# YANKEE MEADOW RESERVOIR
# 2021 TREND NET SURVEY

**Report prepared by:**
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**BACKGROUND:** Yankee Meadow Reservoir is managed with the annual stocking of rainbow (RBT), brook (BRK), and Bonneville cutthroat (BCT) trout (Table 1). These stocking quotas have historically supported heavy fishing pressure, especially during summer months. A DWR-owned conservation pool helps sustain the fishery, even during severe drought.

Much of the fishing pressure at Yankee Meadow Reservoir has focused on RBT, with the other two species providing variety. For many years the RBT fishery was maintained with an annual quota of 4,000 catchable fish to satisfy summer harvest. An additional quota of 2,000 fingerlings took advantage of the reservoir's productivity and minimum pool to produce a group of fish that typically experienced better overwinter survival and growth, yielding larger, healthier, and more aesthetically pleasing fish. (These RBT were easily distinguished from catchables due to lack of fin wear and better body condition.) The density of recently stocked catchable RBT often made fishing for the higher quality fingerling stock difficult during summer months, so they were more readily caught during spring and fall.

Following the last monitoring survey at Yankee Meadow Reservoir in 2018, projections of reduced statewide hatchery capacity compelled regional staff to evaluate stocking practices and make adjustments to reduce requested pounds, when possible. One of the simplest ways to accomplish such reduction was to request fingerling (put-grow-and-take) instead of catchable (put-and-take) RBT. This strategy especially made sense in productive waters that promoted favorable growth, but still provided suitable conditions for overwinter survival. Yankee Meadow Reservoir, as evidenced by past monitoring, was an ideal candidate for converting catchable to fingerling stocking. RBT quotas were incrementally adjusted, eventually resulting in annual requests of 5,000 fingerlings and 1,000 catchables in 2021 (Table 1). In addition to reducing the overall burden on aquaculture and improve stocking efficiency, the changes were intended to shift the RBT fishery to one being sustained primarily by higher quality fingerling stock, with a limited number of catchables to boost summer fishing and harvest.

The fishery at Yankee Meadow Reservoir is monitored regularly through trend net surveys conducted every three years. Since 2012 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 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. At Yankee Meadow Reservoir, mean catch rate for AFS nets has not varied much from that of the old style nets.

**METHODS:** Three experimental gill nets (two floating and one diving) were set in Yankee Meadow Reservoir on April 28, 2021, and were allowed 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 20 years of sampling (Figure 1). Fish caught were removed from nets on the morning of April 29 and all fish were measured to the nearest millimeter (total length [TL]) and weighed to the nearest gram. Trout body condition was measured by the calculation of Fulton's $K_{TL}$ (generated from total length):

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

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

**RESULTS:** A total of 171 trout was collected in three nets in Yankee Meadow Reservoir on April 29, 2021, for a catch rate of 57 trout per net-night (Table 2). This catch rate equaled the highest observed since the implementation of AFS nets in 2012 (Fig. 2) and was higher than the mean rate for previously used DWR nets (Table 3). RBT and BCT made up similar proportions of the catch (40% each), while BRK were about half as abundant as those species. RBT spanned at least three size classes (Fig. 3, 4) and averaged 333 mm (13.1 in) in total length (TL), 408 g (0.9 lbs) in weight, with a mean condition ($K_{TL}$) of 1.05. Mean length was similar to the long-term mean observed during 40 years of netting surveys, while weight and condition were lower than long-term means (Table 3). RBT ranged in size up to 466 mm (18.3 in) and 1,014 g (2.2 lbs). BCT spanned at least three size classes (Fig. 5, 6) and averaged 304 mm (12.0 in) in TL, 279 g (0.6 lbs) in weight, with a mean $K_{TL}$ of 0.95. BRK also spanned at least three size classes (Fig. 7, 8) and averaged 314 mm (12.4 in) in TL, 335 g (0.7 lbs) in weight, with a mean $K_{TL}$ of 0.97. Mean length of both BCT and BRK was higher than long-term means, while weight was similar, yielding lower mean condition. Mean length of all three species declined between 2018 and 2021, ending increasing trends in size that had been observed for several years (Fig. 9).

