive even during frequent drawdown. Opportunistic stocking of excess trout will continue when conditions are favorable.

Trend net surveys conducted at DMAD and Gunnison Bend reservoirs in recent years have found that white crappie are thriving in marginal environmental conditions – high turbidity, frequent water fluctuation, little to no aquatic vegetation – while also competing with a high density of carp. In addition, these fish are providing a valuable forage for other desirable sport fish. These observations have prompted regional staff to investigate their introduction to other struggling fisheries. Introduction of white crappie has been requested for Piute Reservoir in 2021, both through transfer from the Delta reservoirs as well as purchase of fingerlings (if a source can be secured).

RECOMMENDATIONS:

1. Stock an annual quota of 50,000 fingerling (3-inch) channel catfish in Piute Reservoir.
2. Introduce white crappie to Piute Reservoir in 2021.
3. Stock excess trout when available from hatcheries and when conditions are favorable.
4. Conduct trend net surveys annually to evaluate channel catfish stocking and monitor density of Utah suckers. Conduct fyke net surveys in the fall to monitor establishment of white crappie.
5. Explore other opportunities for stocking or introducing warm and cool water fish species.

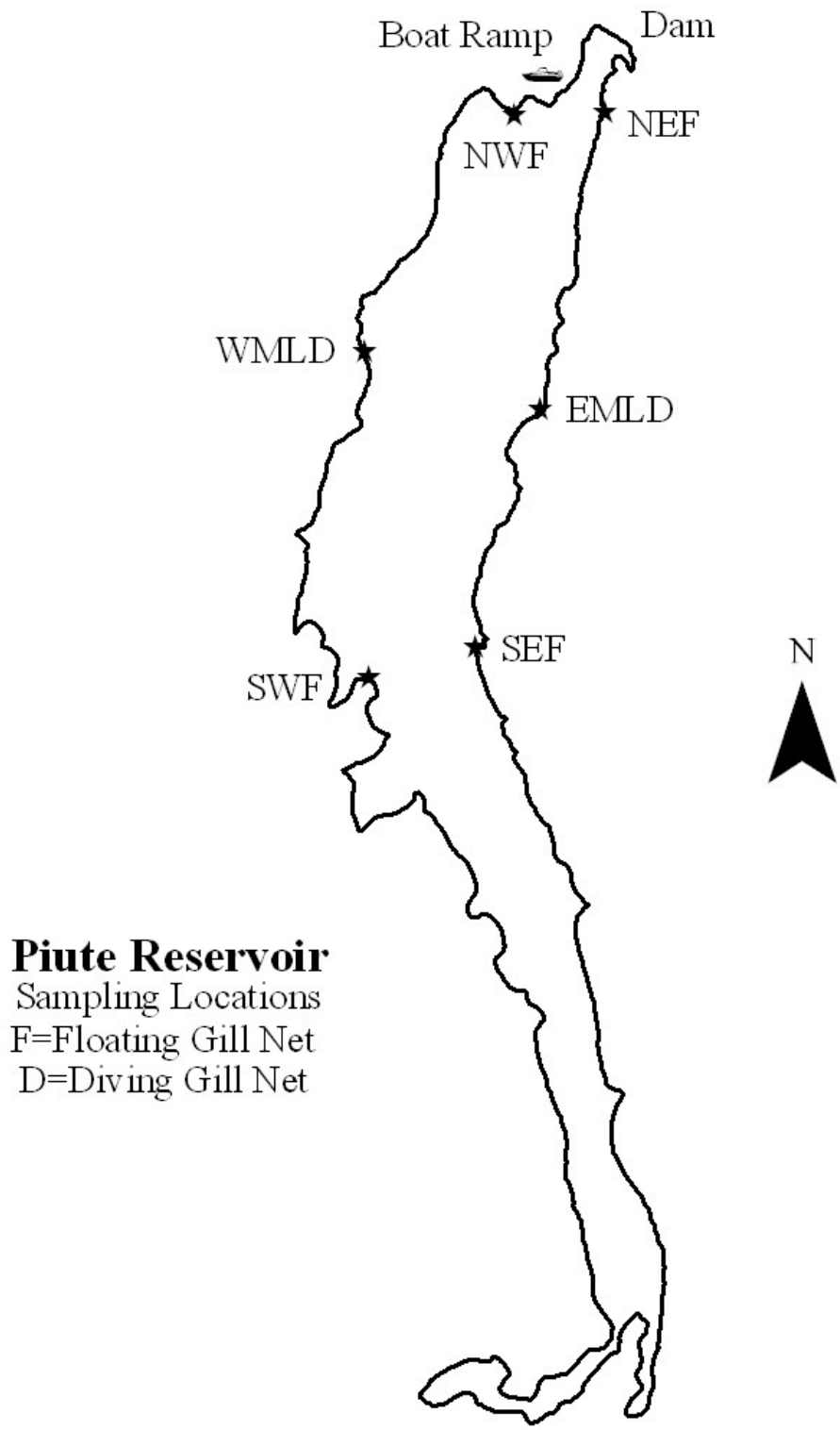


Figure 1. Locations of gillnets set at Piute Reservoir during the 2020 trend net survey.

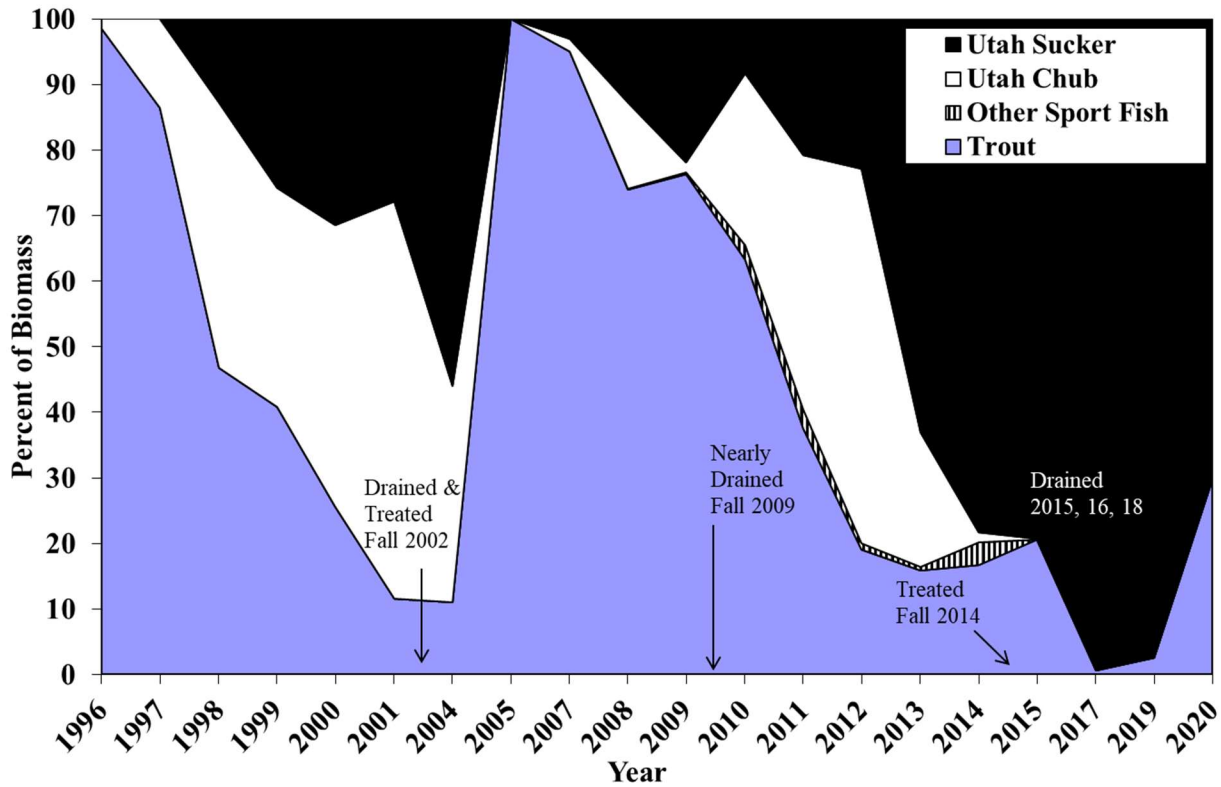


Figure 2. Relative biomass of fish species collected during trend net surveys at Piute Reservoir, 1996-2020.

