

FIELD SEASON NOTES



2022



2022 Season

Our summer research season started this year in May with the arrival of our seasonal Avian Ecology Intern, Kaitlyn, who joined our year-long Resident Bird Intern, Kati, followed by our two Trout Ecology and Stream Restoration Interns, Will and Emily, in June.

We had a busy season this year with our field duties, surveying multiple properties for bird communities through point count surveys and mist-netting, and restoring just under 2 miles of stream habitat through large wood additions.

In addition to field work, the TMCC research team found time to work on a few side projects (stay tuned), and present our first annual Research Open House, where we gave the public a look into all of the research activities we do with our stream and bird projects, highlighted some of the citizen science projects we work on, and hosted some of our partners including the Natural Resources Conservation Service and the Loon Preservation Committee.



AVIAN ECOLOGY AND FOREST MONITORING PROJECT



2022



This season, we had a few different elements to our avian field work. All of the work that we do is done to evaluate the avian community over time for long-term trends, and to measure forest songbird response to a series of selective harvests that TMCC conducted on its Bear Paw Timberlands in the early 2000s. To evaluate the forest habitats we steward as avian habitat, we conduct point count surveys and band forest songbirds using mist nets. These methods allow us to see who is using our forests and whether the forests we manage and steward are suitable breeding habitat.

Point Count Surveys

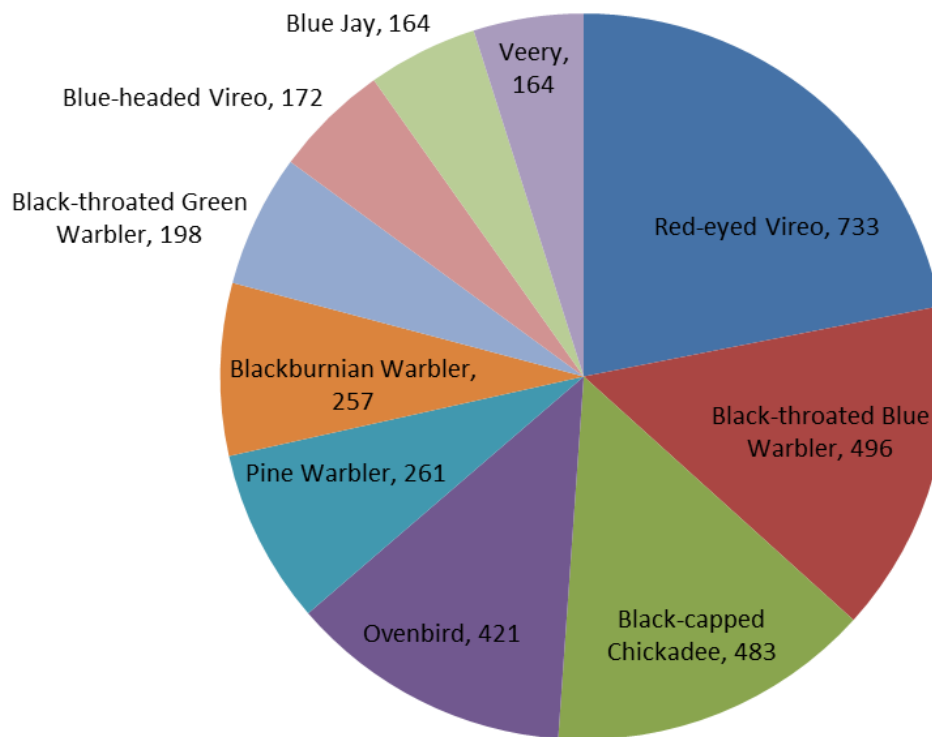
We conducted bird surveys on three forest tracts in the valley. In addition to the Tin Mountain Bear Paw Timberlands and Rockwell Sanctuary that the research team has surveyed yearly since 2010, this year we added an additional property that we surveyed for birds on private conservation land in Albany as part of the bird monitoring component of a Conservation Stewardship Program through the Natural Resources Conservation Service. We conducted weekly point counts from May–July at 38 permanent point count locations at the 459 acre Bear Paw Timberlands in Conway, and 32 point count locations at the 230 acre Rockwell Sanctuary and Michael Cline Memorial Forest located in Albany. We also conducted monthly point counts at 35 point count locations at the private conservation property, which is 600 acres.

Throughout the season, we detected **66 species during the breeding season in Bear Paw, 68 species at the Rockwell Sanctuary and Michael Cline Memorial Forest, and 54 species at the private conservation property** that we surveyed for the first time this year.