**DISCUSSION:** AFS-designed gill nets have been employed in most netting surveys throughout southern Utah for the last ten years. This time period has provided ample opportunity to comparatively evaluate the catches of this net design and that previously employed by DWR for many years. While the experience at most waters has found that AFS nets tend to catch about half as many trout as did the DWR design, the average catch at Yankee Meadow has been almost equal with both net types. Trout catch became consistently higher in netting surveys after BCT were added in 2003 (Fig. 2) but, even when only those years are compared to recent surveys, the current mean catch with AFS nets (48 trout per net-night) is still 80% of the mean catch from 2003-2009 (60 trout per net-night). These results indicate that Yankee Meadow Reservoir is maintaining a higher abundance of trout than in years past. This conclusion is corroborated by the mean condition of all three species which, while not poor, is lower than levels often observed in a productive water body like Yankee Meadow, and has been observed there in the past (Table 3). In addition to reduced body condition, overabundance can result in reduced individual growth and mean size. All these factors can have a negative effect on angler satisfaction.

The increased abundance of trout in Yankee Meadow Reservoir may be attributed to multiple factors, including stocking adjustments and, potentially, reduced harvest. Excess fingerling RBT were stocked in 2018 (Table 1) in an effort to build up the pool of harvestable fish before catchable stocking was reduced. Despite reduced RBT stocking in 2019, the 2018 fingerling quota persisted into 2021, as evidenced by an abundance of larger fish (340-470 mm; 13.4-18.5 in) with little to no fin wear (Fig. 4). The abundant cohort of fish measuring 270-330 mm (10.6-13.0 in) (Fig. 3) in 2021 was likely made up of RBT stocked as fingerlings in 2019 and as catchables in 2020. Although more time is needed to allow new RBT quotas to stabilize and to fully evaluate those changes, the abundance of RBT observed in spring netting surveys suggests that angler harvest of RBT may have declined at Yankee Meadow Reservoir.

Since 2007, the requested BCT quota has been set at 4,000 two-inch fish, twice that of the BRK quota (Table 1). BCT quotas are often set higher due to lower survival rates following stocking, though surveys at Yankee Meadow Reservoir demonstrate that these fish have experienced exceptional survival (Fig. 2). In addition, excess BCT were stocked in 2019 to mitigate a lower mean size caused by late spawning at the Manning Meadow brood. This increase was repeated in 2020, though it was not necessary. Anecdotal angling reports indicate

that BCT are caught less often than RBT and those anglers that do consistently catch BCT tend to harvest less often. Because RBT and BRK tend to be more sought after at Yankee Meadow Reservoir, excess BCT should not be stocked and the quota may even be reduced in the future if overabundance continues. Requested quotas for all three species should be maintained until the next survey in 2024, when the change in RBT quotas can be fully evaluated. Patterns in angler catch, harvest, and species preference are very important to managing the fishery at Yankee Meadow Reservoir, but have only been assessed through anecdotal reports, so a formal angler survey should be considered in the coming years to better inform management decisions.

**RECOMMENDATIONS:**

1. Continue trend net surveys at Yankee Meadow Reservoir on a three-year rotation. The next survey is scheduled for 2024.
2. Maintain current annual stocking quotas – 5,000 fingerling rainbow trout, 1,000 catchable rainbow trout, 2,000 fingerling brook trout, and 4,000 fingerling Bonneville cutthroat trout – through 2023. Adjust as needed following the 2024 trend net survey.
3. Consider conducting an angler survey to assess catch, harvest, and species preference.