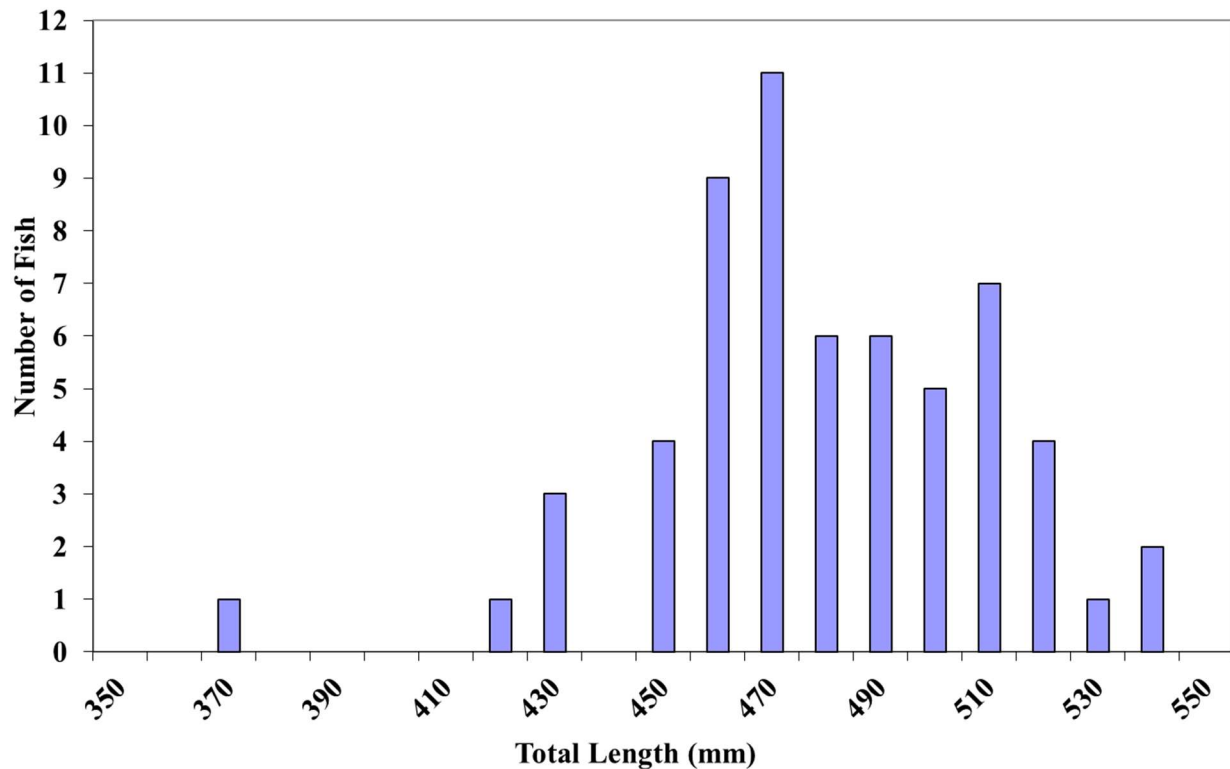


Figure 3. Length distribution of Utah suckers collected at Piute Reservoir on April 9, 2020.