We had a total of **76 individual species** across all three properties we surveyed during the breeding season.

AVIAN ECOLOGY AND FOREST MONITORING PROJECT

2022 Overall Top 10 Bird Species



Most Frequently Observed Species by Property (in descending order):

Bear Paw Timberlands

- Red-eyed Vireo
- Black-throated Blue Warbler
- Ovenbird
- Blackburnian Warbler
- Veery
- Black-capped Chickadee
- Black-throated Green Warbler
- Scarlet Tanager
- Blue-headed Vireo
- Chestnut-sided Warbler

Rockwell Sanctuary & Michael Cline Memorial Forest

- Red-eyed Vireo
- Black-capped Chickadee
- Black-throated Blue Warbler
- Pine Warbler
- Ovenbird
- Veery
- Blue Jay
- Winter Wren
- Chestnut-sided Warbler
- Eastern Wood-pewee

Private Conservation Property

- Red-eyed Vireo
- Black-capped Chickadee
- Ovenbird
- Black-throated Blue Warbler
- Pine Warbler
- Pine Siskin
- Blue-headed Vireo
- Blue Jay
- Black-throated Green Warbler
- Hermit Thrush

AVIAN ECOLOGY AND FOREST MONITORING PROJECT

Monitoring Avian Productivity and Survivorship (MAPS) Banding

Recaptures from 2021 Field Season:

2 Ovenbirds
2 Veery
3 Red-eyed Vireos

Recapturing birds we've banded in previous years tells us that the same birds are coming back to the habitats we maintain, which indicates that we're providing good breeding habitat for forest songbirds.

In addition to our yearly point count surveys, the 2022 field season was the second year of our Monitoring Avian Productivity and Survivorship (MAPS) station banding. We expanded the number of stations where we band from one to two at the Bear Paw Timberlands and in the Michael Cline Memorial Forest, and expanded the number of nets from five at each station to eight. This season, we banded a total of **88 birds and 28 species**.



Top Species Banded:



**Black-throated Blue
Warbler
18 Birds Banded**

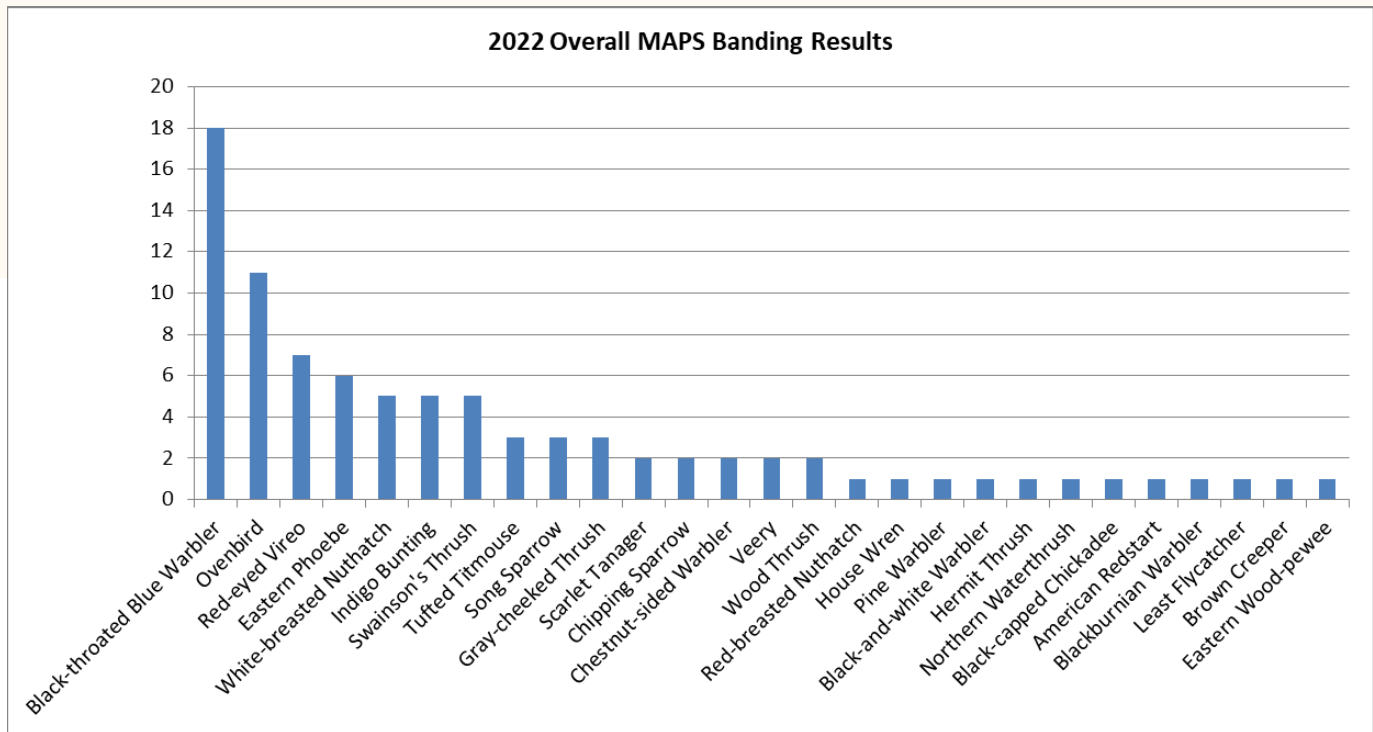


**Ovenbird
11 Birds Banded**



**Red-eyed Vireo
7 Birds Banded**

AVIAN ECOLOGY AND FOREST MONITORING PROJECT



Highlights: From left: a vibrant male Scarlet Tanager, a Chestnut-sided Warbler staying true to its name, a hatch-year Northern Waterthrush and Brown Creeper that confirmed these species are breeding in the area, and a Yellow-bellied Sapsucker, our first woodpecker capture.

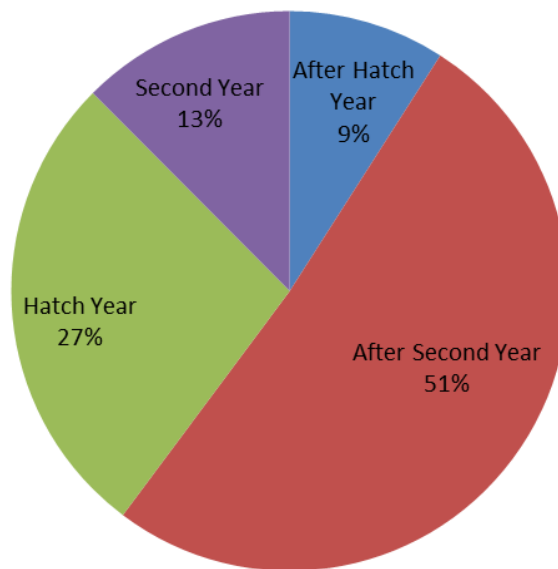
Not pictured highlights include banding hatch-year Swainson's Thrushes that confirmed breeding in Bear Paw, and some juvenile Gray-cheeked Thrushes as they passed through at the end of the season.

AVIAN ECOLOGY AND FOREST MONITORING PROJECT

Banded Bird Age Breakdowns:

One of the benefits of banding birds versus doing a point count survey is we're able to tell the age of the bird when we have it in the hand based on molt and plumage characteristics. Below is a breakdown of the ages of the birds we banded this season, both overall and at each station. Hatch Year denotes birds that hatched this year and still have juvenile plumage; we mostly catch these birds toward the end of the season. Second Year birds are those that hatched the previous breeding season, and are going through their first breeding season as adults. After Hatch Year is a category for some species that are difficult to age based on visible characteristics, and therefore can only be sorted into Hatch Year or After Hatch Year but not much more specific than that. After Second Year birds are birds that are at least two years old. They are in full adult plumage and have no juvenile or second year feathers.

2022 Overall MAPS Banded Birds Age Distribution



	Bear Paw Timberlands Banding Station	Michael Cline Memorial Forest Banding Station
Hatch Year	24%	31%
Second Year	10%	16%
After Hatch Year	10%	8%
After Second Year	56%	45%

The vast majority of the birds we banded this season both overall and at each individual site were After Second Year, or birds that are at least two years old. A lot of the time in songbird species, older individuals will stake out and defend higher quality breeding territory than younger birds. Our abundance of adult birds indicate that the Bear Paw Timberlands and the Michael Cline Memorial Forest are desirable habitats for breeding songbirds. The presence of Hatch Year birds-or birds that hatched this summer, tells us that nests for that species were successful, and indicates that we are providing adequate nesting and fledgling habitat.

