



**KOOSHAREM RESERVOIR
2020 TREND NET SURVEY**

**Report prepared by:
Mike Hadley
Regional Aquatics Biologist**

BACKGROUND: Koosharem Reservoir is a small, relatively shallow irrigation reservoir. There is no conservation pool in the reservoir and periodic, severe draw-downs have historically limited the survival of stocked trout. In addition, competition between trout and Utah chubs is a chronic problem and the reservoir has been chemically treated periodically to reduce chub densities, the last time in 2002. Complete removal of chubs has been difficult to achieve due to the presence of spring complexes in the valley upstream of the reservoir. Despite these limitations, trout growth has been exceptional during years when water conditions are good and chub numbers are low. Koosharem Reservoir was historically managed as a rainbow trout (RBT) fishery though, in recent years, attempts have been made to add trout species that would utilize Utah chubs as forage (Table 1), including Bear Lake cutthroat trout (BLCT), tiger trout, and splake. In addition to this stocking, a limited number of wild trout (brook, RBT, and RBT x BLCT hybrids) enter the reservoir from tributary streams.

The fishery in Koosharem Reservoir is regularly monitored through trend net surveys, most recently conducted every two years. Since 2011, a new net design recommended by the American Fisheries Society (AFS) has been employed in trend net surveys at most Southern Region waters, including Koosharem Reservoir. This design was intended to reduce catch bias generated by graduated nets, which “lead” fish into the net. In most waters where they have been deployed, the AFS-style nets have caught about 50% of the trout and chubs when compared to the older style nets that were used by UDWR for many years.

Koosharem Reservoir was drained for several months in fall 2018 while repair work was conducted on the dam. Due to this draining the scheduled 2019 trend net survey was postponed to 2020.

METHODS: Three experimental gill nets (two floating and one diving) were set in Koosharem Reservoir on April 21, 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 many years (Figure 1). Fish caught were removed from nets on the morning of April 22 and all 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]):

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

Results of the 2020 survey were compared with those from historic trend net surveys.

RESULTS: One floating net (EF) was removed from calculation of catch data because it was fouled by algae and grass and caught only two RBT. The remaining two nets caught 39 trout, for a catch rate of 19.5 fish per net-night (Table 2), the highest rate observed since 2008 (Table 3, Fig. 2). RBT made up the majority of the trout catch and included two distinct size classes (Fig. 3, 4). The smaller RBT were stocked at 138 mm (5.5 in) in March 2019 (Table 1). Mean size and growth of these fish compared favorably with historic values for RBT stocked the previous year in Koosharem Reservoir (Table 3), even though the requested quota has been increased to catchable-sized (10 in) fish in recent years. Most of the RBT collected were larger fish, averaging 446 mm (17.6 in) in TL, 1,158 g (2.6 lbs) in weight, with a mean condition (K_{TL}) of 1.30. All values were among the highest ever observed for older RBT. While some of these fish were likely stocked at 254 mm (10 in) in March 2019, mean size and abundance also indicate that many of the cohort likely survived the 2018 draining of the reservoir. RBT ranged in size up to 498 mm (19.6 in) and 1,445 g (3.2 lbs). The remainder of the trout catch consisted of four BLCT, four brook trout, and two tiger trout (Fig. 5). While one of the tiger trout was small

enough to have been stocked in 2019, the rest of these fish were likely stocked before the 2018 draining. Trout made up 91% of the net catch and 99% of the total biomass sampled (Fig. 6).

Only four small Utah chubs, spanning 148-179 mm, were observed in the 2020 survey. Chub catch rate has varied widely at Koosharem Reservoir (Fig. 7) and is heavily influenced by water level fluctuation.

DISCUSSION: Results of the 2020 trend net survey confirmed that the 2018 draining of Koosharem Reservoir shunted significant numbers of fish downstream. Utah chubs showed a particularly significant decrease and netting in spring 2019 showed that many moved all the way to Otter Creek Reservoir. Up to 75% of the trout caught in the 2020 survey survived the draining in the reservoir's tributaries, however. As has been observed many times in the past, trout exhibited favorable survival and growth during a period of low chub density.