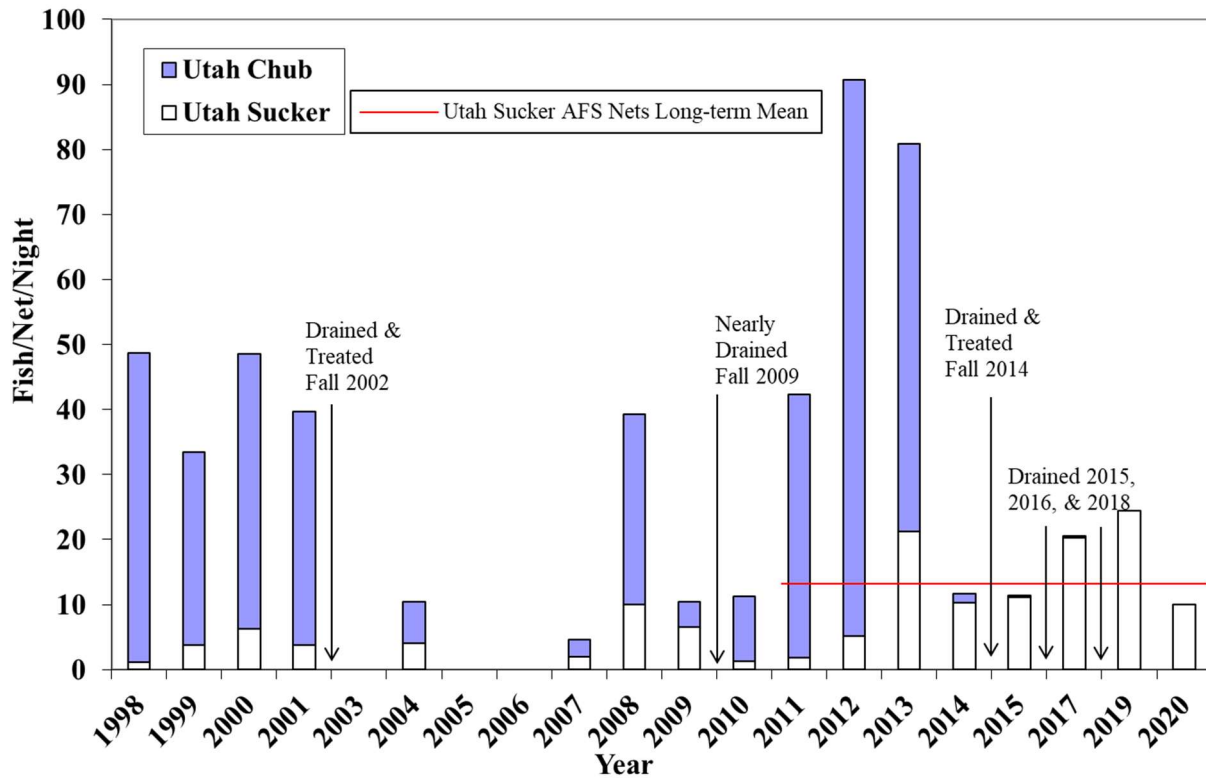


Figure 4. Catch rate of Utah chubs and Utah suckers during trend net surveys at Piute Reservoir, 1998-2020.

