



Department of
Environmental
Conservation



2018 PROGRESS REPORT: TROUT SURVEY

**Delaware Tailwaters Fisheries Investigation Plan: A
Joint Project of the New York State Department of
Environmental Conservation and the Pennsylvania
Fish and Boat Commission 2018-2020**

April 11, 2019

Delaware Tailwaters Fisheries Investigation Plan, 2018 - 2020
Delaware Fishery-Independent Monitoring Survey Plan, 2018 - 2020
2017-2018 Progress Report Trout Survey
March 28, 2019

The New York City (NYC) reservoir tailwaters in the upper Delaware River Basin (Delaware Tailwaters) are an increasingly popular destination water for wild trout fishing. The New York State Department of Environmental Conservation (NYSDEC) and Pennsylvania Fish and Boat Commission (PFBC) have agreed supporting a Joint Fisheries Investigation Plan¹ (Plan). This Plan identifies information most urgently needed to inform a new fisheries management plan and a set of strategies to collaboratively obtain that information over the next three years, 2018 – 2020. Electrofishing surveys were conducted during the 2017 and 2018 season to estimate population characteristics of brown and rainbow trout in the Delaware tailwaters². Findings within this progress report are considered provisional and subject to modification pending additional analysis, scrutiny and review over the duration of the Plan lifespan.

In 2017, exploratory night-time boat electrofishing occurred once a month from June through October in the West Branch Delaware River (West Branch) at four fixed sampling sites. Our primary goal was to identify suitable sampling locations that were favorable to sampling for adult sized trout using nighttime boat electrofishing. Additionally, exploratory day-time backpack electrofishing occurred once a month from July through October in the West Branch at five fixed sampling sites and ten fixed sampling sites total West Branch tributaries.

In 2018, night-time boat electrofishing was to occur once a month from April through October in the West Branch Delaware River (West Branch) at four fixed sampling sites. Additionally, day-time backpack electrofishing was to occur once a month from July through October in the West Branch at five fixed sampling sites and ten fixed sampling sites total West Branch tributaries. Flows were adequate for sampling in April, May, June and most of July. Rain started in late July making sampling in August, September and October difficult, some sampling was canceled while other sampling events were squeezed in when flows were adequate. The West Branch and its tributaries experienced a number of flash floods in 2018.

Night-time boat electrofishing

In 2017, at all four sample sites, there were 830 brown trout and 45 rainbow trout captured (Table 1) for a total of 30 independent samples. In 2018, 1221 brown trout and 147 rainbow trout were captured (Table 2) for a total of 36 independent samples. Brown trout were consistently caught at the two upriver sites (Laurel Bank and Airport Road) when compared to the two downriver sites (Balls Eddy and Shehawken). As expected, higher brown trout occurrences were reflective of the relatively stable, cold-water habitat at the upriver sites. The reverse pattern was observed for rainbow trout, with rainbow trout catches being higher at the downriver most site, the Shehawken Pool. Rainbow trout prefer faster-flowing pool and riffle habitat which is prevalent in the Shehawken Pool sample location.

¹ <http://www.dec.ny.gov/outdoor/112782.html>

² http://www.dec.ny.gov/docs/fish_marine_pdf/dfiptroutmonitor.pdf

Table 1. Total catch of brown trout and rainbow trout from night-boat electrofishing June – October 2017*.