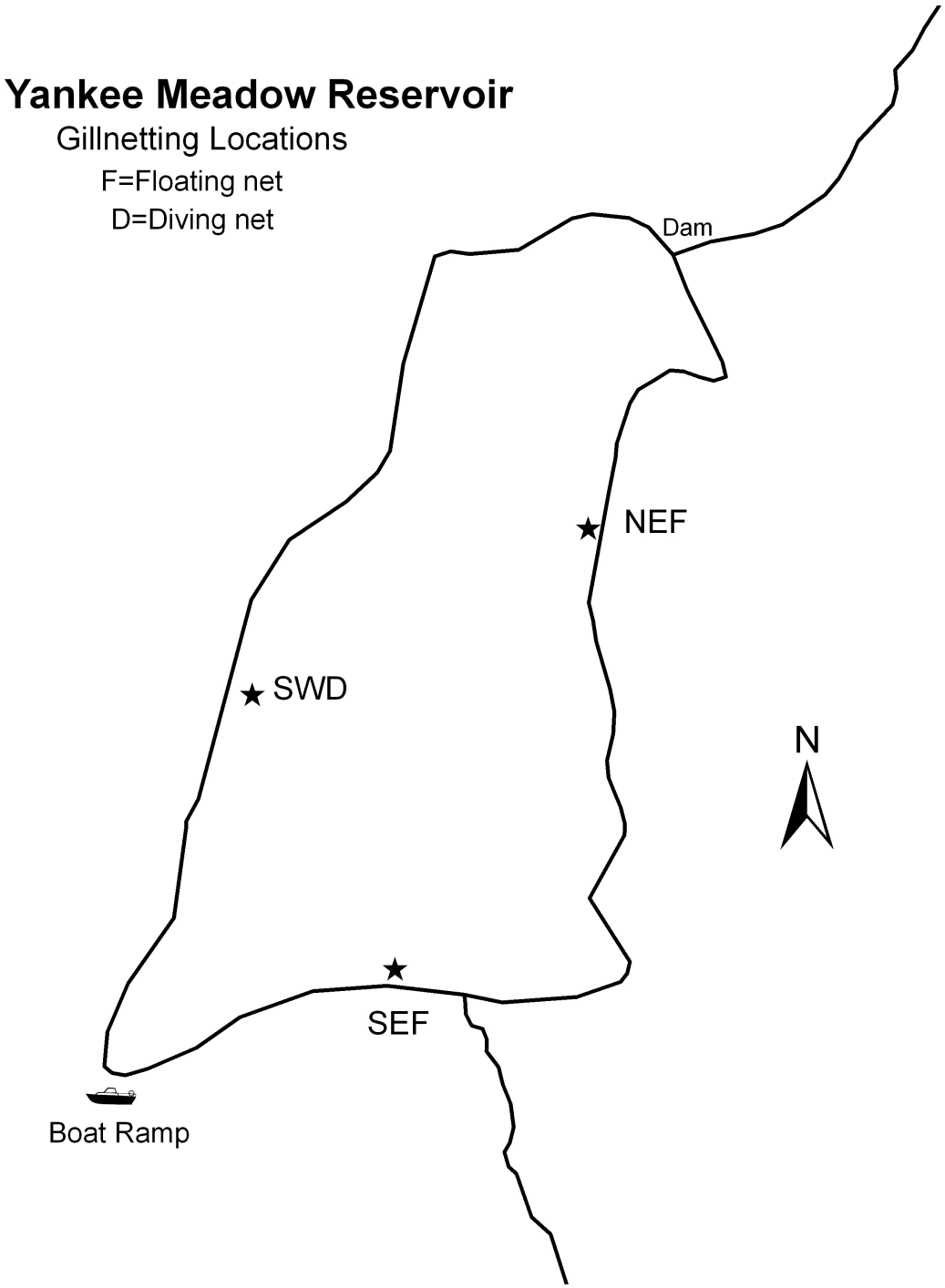


Figure 1. Locations of gill nets set at Yankee Meadow Reservoir during the 2021 trend net survey.