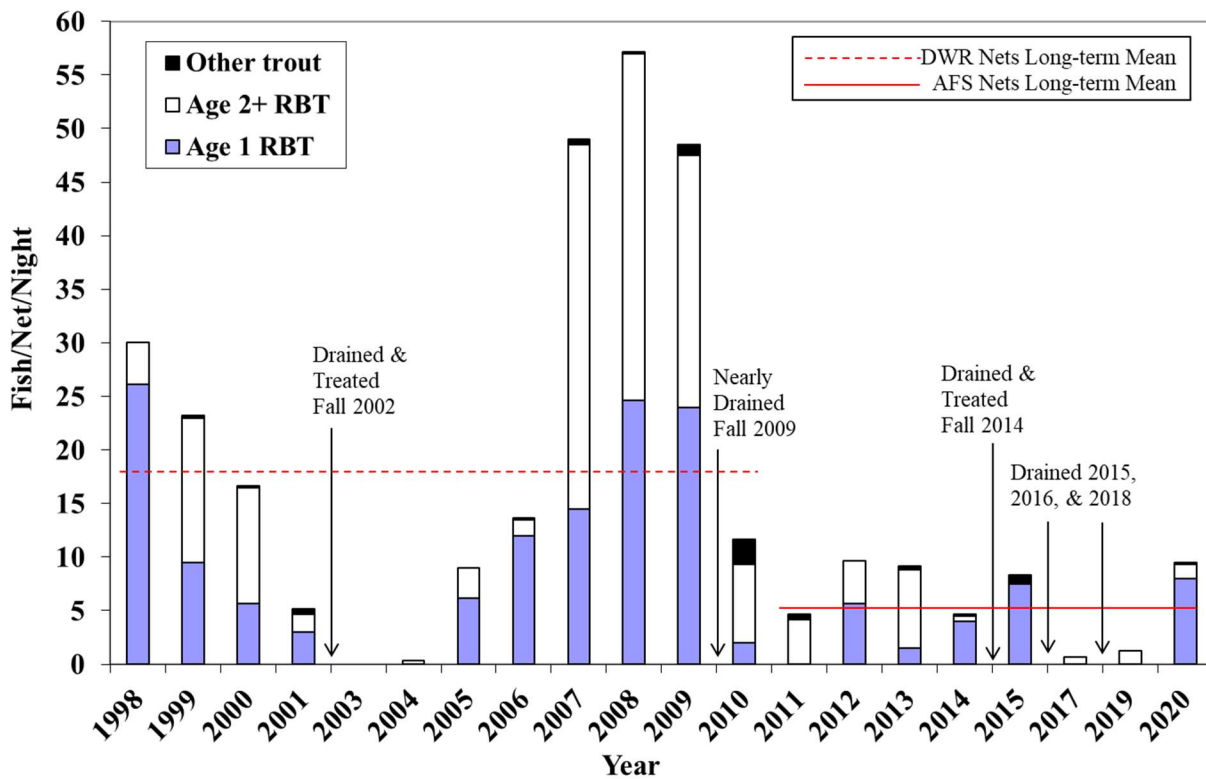


Figure 5. Trout catch rate during trend net surveys at Piute Reservoir, 1998-2020.



Figure 6. Rainbow trout collected at Piute Reservoir on April 9, 2020.