| Site | Size | Brown Trout | | | | Rainbow Trout | | | | |
|---------------------|--------------|-------------|-----|-----|-----|---------------|-----|-----|-----|-----|
| | | Jun | Jul | Aug | Sep | Oct | Jun | Jul | Aug | Sep |
| <i>Laurel Bank</i> | <i>Total</i> | 100 | 56 | 92 | 72 | | 0 | 0 | 1 | 2 |
| | ≥12" | 26 | 29 | 40 | 32 | | 0 | 0 | 1 | 2 |
| | ≥16" | 13 | 16 | 15 | 17 | | 0 | 0 | 1 | 1 |
| | ≥20" | 2 | 3 | 5 | 0 | | 0 | 0 | 0 | 0 |
| <i>Airport Road</i> | <i>Total</i> | 99 | 40 | | 45 | | 2 | 2 | | 0 |
| | ≥12" | 50 | 24 | | 29 | | 1 | 2 | | 0 |
| | ≥16" | 29 | 16 | | 15 | | 1 | 1 | | 0 |
| | ≥20" | 2 | 2 | | 2 | | 0 | 0 | | 0 |
| <i>Balls Eddy</i> | <i>Total</i> | 43 | 74 | 78 | | 56 | 2 | 2 | 4 | 1 |
| | ≥12" | 39 | 61 | 56 | | 51 | 2 | 2 | 1 | 1 |
| | ≥16" | 13 | 29 | 30 | | 31 | 1 | 0 | 0 | 0 |
| | ≥20" | 1 | 1 | 3 | | 3 | 0 | 0 | 0 | 0 |
| <i>Shehawken</i> | <i>Total</i> | 31 | 11 | 5 | | 28 | 5 | 8 | 6 | 11 |
| | ≥12" | 28 | 6 | 4 | | 27 | 3 | 5 | 5 | 5 |
| | ≥16" | 20 | 2 | 2 | | 20 | 0 | 0 | 1 | 2 |
| | ≥20" | 2 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 |

*Blanks indicate not sampled, zeros indicate sampled no fish. Balls Eddy in September was not sampled due to a scheduling conflict.

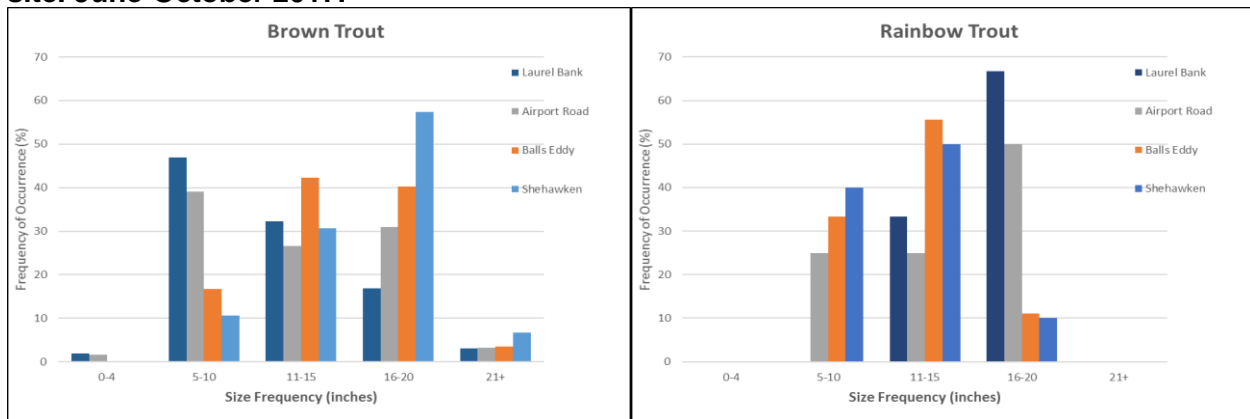
Table 2. Total catch of brown trout and rainbow trout from night-boat electrofishing April – October 2018.*

| Site | Size | Brown Trout | | | | | | | Rainbow Trout | | | | | | |
|---------------------|--------------|-------------|-----|-----|-----|-----|-----|-----|---------------|-----|-----|-----|-----|-----|-----|
| | | Apr | May | Jun | Jul | Aug | Sep | Oct | Apr | May | Jun | Jul | Aug | Sep | Oct |
| <i>Laurel Bank</i> | <i>Total</i> | 103 | 125 | 135 | | | | 82 | 8 | 4 | 2 | | | | 4 |
| | ≥12" | 70 | 79 | 83 | | | | 66 | 5 | 1 | 1 | | | | 2 |
| | ≥16" | 12 | 15 | 16 | | | | 26 | 1 | 0 | 0 | | | | 0 |
| | ≥20" | 2 | 3 | 3 | | | | 7 | 0 | 0 | 0 | | | | 0 |
| <i>Airport Road</i> | <i>Total</i> | 34 | 96 | 134 | | 45 | 100 | | 2 | 6 | 10 | | 3 | 10 | |
| | ≥12" | 27 | 74 | 99 | | 27 | 62 | | 2 | 5 | 5 | | 1 | 5 | |
| | ≥16" | 10 | 32 | 43 | | 14 | 25 | | 1 | 1 | 2 | | 1 | 0 | |
| | ≥20" | 0 | 2 | 3 | | 1 | 0 | | 0 | 0 | 0 | | 0 | 0 | |
| <i>Balls Eddy</i> | <i>Total</i> | 27 | 49 | 96 | | 32 | 76 | | 8 | 5 | 13 | | 16 | 17 | |
| | ≥12" | 20 | 35 | 81 | | 14 | 40 | | 5 | 2 | 7 | | 4 | 7 | |
| | ≥16" | 12 | 21 | 53 | | 8 | 24 | | 0 | 1 | 1 | | 2 | 1 | |
| | ≥20" | 1 | 1 | 6 | | 1 | 0 | | 0 | 0 | 0 | | 0 | 0 | |
| <i>Shehawken</i> | <i>Total</i> | 14 | 26 | 28 | | | 19 | | 7 | 9 | 14 | | | 9 | |
| | ≥12" | 13 | 20 | 21 | | | 14 | | 4 | 5 | 6 | | | 2 | |
| | ≥16" | 7 | 10 | 9 | | | 9 | | 1 | 0 | 1 | | | 0 | |
| | ≥20" | 0 | 0 | 0 | | | 0 | | 0 | 0 | 0 | | | 0 | |