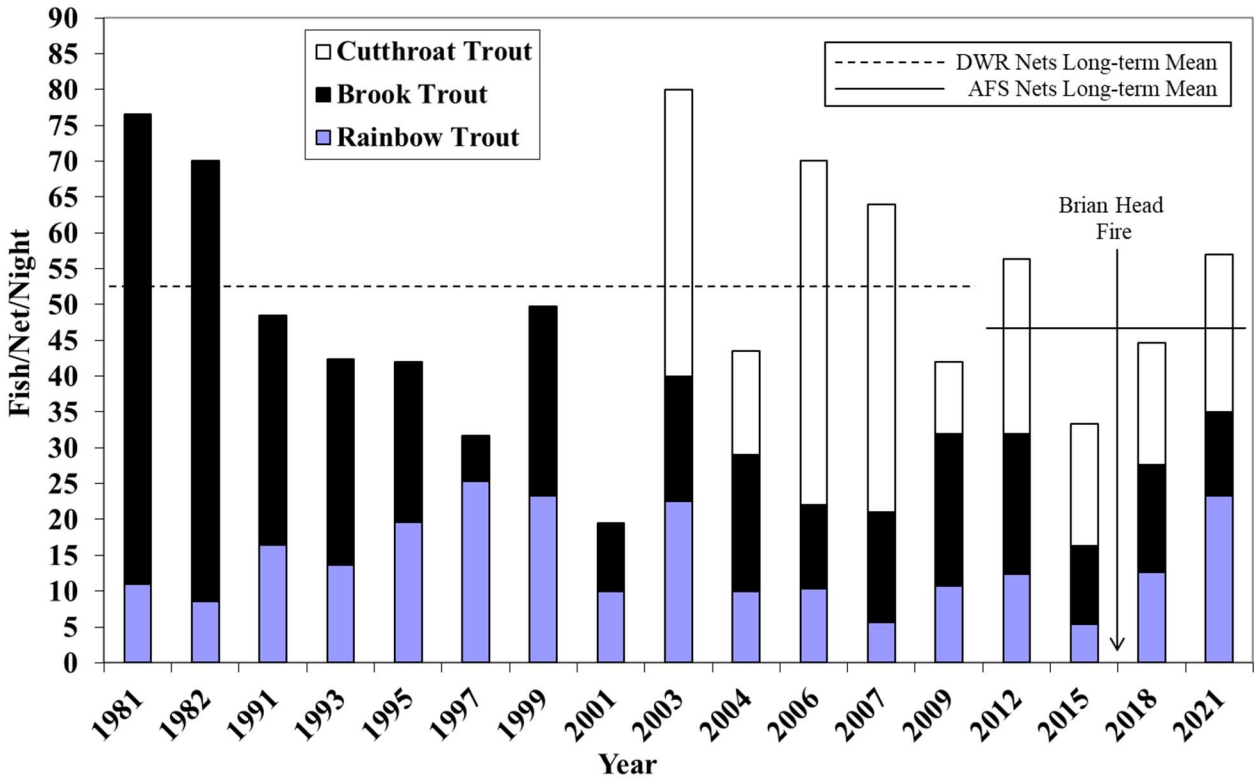


Figure 2. Trout catch rate during trend net surveys at Yankee Meadow Reservoir, 1981-2021.

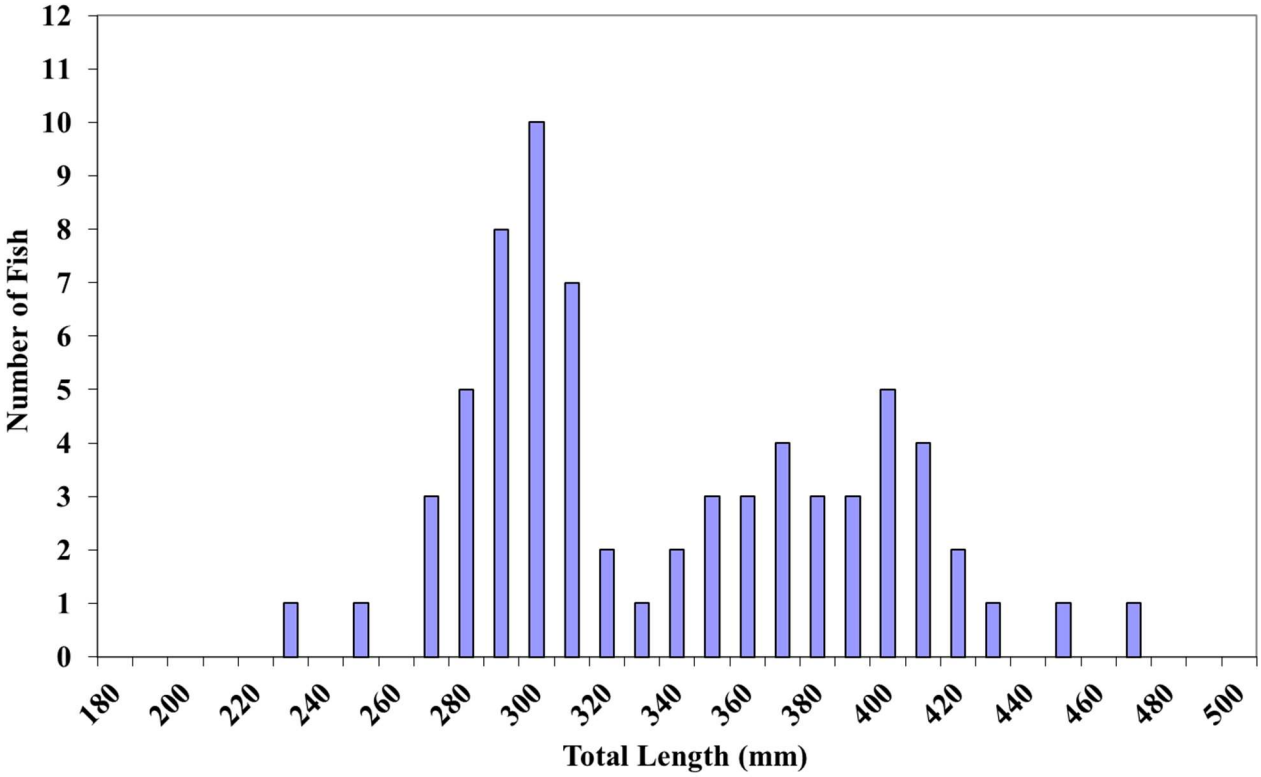


Figure 3. Length distribution of rainbow trout collected at Yankee Meadow Reservoir on April 29, 2021.