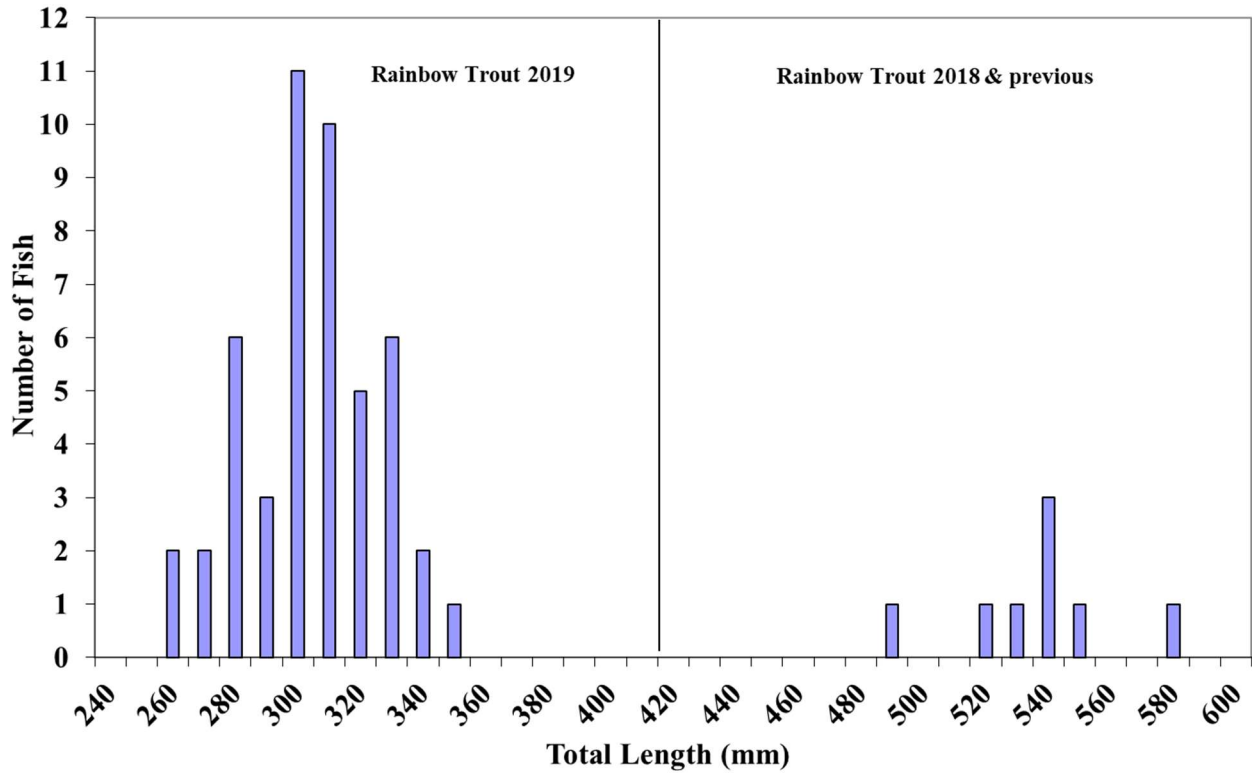


Figure 7. Length distribution of rainbow trout collected at Piute Reservoir on April 9, 2020.

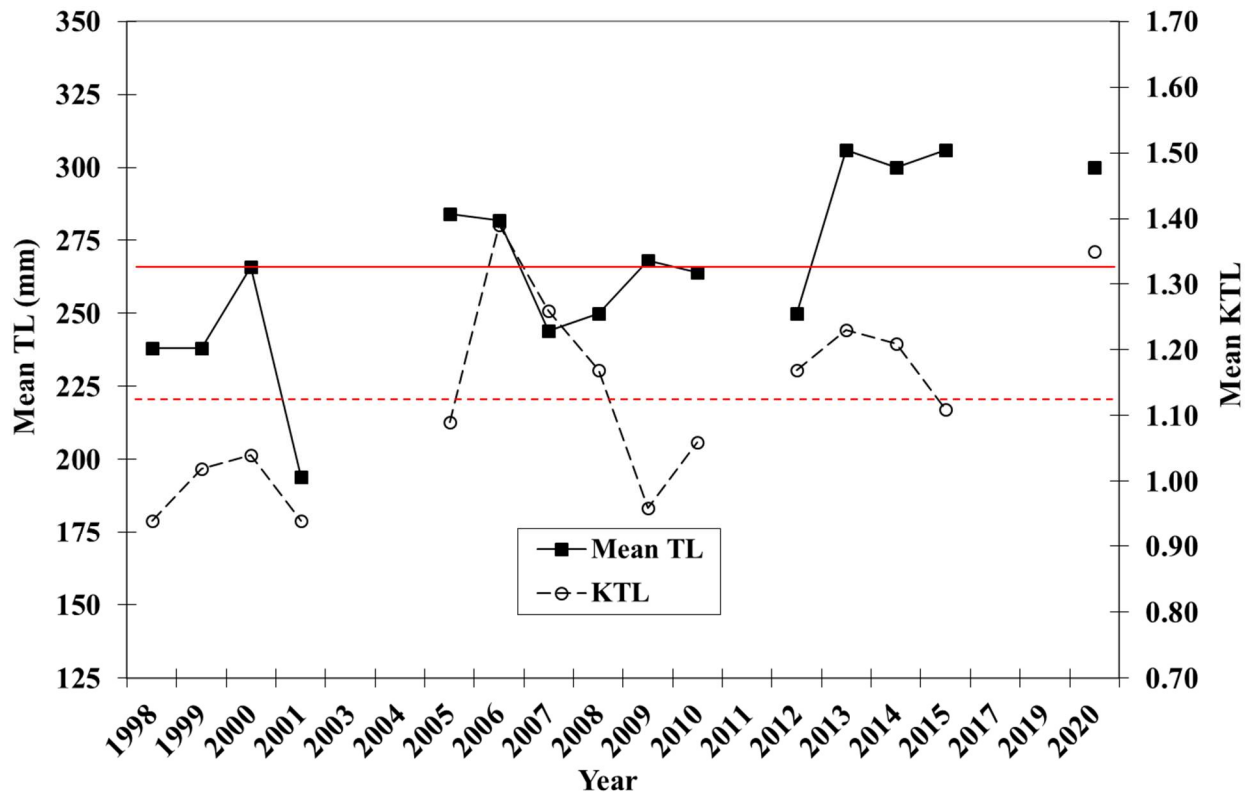


Figure 8. Mean total length (mm) and condition (K_{TL}) of rainbow trout stocked the previous year and collected during trend net surveys at Piute Reservoir, 1998-2020.