*Blanks indicate not sampled, zeros indicate sampled no fish. April and August were not sampled due to high water, Laurel Bank and Shehawken were not sampled in September due to equipment issues.

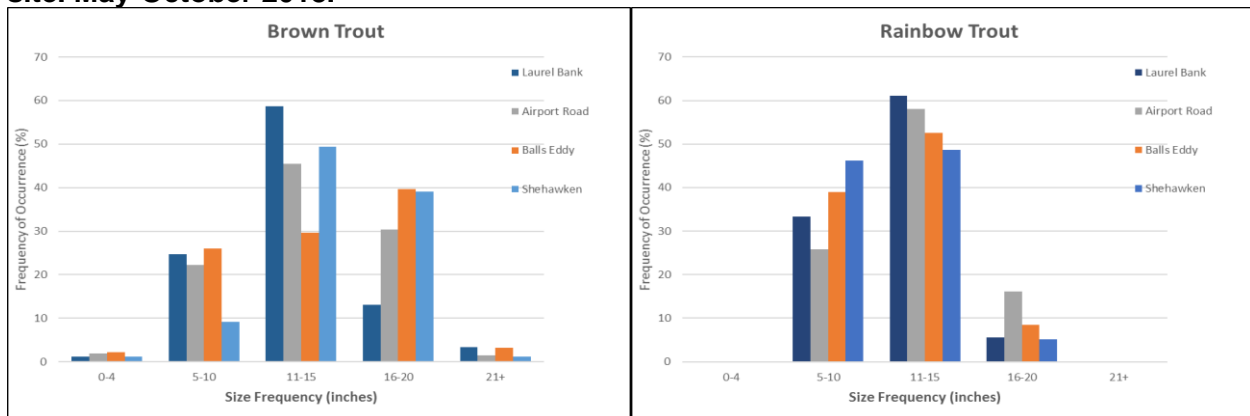
The trout population was well represented by multiple size classes, typically two – four size classes at each site (Figure 1 & 2). The catch composition of yearling and sub-legal (<12 inches) Brown Trout decreased proceeding downriver from 39% at the Laurel Bank site to 10% at the Shehawken site in 2017, 33% at the Laurel Bank site and 22% at the Shehawken site in 2018, respectively. Large-sized trout (> 16-inches) were present all sites. Brown trout > 20 inches were a rare occurrence (< 1%) at all sites in 2017 and <1.2% in 2018. The largest brown trout in 2017 was 29.25 inches, which was captured in July at the Airport Road site. The largest brown trout in 2018 was 26.22 inches, which was captured in June and October at the Laurel Bank site. Rainbow Trout catches were predominately legal-size (> 12-inches) or larger; however, individuals over 18 inches were rare occurrences (< 1%) at all sites. The largest Rainbow Trout captured in 2017 was 19.5 inches, also in July at the Airport Road site. Only one individual over 18 inches (19.1 inches) was collected in 2018; at the Shehawken pool in May. Individuals over 18 inches were rare occurrences (< 1%) at all sites.

Figure 1. Trout size distribution all months combined by each night-boat electrofishing site. June-October 2017.*



*Only Balls Eddy was sampled in June, Airport Road and Balls Eddy were not sampled in September.