Despite regular stocking of tiger and splake trout in Koosharem Reservoir (Table 1), very few of these hybrids were observed during recent trend net surveys. Both hybrids have exhibited the propensity of brook trout to ascend tributaries when sufficient flow is available (eg. Panguitch Lake, Mill Meadow Reservoir, Forsyth Reservoir). In addition, tiger trout showed a low return to monitoring surveys during a long period of stocking in Koosharem during the 2000s. It is possible that these hybrids are ascending the tributaries en masse – electrofishing sampling would be helpful in documenting the potential fate of these fish. Tiger trout stocked in Panguitch Lake eventually recruited to the lake once a critical density was reached in tributaries, so it is possible that tiger and splake trout will begin to re-enter Koosharem Reservoir in the coming years, though they may prefer to stay in the tributaries due to poor water conditions in the reservoir.

Because trout predators have experienced inconsistent recruitment in Koosharem Reservoir, a request was made after the last netting survey in 2017 to add sterile tiger muskies (northern pike x muskellunge) to the fishery. A quota secured for 2019 was diverted to other waters due to the 2018 draining but, after chubs were confirmed during the 2020 survey, 300 fingerling (1.2 in) tiger muskies were stocked. Unfortunately, the reservoir once again reached a very low level in fall 2020 and die-offs of trout and chubs were observed. Netting scheduled for spring 2021 will assess survival through this low water event.

2021 stocking quotas for Koosharem Reservoir have been set at 6,000 10-inch rainbow trout, 5,000 8-inch Bear Lake cutthroat trout, 2,000 5-inch splake, 2,000 6-inch tiger trout, and 1,000 3-inch tiger muskies. While inconsistency in a sport fishery typically does not justify so many quotas, Koosharem's potential for high growth has prompted managers to attempt several options to help the fishery achieve this potential more regularly. Netting surveys should be conducted annually so that these quotas can be evaluated – and cancelled, when appropriate – in a timely manner.

RECOMMENDATIONS:

1. Maintain requested stocking quotas of trout and tiger muskies in Koosharem Reservoir until they can be fully evaluated.
2. Conduct trend net surveys annually until predator quotas can be fully evaluated. Sample tributary streams with electrofishing equipment to assess potential exit from the reservoir by stocked trout.