Figure 4. Rainbow trout collected at Yankee Meadow Reservoir on April 29, 2021.

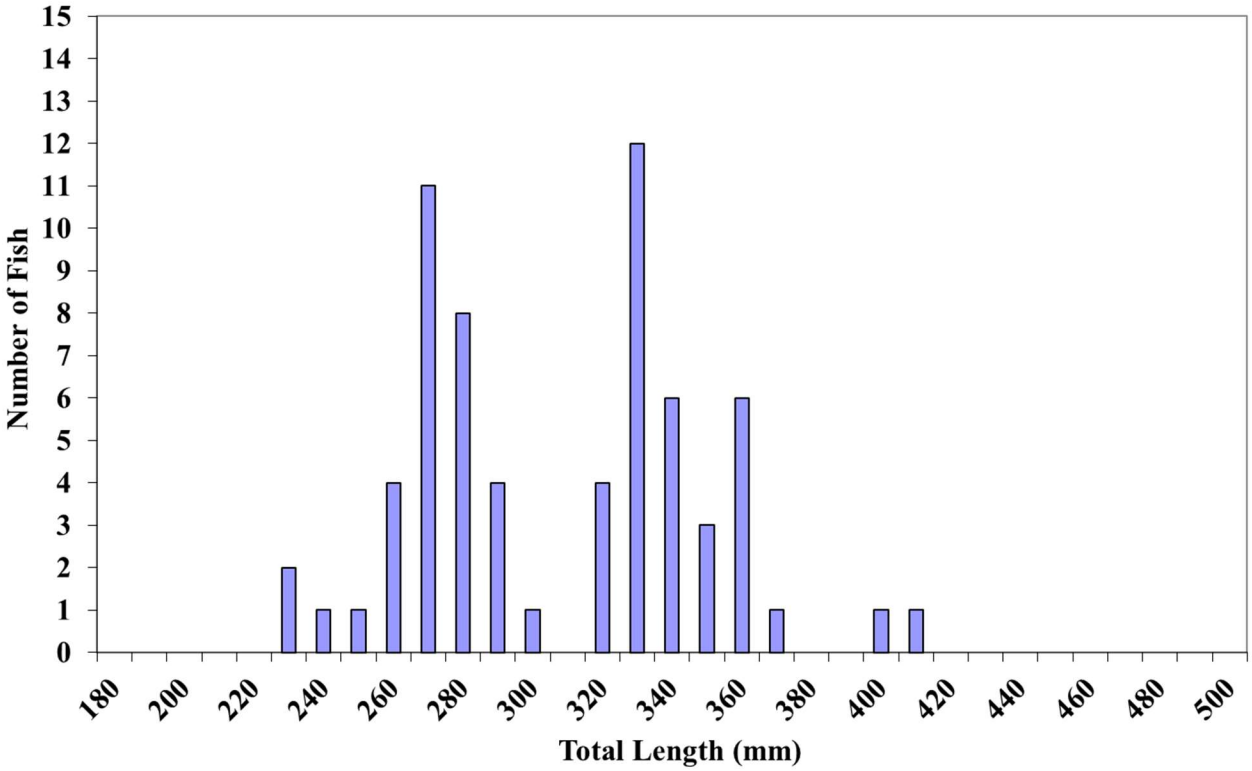


Figure 5. Length distribution of Bonneville cutthroat trout collected at Yankee Meadow Reservoir on April 29, 2021.

Figure 6. Bonneville cutthroat trout collected at Yankee Meadow Reservoir on April 29, 2021.