Table 1. Record of trout stocking in Piute Reservoir for the five years prior to the 2020 trend net survey. Bold text identifies the regularly scheduled annual quota.

<u>Year</u>	<u>Rainbow Trout</u>			<u>Cutthroat Trout</u>		<u>Brown Trout</u>		<u>Total Excess</u>	
	<u>Number</u>	<u>Size (in)</u>	<u>Timing</u>	<u>Number</u>	<u>Size (in)</u>	<u>Number</u>	<u>Size (in)</u>	<u>Rainbow</u>	<u>Other</u>
2015	39,010	6.5	Spring						
	42,500	3.1	Spring			518 ^b	13.2	95,580	518
	14,070	7.3	Spring						
	101,297	7.6	Fall						
2016	0								
2017	50,004	7.0	Spring					50,004	
	81,288	7.2	Fall						
2018	672 ^b	14.7	Spring			381 ^b	17.2	925	381
	253 ^b	6.8	Spring						
2019	68,329	3.7	Summer					68,329	
2020 Quota	---	---	---	---	---	---	---	---	---

^a – Bear Lake cutthroat trout.

^b – Excess brood.

Table 2. Record of warm water fish stocking in Piute Reservoir for the five years prior to the 2020 trend net survey.

<u>Year</u>	<u>Wiper</u>		<u>Channel Catfish</u>	
	<u>Number</u>	<u>Size (in)</u>	<u>Number</u>	<u>Size (in)</u>
2015				
2016	23,214	1.5	187,556	0.5
2017	7,548	2.1		
	1,870	3.4		
2018				
2019			49,999	3.3
2020 Quota	---	---	50,000	3.0

Table 3. Summary of the results from the 2020 trend net survey at Piute Reservoir.

Water:	Piute Reservoir						Catalog #:	VI 404												
Date Set:	4/8/2020						Time:	14:00						Weather:	Rain, wind, snow					
Date Pulled:	4/9/2020						Time:	9:00						Water Temp:	46 F					
# Nets:	4 Floaters, 2 Divers						Collectors:	M. Hadley, J. Hudson, R. Hepworth, B. Griffin												
Summary for Sport Fish																				
Species	N	Total	fish per net/night	Total Length (mm)			Weight (g)			Condition (KTL)			% total catch	% total trout	% total biomass	% trout biomass				
		Weight (kg)		Mean	SE	Range	Mean	SE	Range	Mean	SE	Range								
Brown Trout	1	0.58	0.17	---	---	390	---	---	575	---	---	0.97	0.85	1.75	0.50	1.68				
Rainbow Trout	56	33.63	9.33	333	11.4	252-575	601	79.2	209-2790	1.34	0.02	0.99-1.61	47.86	98.25	29.29	98.32				
RBT 2019	48	17.73	8.00	300	3.06	252-341	369	12.0	209-575	1.35	0.02	0.99-1.61	41.03	84.21	15.44	51.82				
RBT 2018 & prev	8	15.91	1.33	533	8.86	488-575	1988	137	1488-2790	1.30	0.04	1.16-1.50	6.84	14.04	13.85	46.50				
Trout	57	34.21	9.50	334	11.2	252-575	600	77.8	209-2790	1.34	0.02	0.97-1.61	48.72	---	29.79	---				
Summary for Non-Sport Fish																				
Species	N	Total	fish per net/night	% total catch	% total biomass	Total Length (mm)														
		Weight (kg)				Range														
Utah Sucker	60	80.61	10.00	51.28	70.21	365-538														

Table 4. Trend net survey results at Piute Reservoir, 1981-2010.