Koosharem Reservoir

Sampling Locations

F=Floating Gill Net

D=Diving Gill Net

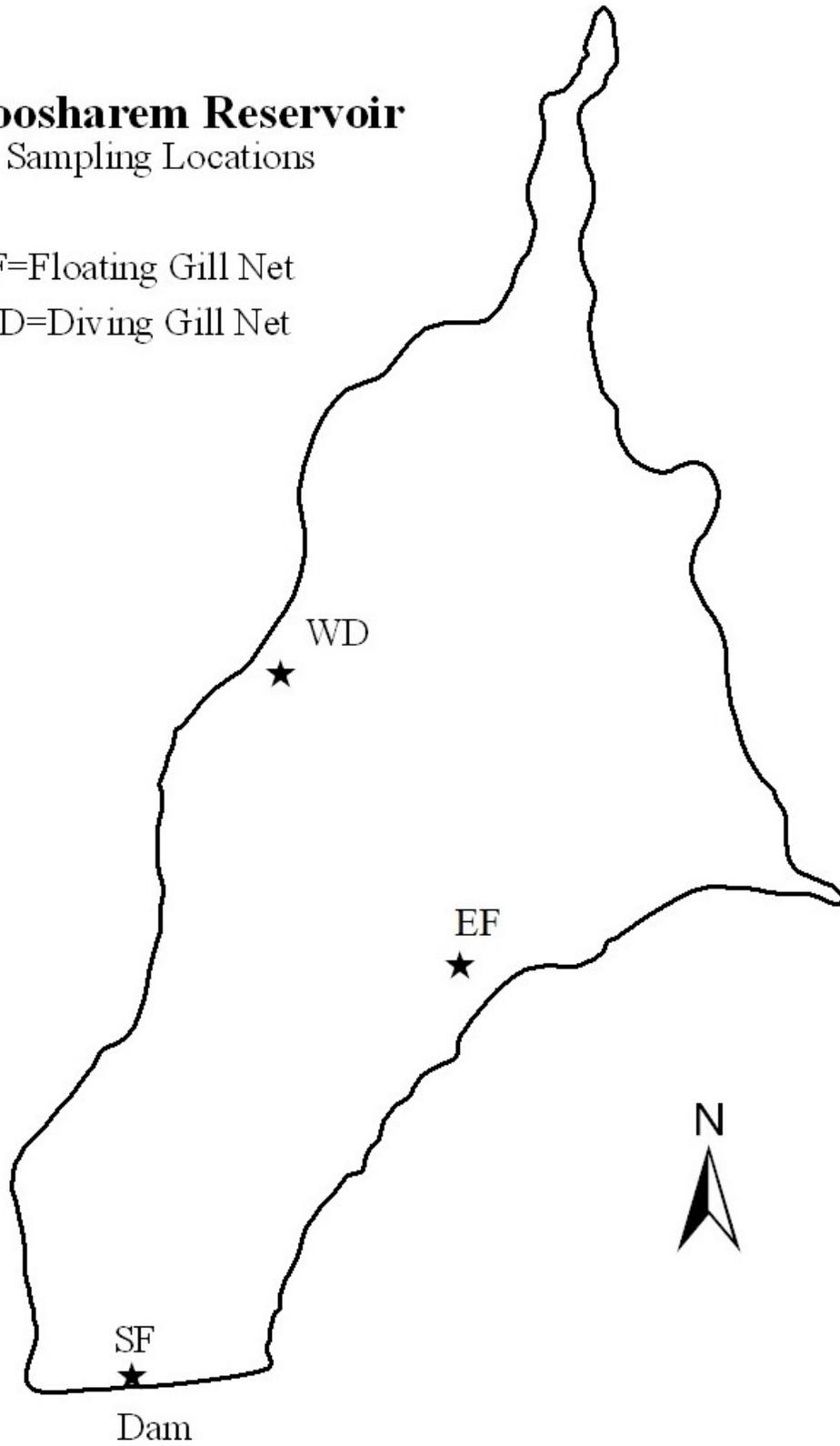


Figure 1. Locations of gill nets set at Koosharem Reservoir during the 2020 trend net survey.

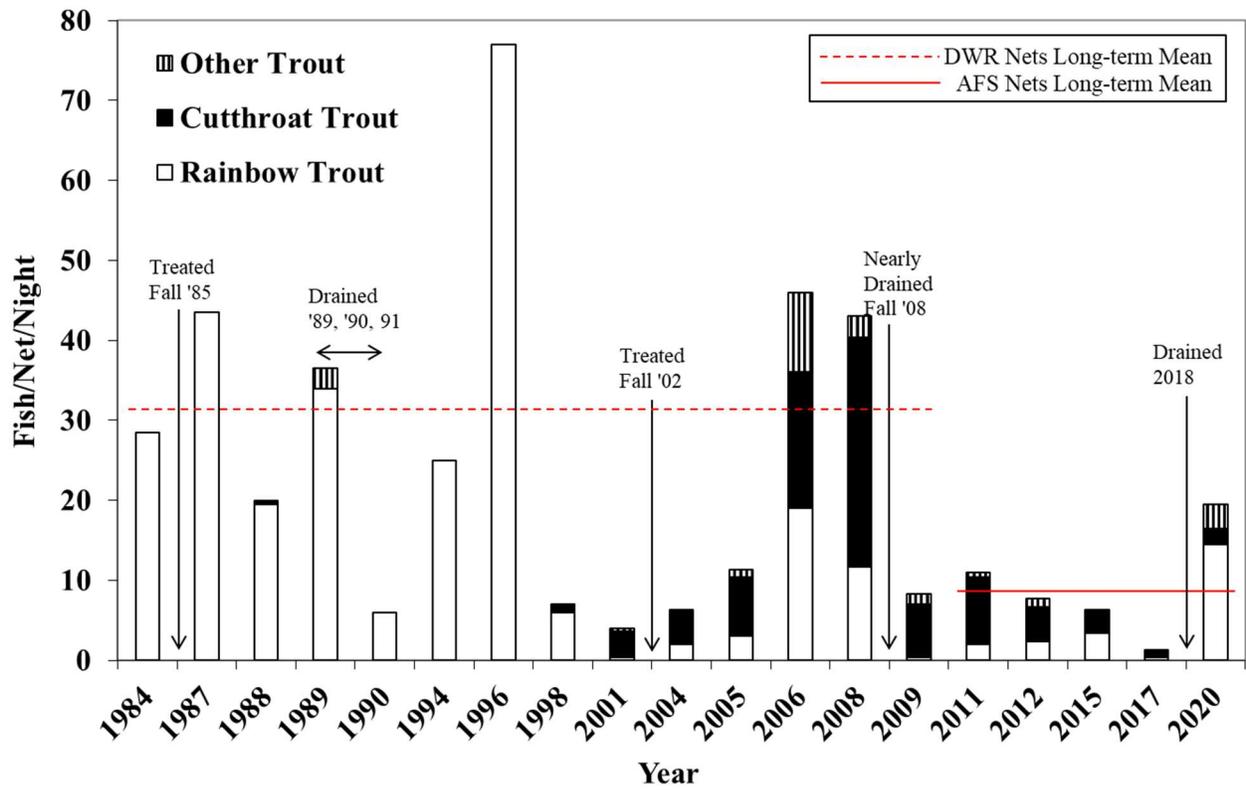


Figure 2. Trout catch rate during trend net surveys at Koosharem Reservoir 1984-2020.