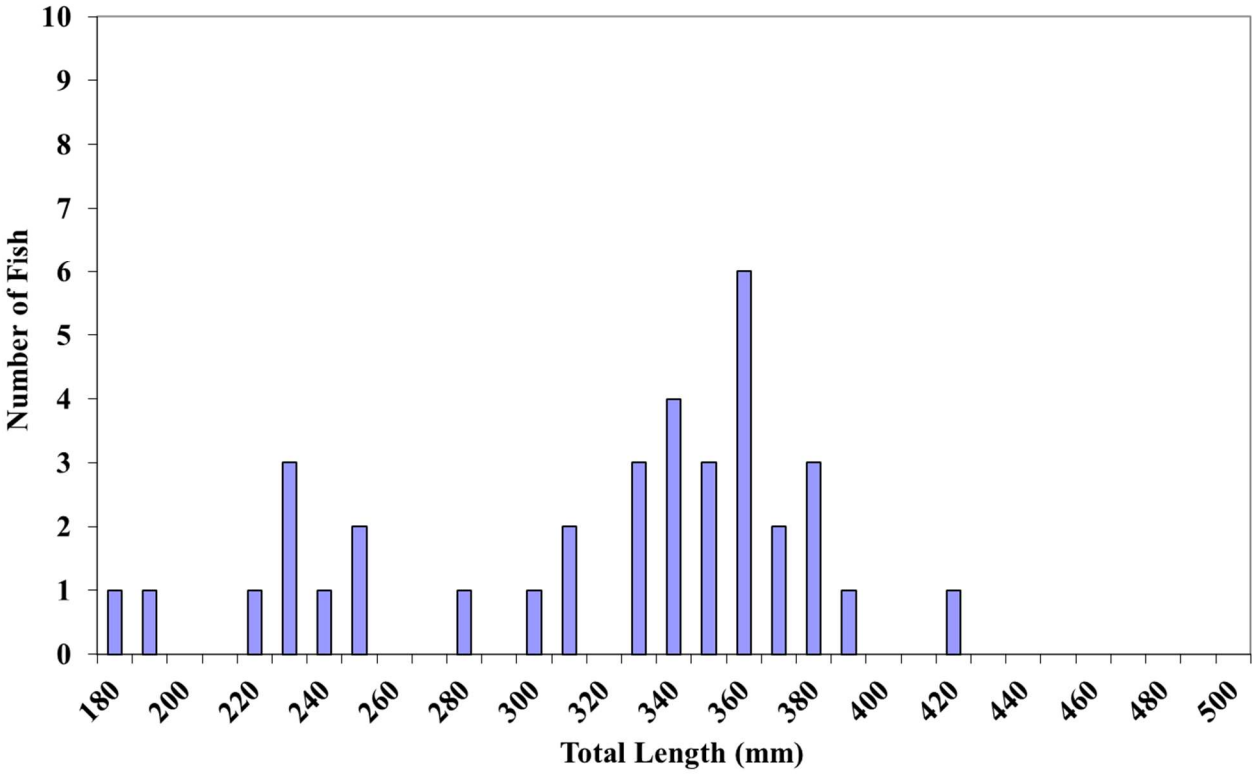

Figure 7. Length distribution of brook trout collected at Yankee Meadow Reservoir on April 29, 2021.


Figure 8. Brook trout collected at Yankee Meadow Reservoir on April 29, 2021.