TROUT ECOLOGY AND STREAM RESTORATION PROJECT



2022



During the summer of 2022, We conducted pre-treatment assessments on two streams, the Melvin River and an unnamed tributary feeding into Mirror Lake, located in the Tuftonboro and Wolfeboro area to establish baseline conditions before conducting just under 2 miles of large wood additions to restore these streams. The addition of these two streams brings our total of stream restoration and assessment activities in Carroll County to 21.5 miles on 26 streams, beginning with White Lot Brook in 2010. Large wood in streams slows stream velocity, which in turn can increase scouring that leads to deeper and more frequent pools—important brook trout habitat. Large wood in streams also re- engages floodplains, increases nutrient retention through the rafting of organic material, and increases instream habitat complexity.

During the summer 2022 field season, we collected pre-treatment data on the Melvin River and an unnamed tributary of Mirror Lake. The data we collected included instream habitat characteristics, wood load surveys, benthic macroinvertebrate sampling, and electrofishing. We collect pre-treatment data to establish baseline conditions of the streams that we conduct restoration activities on. In 3–5 years, the TMCC research team will reassess the habitat and biological data at the Melvin River and unnamed tributary to evaluate the impact that the large wood additions have had on the stream ecosystem.

Left: Segments of the Melvin River pre-treatment with large wood additions

TROUT ECOLOGY AND STREAM RESTORATION PROJECT

Pre-treatment Assessments

Percent cover of large wood in Melvin River before large wood additions: 1.87%

Percent cover of large wood in Unnamed Tributary of Mirror Lake before large wood additions: 1.86%

Habitat Data Category	Melvin River	Unnamed Tributary of Mirror Lake
Average Riffle Depth	7.86 inches	2.03 inches
Average Pool Depth	17.47 inches	8.45 inches
Average Wetted Width	15.04 feet	5.35 feet
Average Bankfull Width	17.87 feet	10.83 feet
Primary Substrate	Sand	Sand
Secondary Substrate	Organic material	Organic Material
Average Percent Cover	8.08%	3.43%
Primary Cover Type	Wood	Wood
Canopy Cover	>75%	>75%

Habitat Assessments:

Our habitat assessments involve several components to get a sense of the stream conditions both before and after large wood additions. Every 100ft, we take measurements at one representative riffle and one representative pool including taking water depths, measuring bankfull and wetted widths, assessing the streambed substrate, measuring the percent hiding and resting cover, and canopy cover. We use these data to compare with post-treatment numbers to assess whether large wood additions have deepened pools, accumulated more or larger streambed substrate, increased cover in habitat units, and generally increased instream habitat complexity.

Instream Wood Survey:

Before adding large wood, we catalog the existing naturally occurring large wood in the entire treatment reach of our study streams. We take length and width measurements, and record the placement of the wood in the stream, whether the wood has formed a pool, and whether the wood is storing sediment or rafted organic material.

Instream Wood Data Category	Melvin River	Unnamed Tributary to Mirror Lake
Average Length of Large Wood Pieces	13.2 feet	9.01 feet
Average Diameter of Large Wood Pieces	8.05 inches	7.73 inches
Proportion of Wood Forming Pools	72.7%	51.6%
Proportion of Wood Storing Sediment	63.8%	66.6%
Proportion of Wood Rafting Organic Material	80.2%	78.3%

TROUT ECOLOGY AND STREAM RESTORATION PROJECT

Electrofishing

In July and August we electrofished three 100m segments of the Melvin River, with a second pass of the last 50m of each segment to establish pre-large wood addition treatment baseline conditions of the fish population.