Figure 3. Rainbow trout collected at Koosharem Reservoir on April 22, 2020.

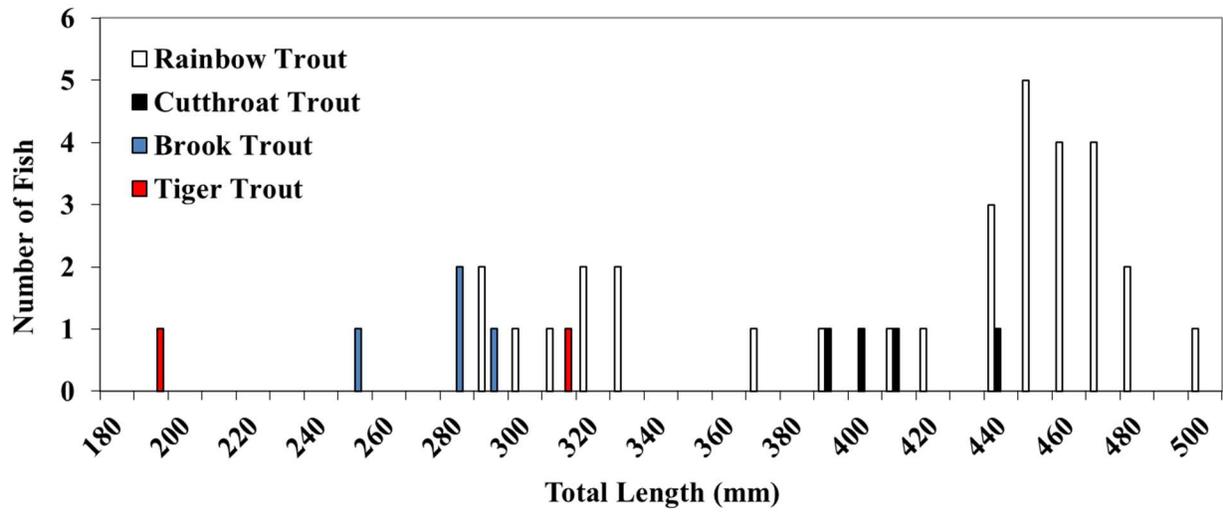


Figure 4. Length distribution of trout collected at Koosharem Reservoir on April 22, 2020.



Figure 5. Cutthroat trout (top left), hybrid rainbow-cutthroat trout (bottom left), and brook trout (right) collected at Koosharem Reservoir on April 22, 2020.