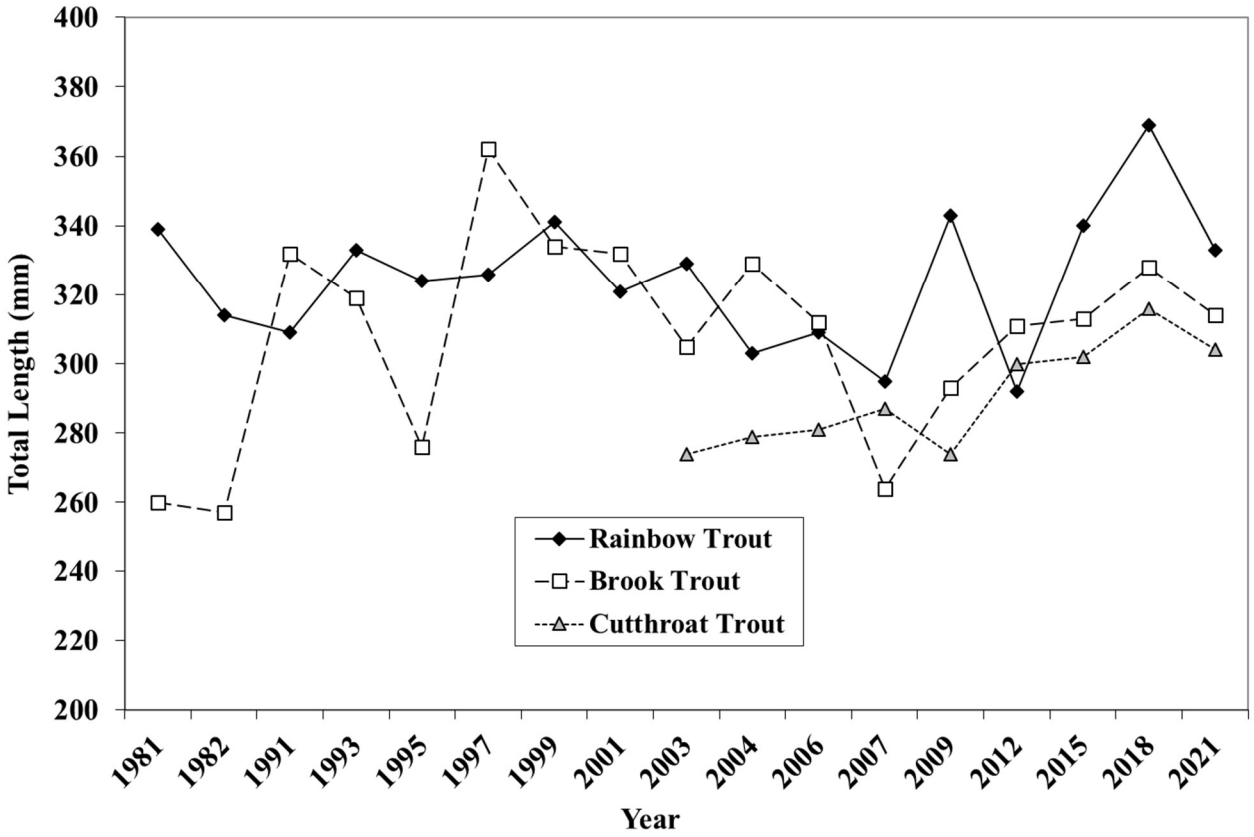

Figure 9. Mean total length (mm) of trout collected in trend net surveys at Yankee Meadow Reservoir, 1981-2021.

Table 1. Record of trout stocking in Yankee Meadow Reservoir in the five years prior to the 2021 trend net survey.

| | Rainbow Trout | | Brook Trout | | Cutthroat Trout | |
|---|---|---|---|---|---|---|
| Year | Number | Size (in) | Number | Size (in) | Number | Size (in) |
| 2016 | 3,999<br>1,998 | 9.9<br>3.4 | 2,048 | 2.0 | 4,203 | 2.1 |
| 2017 | 2,294<br>2,039 | 9.7<br>3.8 | 2,030 | 2.4 | 4,020 | 2.1 |
| 2018 | 4,083<br>2,059<br>6,975 | 10.2<br>3.9<br>3.0 | 2,033 | 3.2 | 4,209 | 2.1 |
| 2019 | 2,013<br>1,000 | 3.4<br>9.6 | 1,998 | 3.0 | 5,777 | 1.4 |
| 2020 | 3,885<br>3,013 | 2.8<br>9.9 | 2,003 | 2.6 | 5,643 | 2.1 |
| *2021 Quota* | *5,000*<br>*1,000* | *3.0*<br>*10.0* | *2,000* | *3.0* | *4,000* | *2.0* |

Table 2. Summary of the results from the 2021 trend net survey at Yankee Meadow Reservoir.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Water:** | Yankee Meadow Reservoir | | | | | **Catalog #:** | VI 376 | | | | | | | | |
| **Date Set:** | 4/28/2021 | | | **Time:** | 14:00 | **Weather:** | Clear, warm | | | | | | | | |
| **Date Pulled:** | 4/29/2021 | | | **Time:** | 10:00 | **Water Temp:** | 45 F | | | | | | | | |
| **# Nets:** | 2 Floaters, 1 Diver; AFS design | | | | | **Collectors:** | M. Hadley, A. Silva, M. Cox, M. Golden, G. Bezzant, K. Jones, J. Ballard | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **Summary for Sport Fish** | | | | | | | | | | | | | | | |
| | | **Total** | **fish per** | **Total Length (mm)** | | | **Weight (g)** | | | **Condition (Ktl)** | | | **% total** | **% total** |
| **Species** | **N** | **Weight (kg)** | **net/night** | **Mean** | **SE** | **Range** | **Mean** | **SE** | **Range** | **Mean** | **SE** | **Range** | **catch** | **biomass** |
| Rainbow Trout | 70 | 28.56 | 23.33 | 333 | 6.51 | 228-466 | 408 | 21.7 | 167-1014 | 1.05 | 0.01 | 0.82-1.27 | 40.94 | 48.42 |
| Cutthroat Trout | 66 | 18.38 | 22.00 | 304 | 4.98 | 225-405 | 279 | 13.5 | 92-622 | 0.95 | 0.01 | 0.67-1.14 | 38.60 | 31.17 |
| Brook Trout | 35 | 12.04 | 11.67 | 314 | 10.3 | 180-412 | 335 | 28.0 | 54-706 | 0.97 | 0.02 | 0.63-1.11 | 20.47 | 20.41 |
| | | | | | | | | | | | | | | |
| Trout | 171 | 58.99 | 57.00 | 318 | 4.01 | 180-466 | 343 | 12.5 | 54-1014 | 0.99 | 0.01 | 0.63-1.27 | 100.00 | 100.00 |