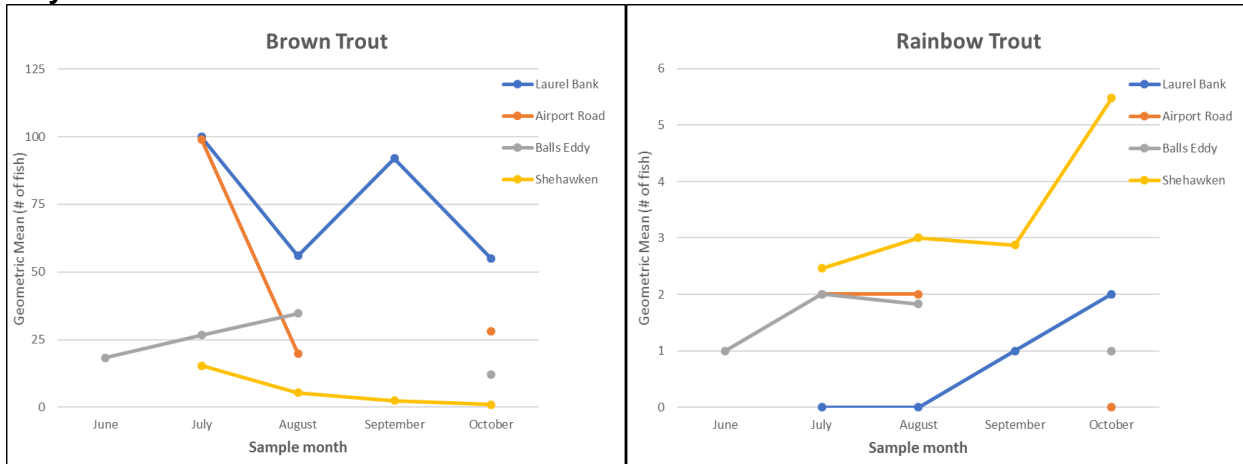
Figure 2. Trout size distribution all months combined by each night-boat electrofishing site. May-October 2018.*



*April and August were not sampled due to high water, Laurel Bank and Shehawken were not sampled in September due to equipment issues.

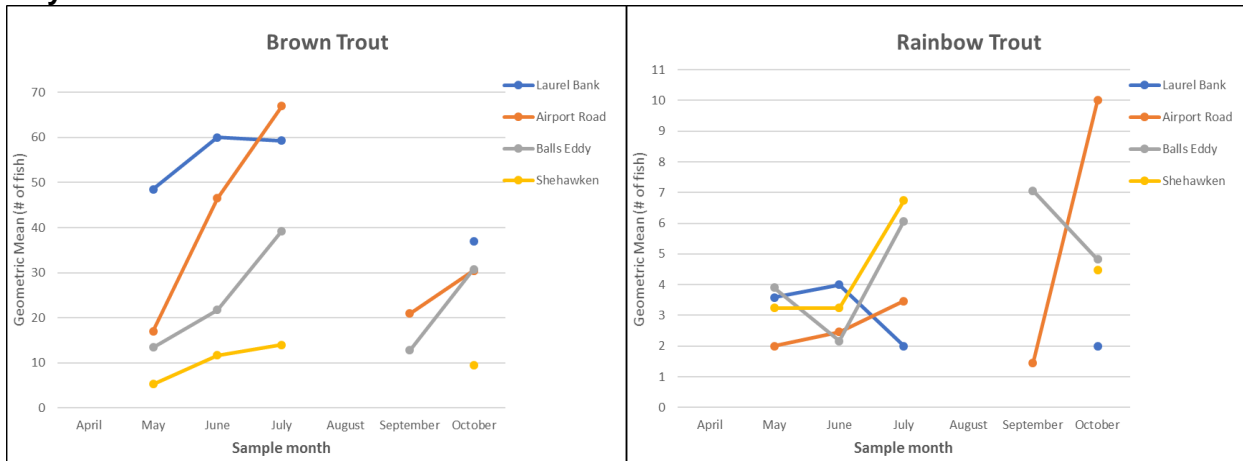
Species-specific relative abundance expressed as geometric means are depicted by water and month in Figure 3 & 4. Brown trout average geometric mean across all sites was 37.7 in 2017, 30.26 in 2018 and rainbow trout was 1.8 in 2017, 4.04 in 2018.