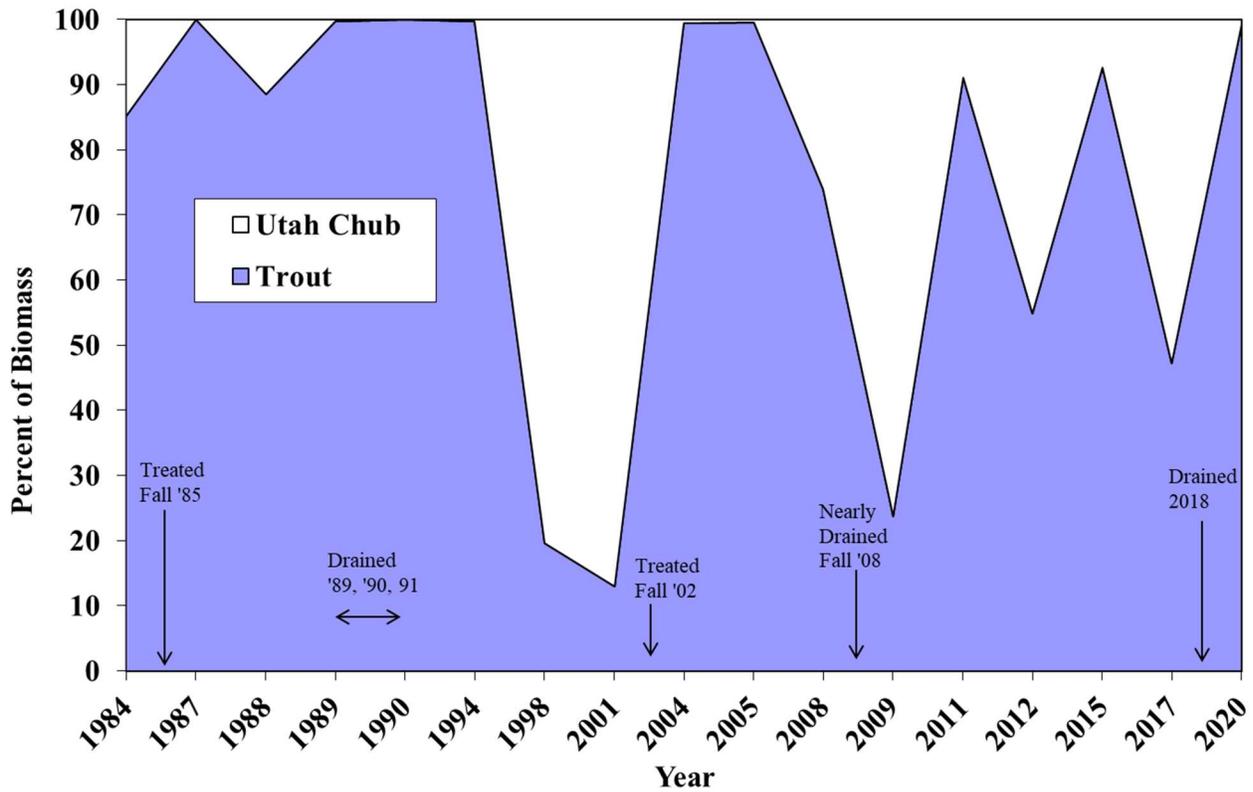


Figure 6. Relative biomass of trout and Utah chubs collected during trend net surveys at Koosharem Reservoir, 1984-2020.