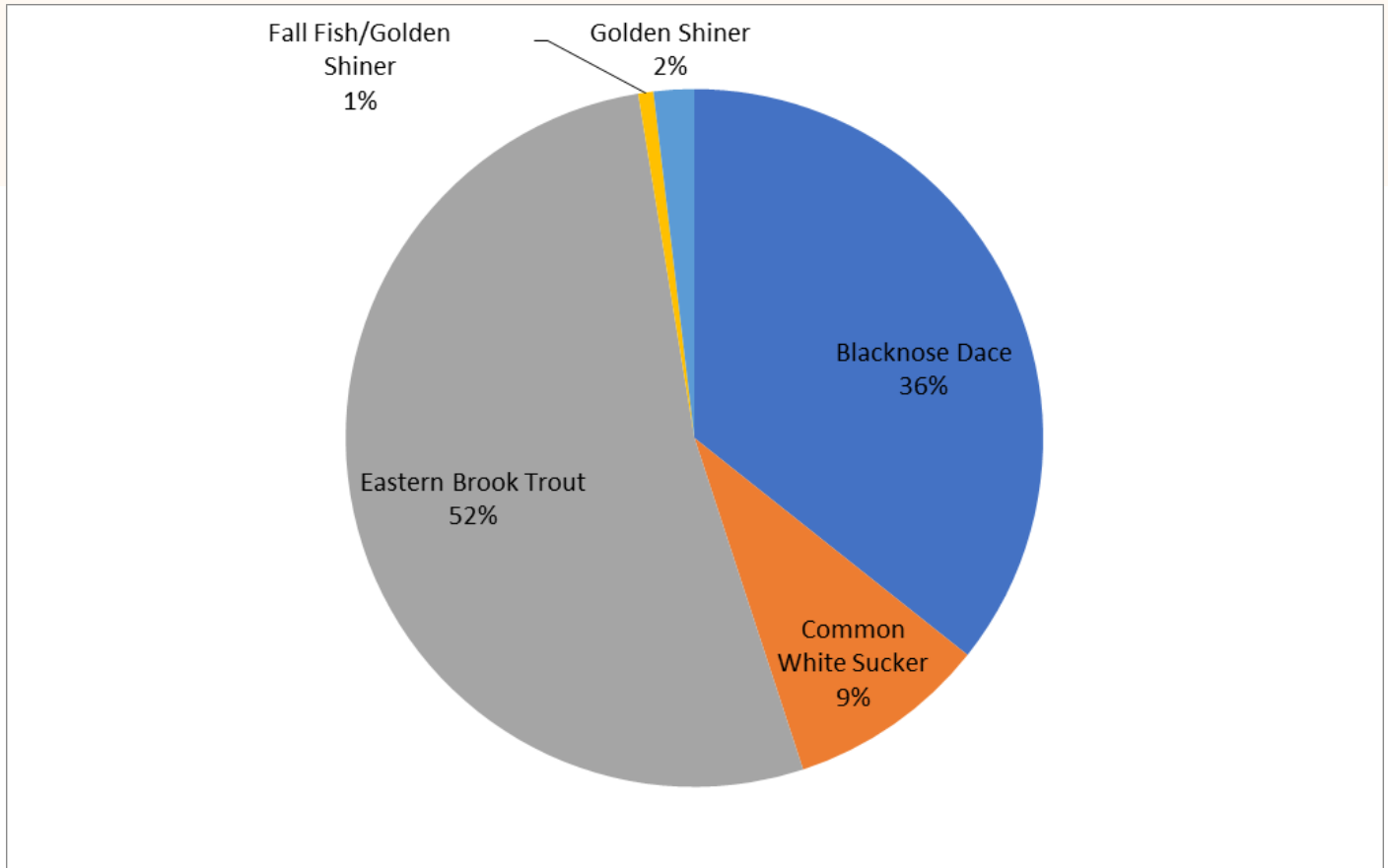
TMCC Research Team and NH Fish and Game taking measurements of fish caught during our electrofishing surveys this year



A Common White Sucker (left) and Eastern Brook Trout (right) captured on our electrofishing survey of the Melvin River

TROUT ECOLOGY AND STREAM RESTORATION PROJECT

Fish Population Caught During Melvin River Electrofishing:



Metrics of Melvin River Fish Population

Species	Density (n/100m)	Average Weight (g)	Average Length (mm)	Max Weight (g)	Max Length (mm)
Blacknose Dace	67.6	1.9	56.7	22.0	86.0
Common White Sucker	17.6	7.5	88.2	37.6	152
Eastern Brook Trout	99.3	9.6	85.9	128	220
Fall Fish/Golden Shiner	1.3	2.8	68.2	4.1	73
Golden Shiner	3.5	4.4	76.6	10.2	104

TROUT ECOLOGY AND STREAM RESTORATION PROJECT

Benthic Macroinvertebrate Sampling

We sampled for benthic macroinvertebrates using a D-frame net at three locations each on the Melvin River and Unnamed tributary to Mirror Lake to get a sense of the macroinvertebrate community pre-treatment with large wood additions.