Figure 3. Geometric means of trout by month at each night-time boat electrofishing site. July-October 2017.*



*Only Balls Eddy was sampled in June, Airport Road and Balls Eddy were not sampled in September.

Figure 4. Geometric means of trout by month at each night-time boat electrofishing site. May-October 2018.*



*April and August were not sampled due to high water, Laurel Bank and Shehawken were not sampled in September due to equipment issues.

Day-time backpack electrofishing

In 2017, at the 15 YOY sites, there were 1571 brown trout and 1119 rainbow trout captured (Table 3) for a total of 42 independent samples. In 2018, there were a total of 1932 brown trout and 452 rainbow trout captured (Table 4) for a total of 38 independent samples. Brown trout and rainbow trout were consistently caught at all sites. Sherman Creek had the highest number of brown trout collected and Sands Creek had the highest number of rainbow trout collected in 2017. In 2018, West Branch had the highest number of brown trout collected, even though it was only sampled in July. Sands Creek had the highest number of rainbow trout collected.

Table 3. Total catch of brown trout and rainbow trout from day-time backpack July – October 2017.*

| Site | Size | Brown Trout | Rainbow Trout |
|-------------------|------------------|-------------|---------------|
| West Branch | Total | 455 | 36 |
| | Young of year | 432 | 36 |
| | Yearling & older | 23 | 0 |
| Balls Creek | Total | 91 | 112 |
| | Young of year | 86 | 112 |
| | Yearling & older | 5 | 0 |
| Cold Spring Creek | Total | 95 | 85 |
| | Young of year | 33 | 83 |
| | Yearling & older | 62 | 2 |
| Roods Creek | Total | 169 | 49 |
| | Young of year | 111 | 39 |
| | Yearling & older | 58 | 10 |
| Sands Creek | Total | 169 | 539 |
| | Young of year | 131 | 487 |
| | Yearling & older | 38 | 52 |
| Shehawken Creek | Total | 224 | 193 |
| | Young of year | 163 | 184 |
| | Yearling & older | 61 | 9 |
| Sherman Creek | Total | 368 | 105 |
| | Young of year | 279 | 99 |
| | Yearling & older | 89 | 6 |

*Cold Spring Creek was not sampled in July. Shehawken and Balls Creek were not sampled in September due to a scheduling conflict.

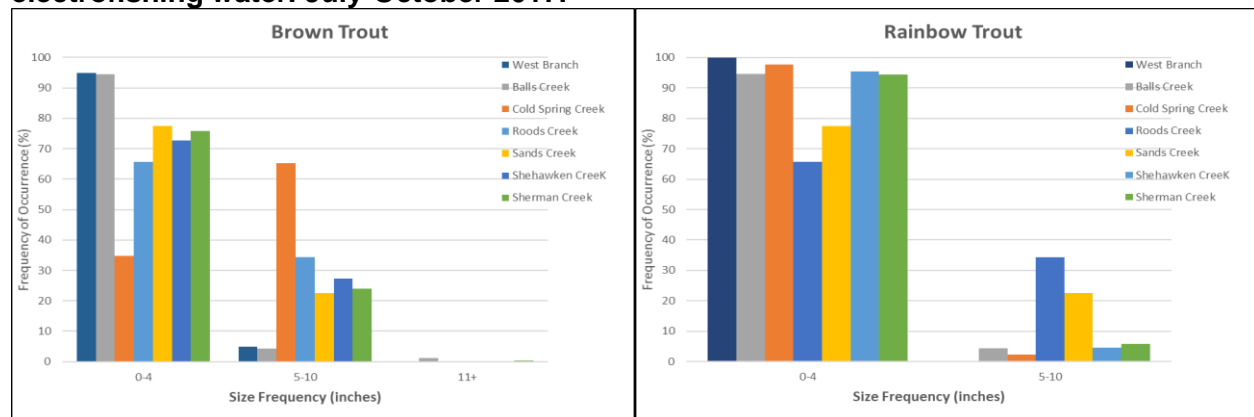
Table 4. Total catch of brown trout and rainbow trout from day-time backpack July – October 2018.*