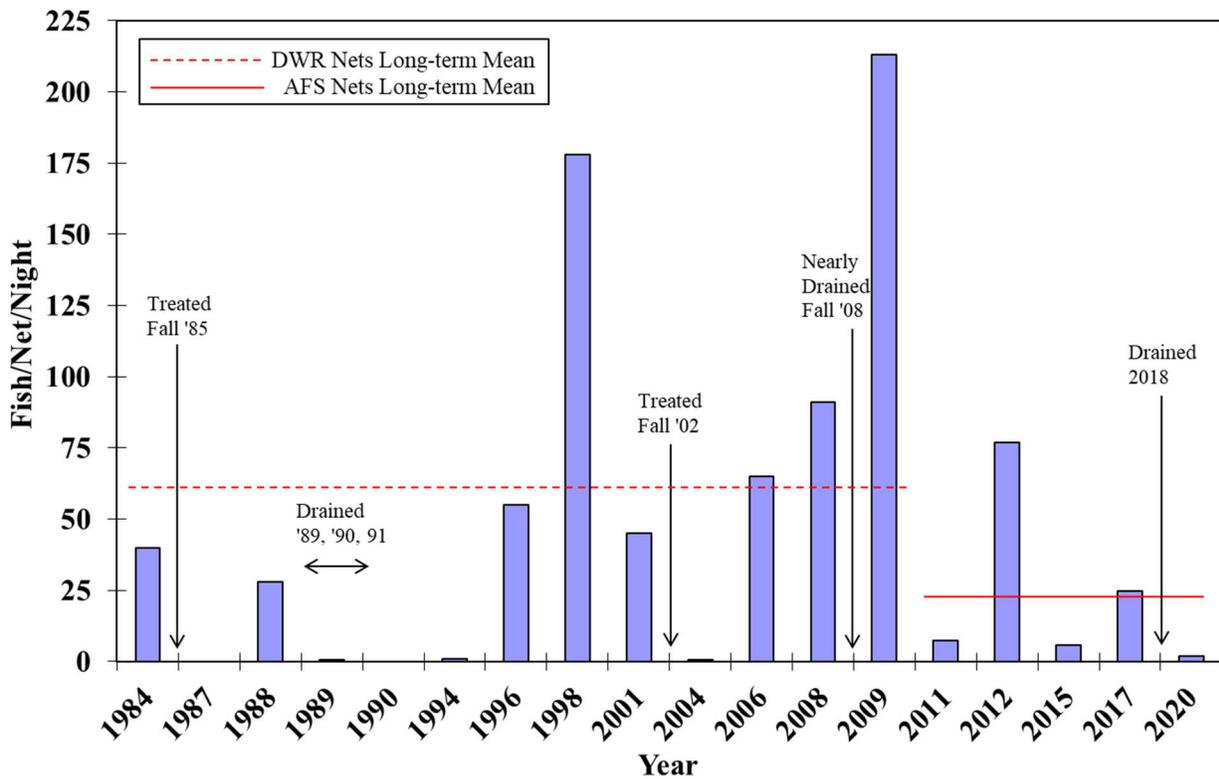


Figure 7. Utah chub catch rate during trend net surveys at Koosharem Reservoir, 1984-2020.

Table 1. Record of trout stocking in Koosharem Reservoir for the five years prior to the 2020 trend net survey.

<u>Year</u>	<u>Rainbow Trout</u>		<u>Cutthroat Trout</u>		<u>Tiger Trout</u>		<u>Splake Trout</u>		<u>Brook Trout</u>	
	<u>Number</u>	<u>Size (in)</u>	<u>Number</u>	<u>Size (in)</u>	<u>Number</u>	<u>Size (in)</u>	<u>Number</u>	<u>Size (in)</u>	<u>Number</u>	<u>Size (in)</u>
2015	3,024	10.2	8,054	7.9	2,000	6.0	1,699	3.5		
2016	6,007	8.8	8,580	8.3	2,025	7.1	2,026	3.6		
2017	6,011	8-9	8,010 16,000 ^a	8.2 4.5	1,994	6.0	2,012	3.4	2,114 ^a	2.5
2018	5,997	10.0	8,059	8.1	24,000 ^a	2.1	2,023	2.9		
2019	27,208 ^a 5,001	5.5 10.0	6,750	6.0	27,683 ^a	2.6				
<i>2020 Quota</i>	<i>6,000</i>	<i>10.0</i>	<i>6,600</i>	<i>8.0</i>	<i>2,000</i>	<i>6.0</i>	<i>2,000</i>	<i>5.0</i>	<i>---</i>	<i>---</i>

^a – Excess fish.

Table 2. Summary of the results from the 2020 trend net survey at Koosharem Reservoir.

Water:	Koosharem Reservoir			Catalog #:	VI 508												
Date Set:	4/21/2020	Time:	14:00	Weather:	Cold, fog												
Date Pulled:	4/22/2020	Time:	9:00	Water Temp:	46 F												
# Nets:	2 Floaters, 1 Diver; but one fouled			Collectors:	M. Hadley, J. Hudson, J. Swensen, M. Jensen												
Summary for Sport Fish																	
Species	N	Total Weight (kg)	fish per net/night	Total Length (mm)			Weight (g)			Condition (Ktl)			% total catch	% total trout	% total biomass	% trout biomass	
				Mean	SE	Range	Mean	SE	Range	Mean	SE	Range					
Rainbow Trout	29	27.38	14.50	411	12.0	290-498	946	72.4	241-1445	1.26	0.02	0.99-1.62	67.44	74.36	86.09	86.73	
Cutthroat Trout	4	3.05	2.00	405	10.8	385-435	761	71.8	659-974	1.14	0.04	1.07-1.23	9.30	10.26	9.57	9.64	
Brook Trout	4	0.87	2.00	272	8.61	248-289	217	24.6	159-278	1.07	0.03	1.02-1.15	9.30	10.26	2.73	2.75	
Tiger Trout	2	0.28	1.00	248	59.5	188-307	140	92.5	47-232	0.75	0.05	0.71-0.80	4.65	5.13	0.88	0.88	
RBT 2019	8	2.70	4.00	309	5.81	290-330	337	23.6	241-440	1.13	0.04	0.99-1.30	18.61	20.51	8.47	8.54	
RBT 2018 & prev	21	26.64	10.50	446	6.37	361-498	1158	40.8	665-1445	1.30	0.03	1.03-1.62	48.84	53.85	77.62	78.19	
Trout	39	31.57	19.50	388	12.4	188-498	818	69.2	47-1445	1.20	0.03	0.71-1.62	90.70	---	99.27	---	
Summary for Non-Sport Fish																	
Species	N	Total Weight (kg)	fish per net/night	% total catch	% biomass	TL range											
Utah Chub	4	0.23	2.00	9.30	0.73	148-179											
Comments:	EF not included in catch - algae and grass																