Table 3. Trend net survey results at Yankee Meadow Reservoir, 1981-2021.

| | | | | | Rainbow trout | | | Brook trout | | | Cutthroat trout | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Trout | All ages | | | All ages | | | All ages | | | |
| | Net Sets | | Total | per | Mean | Mean | | Mean | Mean | | Mean | Mean | | |
| Date | Flo | Div | Trout | net-night | TL (mm) | W (g) | Mean K | TL (mm) | W (g) | Mean K | TL (mm) | W (g) | Mean K | Comments |
| 8-May-81 | 1 | 1 | 153 | 77 | 339 | 454 | 1.14 | 260 | 222 | 1.07 | | | | |
| 20-Apr-82 | 2 | 0 | 140 | 70 | 314 | 362 | 1.20 | 257 | 183 | 1.09 | | | | |
| 16-May-91 | 1 | 1 | 97 | 49 | 309 | 378 | 1.19 | 332 | 474 | 1.27 | | | | |
| 12-May-93 | 2 | 1 | 127 | 42 | 333 | 459 | 1.17 | 319 | 465 | 1.25 | | | | |
| 24-May-95 | 2 | 1 | 126 | 42 | 324 | 408 | 1.17 | 276 | 269 | 1.13 | | | | |
| 14-May-97 | 2 | 1 | 95 | 32 | 326 | 409 | 1.13 | 362 | 541 | 1.12 | | | | |
| 12-May-99 | 2 | 1 | 149 | 50 | 341 | 495 | 1.21 | 334 | 437 | 1.13 | | | | |
| 5-May-01 | 1 | 1 | 39 | 20 | 321 | 394 | 1.16 | 332 | 421 | 1.10 | | | | begin cutt stock |
| 6-May-03 | 1 | 1 | 160 | 80 | 329 | 437 | 1.13 | 305 | 362 | 1.08 | 274 | 211 | 1.01 | |
| 13-May-04 | 1 | 1 | 87 | 44 | 303 | 342 | 1.20 | 327 | 448 | 1.24 | 279 | 263 | 1.13 | |
| 12-May-06 | 2 | 1 | 210 | 70 | 309 | 363 | 1.14 | 312 | 419 | 1.15 | 281 | 256 | 1.05 | triploid study |
| 2-May-07 | 2 | 1 | 192 | 64 | 295 | 293 | 1.09 | 264 | 203 | 1.00 | 287 | 255 | 1.01 | triploid study |
| 14-May-09 | 2 | 1 | 126 | 42 | 343 | 442 | 1.08 | 293 | 294 | 1.05 | 274 | 239 | 0.97 | |
| 25-May-12 | 2 | 1 | 169 | 56 | 292 | 304 | 1.16 | 311 | 379 | 1.17 | 300 | 313 | 1.09 | |
| 29-Apr-15 | 2 | 1 | 100 | 33 | 340 | 443 | 1.09 | 313 | 351 | 1.06 | 302 | 304 | 1.05 | |
| 18-Apr-18 | 2 | 1 | 134 | 45 | 369 | 602 | 1.07 | 328 | 381 | 1.03 | 316 | 325 | 0.98 | Brian Head Fire 2017 |
| 29-Apr-21 | 2 | 1 | 171 | 57 | 333 | 408 | 1.05 | 314 | 335 | 0.97 | 304 | 279 | 0.95 | |
| Long-term mean | | | | 51 | 327 | 422 | 1.14 | 299 | 337 | 1.12 | 290 | 268 | 1.03 | |
| AFS nets (2012-present) | | | | 48 | | | | | | | | | | |
| DWR nets (1981-2009) | | | | 52 | | | | | | | | | | |