| Site | Size | Brown Trout | Rainbow Trout |
|-------------------|------------------|-------------|---------------|
| | | | |
| West Branch | Total | 549 | 31 |
| | Young of year | 546 | 31 |
| | Yearling & older | 3 | 0 |
| Balls Creek | Total | 74 | 61 |
| | Young of year | 64 | 61 |
| | Yearling & older | 10 | 0 |
| Cold Spring Creek | Total | 330 | 27 |
| | Young of year | 316 | 22 |
| | Yearling & older | 14 | 5 |
| Roods Creek | Total | 236 | 29 |
| | Young of year | 204 | 12 |
| | Yearling & older | 32 | 17 |
| Sands Creek | Total | 279 | 143 |
| | Young of year | 254 | 124 |
| | Yearling & older | 25 | 19 |
| Shehawken Creek | Total | 125 | 113 |
| | Young of year | 104 | 109 |
| | Yearling & older | 21 | 4 |
| Sherman Creek | Total | 339 | 48 |
| | Young of year | 292 | 44 |
| | Yearling & older | 47 | 4 |

*The following tributaries were not sampled during some monthly intervals. West Branch after July, Balls Creek and Sherman in August, Cold Spring in September, Shehawken in August and September.

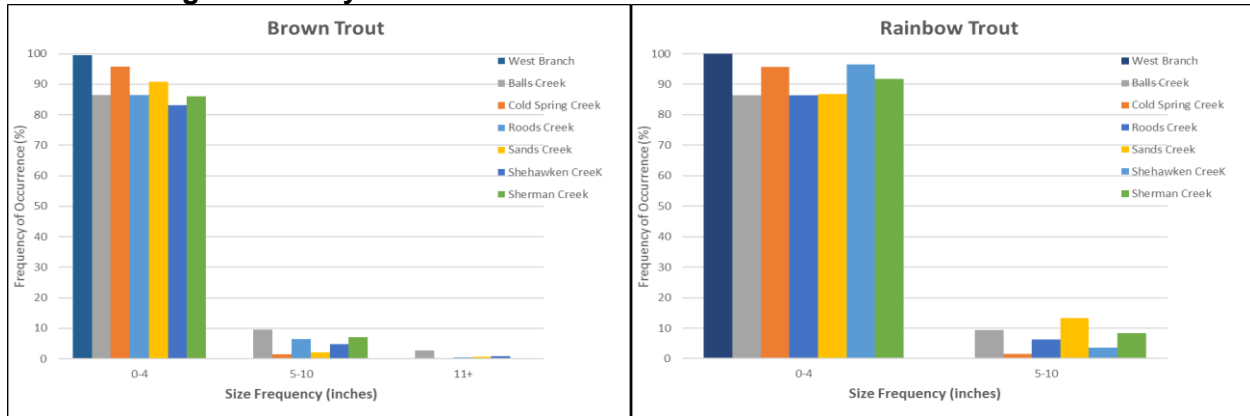
The trout population at the day-time backpack electrofishing sites was dominated by YOY trout <5" in total length (Figure 5 & 6). The abundance of trout was a surprise to both PFBC and NYSDEC because historical surveys did not collect the high numbers of trout that were observed in 2017.

Figure 5. Trout size distribution all months combined at each day-time backpack electrofishing water. July-October 2017.*



*Cold Spring Creek was not sampled in July, Shehawken and Balls Creek were not sampled in September.

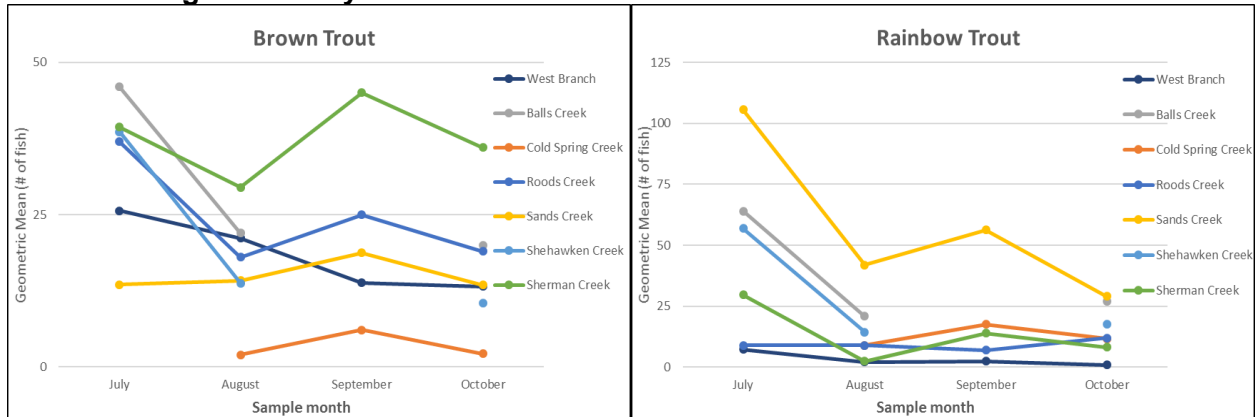
Figure 6. Trout size distribution all months combined by each day-time backpack electrofishing water. July-October 2018.*