Date	Net Sets		Total Trout	Trout per net-night	Rainbow trout stocked 2 yrs. or more			Rainbow trout stocked previous year			Growth (mm/day)	Total Nongame per net-night	Comments
	Flo	Div			Mean TL (mm)	Mean W (g)	Mean KTL	Mean TL (mm)	Mean W (g)	Mean KTL			
24-Apr-81	2	1	10	3								19	
22-Apr-82	2	0	14	7								6	
11-Mar-83	5	0	17	3								120	Treated Fall 1985
17-Apr-87	3	1	75	19				343	550	1.31	0.58	0.75	Algae in nets
26-Apr-88	4	0	56	14	495	1450	1.19	261	236	1.34	0.65	0.25	
18-Apr-89	3	1	80	20	425			290				11	
18-Apr-90	3	1	73	18	424	951	1.22	281	292	1.26		72	Drained & treated 8/90
17-Apr-91	3	0	7	2	454	952	0.97	256	135	0.81	0.47	1.3	Wind problems; treated '91
14-Apr-93	6	0	50	8				296	331	1.25		0	Algae in nets
30-Mar-94	6	0	173	29	478	857	1.13	268	270	1.36	0.45	3.2	Yearling data from fall st.
16-Mar-95	6	0	103	17	407	696	1.03	222	123	1.11	0.31	19	Earlier netting date
3-Mar-96	6	0	92	15	353	498	1.12	235	147	1.1	0.41	0.5	" " "
17-Mar-97	6	0	82	14	377	563	0.91	227	107	0.91	0.19	8.2	" " "
23-Mar-98	6	0	180	30	322	313	0.89	238	128	0.94	0.26	49	" " "
29-Mar-99	4	0	93	23	331	361	0.99	238	141	1.02	0.30	34	" " "
27-Mar-00	6	0	99	17	338	372	0.95	266	198	1.04	0.45	49	" " "
28-Mar-01	6	0	31	5	372	476	0.88	194	133	0.94	0.50	40	
1-Apr-03	6	0	0	0								0	Treated Fall 2002
5-Apr-04	6	0	2	0.33	327	377	1.15					9	drained previous summer
6-Apr-05	6	0	54	9	359	547	1.17	284	256	1.09	0.48	0	very low previous summer
11-Apr-06	6	0	82	14	462	1186	1.20	282	320	1.39	0.64	0	
3-Apr-07	5	1	294	49	412	899	1.33	244	187	1.26	0.50	4.7	
8-Apr-08	4	2	343	57	403	754	1.13	250	191	1.17	0.48	39	
7-Apr-09	4	2	291	49	410	675	0.95	268	188	0.96	0.40	11	nearly drained fall 09
8-Apr-10	4	2	70	12	343	356	0.84	264	196	1.06	0.50	11	

Table 4 (contd). Trend net survey results at Piute Reservoir, 2011-2020.

Date	Net Sets		Total Trout	Trout per net-night	Rainbow trout stocked 2 yrs. or more			Rainbow trout stocked previous year			Growth (mm/day)	Total Nongame per net-night	Comments
	Flo	Div			Mean TL (mm)	Mean W (g)	Mean KTL	Mean TL (mm)	Mean W (g)	Mean KTL			
6-Apr-11	4	2	28	5	378	551	0.93					42	start using AFS nets
11-Apr-12	4	2	58	10	407	780	1.14	250	196	1.17	0.51	91	
12-Apr-13	4	2	55	9	385	680	1.18	306	350	1.23	0.55	81	
9-Apr-14	4	2	28	5	464	1128	1.10	300	329	1.21	0.52	12	
1-Apr-15	4	2	50	8				306	329	1.11	0.61	11	drained, treated fall 2014
6-Apr-17	4	2	4	1	306	247	0.83					21	drained 2015, 2016
3-Apr-19	2	2	5	1	395	647	1.04					25	drained 2018
8-Apr-20	4	2	57	10	533	1988	1.30	300	369	1.35	0.72	10	
	Long-term mean			15	394	678	1.06	265	228	1.12	0.43	24	
	AFS Nets (since 2011)			6				AFS Nets (since 2011)				36	
	DWR nets (pre-2011)			17				DWR nets (pre-2011)				20	
								Ut Sucker AFS Nets (since 2011)				13	