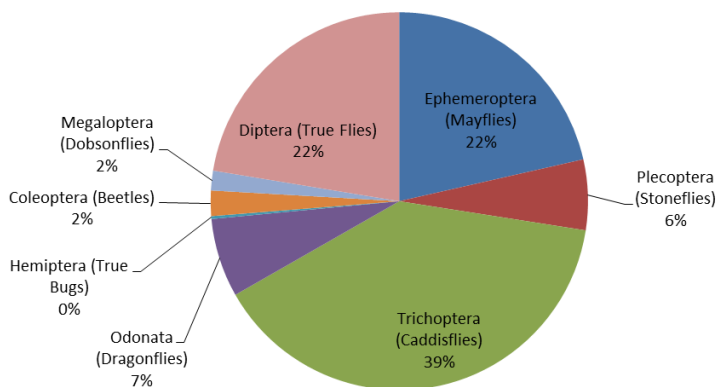
A Mayfly larva in the genus *Epeorus* collected at the Melvin River (top), and some very large dragonfly larvae found during electrofishing (bottom)

On the Melvin River, Trichoptera, or Caddisflies, were the most prominent order of benthic macroinvertebrates. The most common Genus of Trichoptera that we found in our sampling was *Agapetus*.

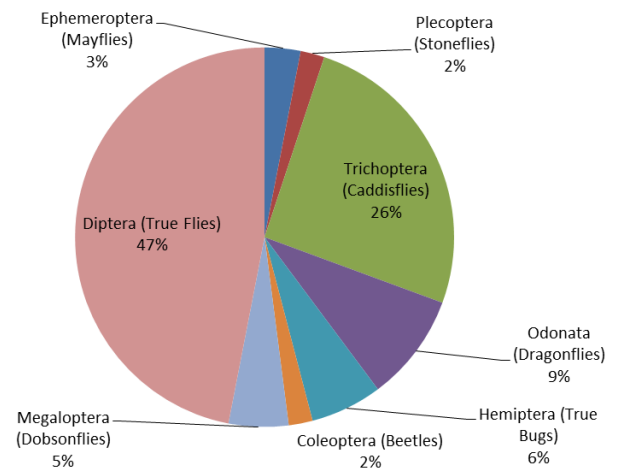
Our sampling on the Unnamed tributary to Mirror Lake revealed that the most common order of benthic macroinvertebrate was Diptera, or True Flies. The most common Genus in our sample of Dipterids was *Chrysops*, or deer flies.

The majority of the benthic macroinvertebrates that we sampled on the Melvin River had pollution tolerances below 4, with most having a tolerance of 0, with the exception of individuals in the order Diptera. The presence of these pollution intolerant species indicates that pre-treatment with woody additions, the Melvin River had a starting higher water quality. The Unnamed tributary to Mirror Lake had fewer insects with low pollution tolerance values, and a prevalence of insects in the order Diptera with high pollution tolerance values. This indicates lower water quality prior to large wood additions.

Benthic Macroinvertebrate Community: Melvin River



Benthic Macroinvertebrate Community: Unnamed Tributary to Mirror Lake



TROUT ECOLOGY AND STREAM RESTORATION PROJECT

Large Wood Additions



Examples of large wood additions placed in the Melvin River

Starting in August, the Trout Ecology and Stream Restoration interns, other TMCC research Staff, and our consulting sawyer, Ryan Harvey, conducted large wood additions on 1.3 miles of the Melvin River and 0.4 miles of the Unnamed tributary to Mirror Lake. We added wood to achieve an average of 4–5 large wood pieces every 100 feet of the treatment reach, using trees from the surrounding forest outside of a 25 foot buffer.

Re-assessment of Previously Treated Streams

In addition to the pre-treatment conditions we assessed at the Melvin River, we also reassessed conditions at Allen Brook, a stream in Tamworth NH located on Chocorua Lake Conservancy Land that the TMCC research team treated with large wood additions in 2018 and 2019. Our Trout Ecology and Stream Restoration Interns for the 2022 field season are working on a paper outlining the pre-treatment versus three to four years-post-treatment conditions of Allen Brook. In general, they have found that the proportion of wood forming pools has almost doubled pre- versus post-treatment, an increase in the proportion of wood storing sediment and rafted organic material, and an increase in wetted widths, and pool and riffle depths. Emily and Will also found an increase in large woody material beyond what was added in 2018 and 2019. This tells us that our adding large wood to Allen Brook not only increased large woody material in the stream artificially, but also our efforts have increased the natural recruitment of large wood in the stream in the years post-treatment. The wood we added has increased pool depth and frequency, and increased the rafting of organic material and sediment. All of these factors contribute to more ideal brook trout habitat. To that point, the analyses that Emily and Will are working on also show an increase in brook trout density and abundance when comparing pre-treatment versus post-treatment numbers. Stay tuned for the full report!

FIELD SEASON NOTES



2022

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