*The following tributaries were not sampled during some monthly intervals. West Branch after July, Balls Creek and Sherman in August, Cold Spring in September, Shehawken in August and September.

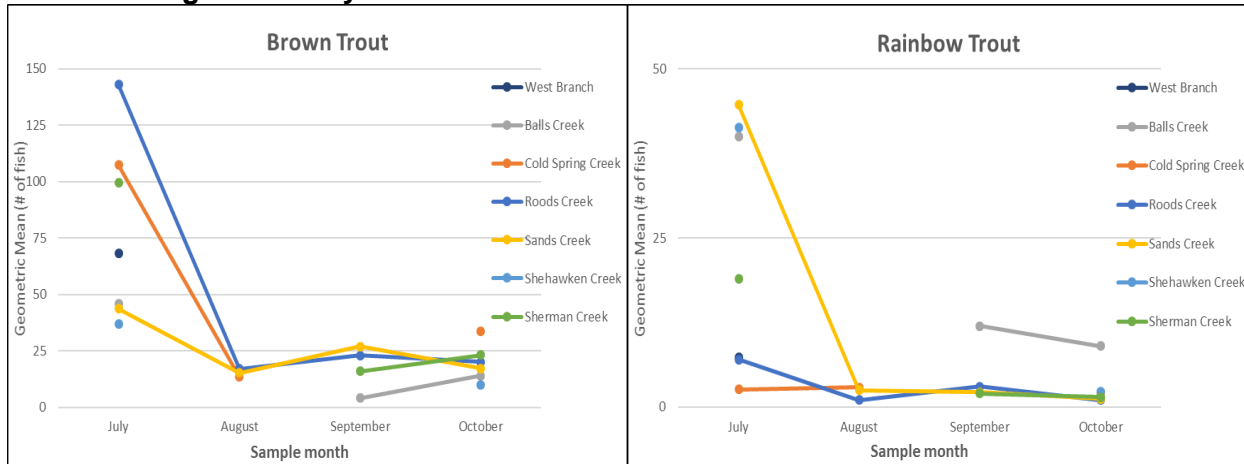
Species-specific relative abundance expressed as geometric means are depicted by water and month in Figure 7 & 8. Brown trout average geometric mean across all sites was 21.4 in 2017, 38.9 in 2018 and rainbow trout was 23.0 in 2017 and 10.2 in 2018.

Figure 7. Geometric means of YOY trout by month at each day-time backpack electrofishing water. July-October 2017.*



*Cold Spring Creek was not sampled in July, Shehawken and Balls Creek were not sampled in September.

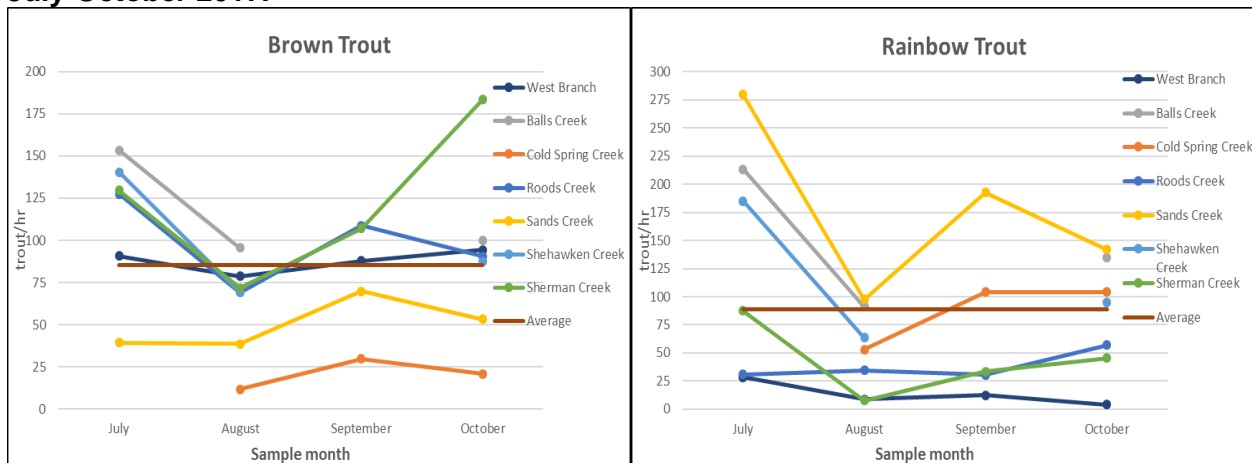
Figure 8. Geometric means of YOY trout by month at each day-time backpack electrofishing water. July-October 2018.*



*The following tributaries were not sampled during some monthly intervals. West Branch after July, Balls Creek and Sherman in August, Cold Spring in September, Shehawken in August and September.

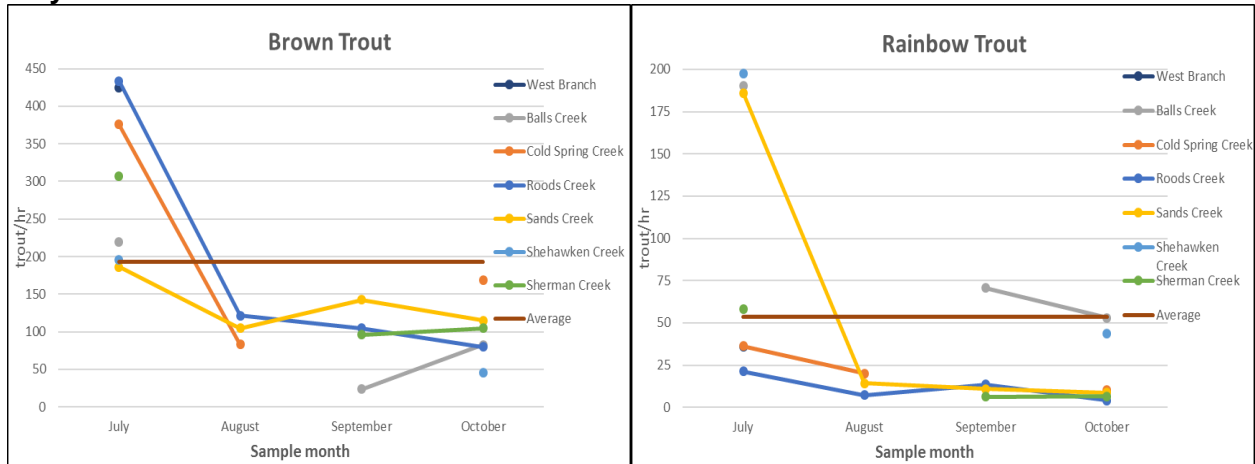
Species-specific YOY CPUE is depicted by site and month for the West Branch and the six tributaries sampled July-October in Figure 9 & 10. The average CPUE was 88.8 brown trout/hr and 85.2 rainbow trout/hr for all west branch sites combined in 2017 and 193.5 brown trout/hr and 53.36 rainbow trout/hr for all west branch sites combined in 2018.

Figure 9. CPUE of YOY trout by month at each day-time backpack electrofishing water. July-October 2017.*



*Cold Spring Creek was not sampled in July, Shehawken and Balls Creek were not sampled in September.

Figure 10. CPUE of YOY trout by month at each day-time backpack electrofishing water. July-October 2018.*



*The following tributaries were not sampled during some monthly intervals. West Branch after July, Balls Creek and Sherman in August, Cold Spring in September, Shehawken in August and September.

Observations

- Nighttime electrofishing should not occur when flows are >2000 cfs at the USGS Hale Eddy gauge for all sites, except Laurel Bank. Sampling should not occur at Laurel Bank when flows are >1600 cfs at the USGS Stilesville gauge.
- Daytime electrofishing on the West Branch should not occur when flows are >1200 cfs at the USGS Hale Eddy gauge.