Annual 2023 Report for FRCC:

Principal Investigator: Carole Cheah, Ph.D.

The Connecticut Agricultural Experiment Station, Windsor, CT

P**roject Title:** Expansion of biological control releases to protect eastern hemlocks from HWA invasions in the upper Farmington River watershed

The upper west branch of the Farmington River has several tributaries which have a heavy component of eastern hemlock which shade and maintain cold water temperatures which then feed into the Upper Farmington. In 2022, hemlock decline was observed from hemlock woolly adelgid (HWA) infestations in these watershed forests which are also recovering from the stress from the moderate summer drought of 2022. Prolonged dry periods exacerbates impacts from HWA and other pests on hemlock health which in turn threatens dependent native wildlife and plant species. After 2-3 warm winters, recent widespread HWA infestations were recently discovered in October 2022.

In 2023, through funding from the Farmington River Coordinating Committee (FRCC), 5,000 *S. tsugae* were purchased for strategic releases on HWA infestations along the Farmington, with expansion of releases to its tributaries to control HWA. Tree Savers hand delivered FRCC shipments of *S. tsugae* to the PI's laboratory in Windsor in late May-early June where the beetles were maintained in cool temperatures in an incubator until the day of release.

S. tsugae deliveries from PA

Transporting beetles in cooler bags to field release sites

All release sites had been extensively pre-scouted for suitable HWA populations during the fall of 2022 and early winter of 2023. However, on Feb 4, 2023, CT experienced a sudden polar vortex event which brought extreme subzero arctic air over much of the state for a few hours. From the PI's assessments. Connecticut recorded an average of 90% of HWA statewide with northern sites experiencing over 95% HWA winter mortality. This was a significant challenge to the release program so the PI had to recheck all release sites with marked hemlocks again in late winter-early spring for viable HWA. The PI sampled riparian corridors where biological control was to be implemented and through intensive assessments recorded significant high mortality of HWA near or over 90% in most areas. However, greater variability in HWA survival was found along rivers and streams than in other interior and higher elevation sites. These infested hemlocks near rivers and streams with pockets of viable HWA were thus selected for 2023 beetle releases. The PI also delayed predator releases until mid-late spring in early-mid June as this facilitated the reproduction of clusters of HWA winter survivors to provide prey for establishing the

predators. Beetles were then released in early-mid June 2023 to target the resulting second summer HWA generation to further reduce HWA rebound and spread.

FRCC Wild + Scenic 2023 Releases of *Sasajiscymnus tsugae*

Species	No.	Date Released	Location	Town
Sasajiscymnus tsugae	600	June 4	Pratt Preserve on Cherry Brook; Canton Conservation LT	Canton
"	100	June 4	Riverview Park, New Hartford LT (FR)	New Hartford
"	200	June 4	Helen Butler River Trail (FR)	New Hartford
"	100	June 6	Mill District Preserve, Hartland LT	Hartland
"	100 + 400	June 6 June 7	MDC Hogback Rd (FR)	Barkhamsted
"	200 + 600	June 6 June 9	Tunxis Trail, Nepaug SF, Satan's Kingdom (FR)	New Hartford
	500 200	June 6	Mathies Grove South, Peoples SF (FR) East River Road (North end)	Barkhamsted
	600	June 6	Austin Hawes Campground, American Legion SF	Barkhamsted
	700 100	June 13 June 16	Sandy Brook Natural Area Preserve, Algonquin SF	Colebrook
	100	June 15	Werner Woods, Nepaug SF, Roaring Brook Nature Center on Jim Brook	Canton
	500	June 16	Howells Brook + Pond and Beach Brook	Hartland
TOTAL	**5,000**		**TOTAL FRCC = 5,000**	

Partners in 2023 for the Upper Farmington River HWA biological control program are FRCC, Dr. Cheah of the CAES, CT DEEP Foresters (for state forest sites), Hartland Land Trust (LT), Canton Conservation LT, New Hartford LT and Town of New Hartford, Metropolitan District Commission (MDC), Friends of American Legion and Peoples State Forests (FALPS), and Roaring Brook Nature Center, part of the Children's Museum Group. Biological control releases of *S. tsugae* through FRCC to protect hemlocks in this watershed now total 11,250 from 2020 – 2023. All 5 member towns (Canton, New Hartford, Barkhamsted, Hartland and Colebrook) had HWA biocontrol releases implemented with the assistance of DEEP foresters, volunteers from the FRCC, FALPS, land trust members, Farmington River Stewards on 58 infested hemlocks along the Farmington River and its tributaries at 5 state forests : Nepaug (Satan's Kingdom, New Hartford & Werner's Woods in Canton; American Legion, Peoples, Tunxis and Algonquin State Forests), 4 town and land trust preserves (Mill District Preserve, Hartland Land Trust; Riverview Park, New Hartford Land Trust; Helen Butler River Trail, New Hartford; Pratt Preserve, Canton Conservation Land Trust; and MDC watershed forests along the Hogback Road. Of special note is the implementation of *S. tsugae* along Sandy Brook in Algonquin State Forest in Colebrook to protect the Sandy Brook Natural Area Preserve and the Kitchel Wilderness Natural Area Preserve, which are preserves of special recognition in Connecticut. The PI and partners released 5,000

S. tsugae to target HWA concentrations along the Farmington River and along 6 tributaries (Howells Brook, Beach Brook, Sandy Brook, Wright Brook, Cherry Brook and Jim Brook) in the Upper Farmington River watershed to reduce HWA populations and spread (Map below, Figure 1).

Assessments of beetle release areas started in the fall of 2023. The abundant rains during the summer and fall of 2023 have spurred tremendous recovery in many previously stressed hemlocks. Surveys of riparian hemlocks where *S. tsugae* were released 2 years ago along the Farmington River in American Legion and Peoples State Forests show dramatic recovery and continued reductions in HWA which attest to the success of HWA biological control introductions of *S. tsugae*:

Recovery of hemlocks at the Austin Hawes campground along the river, American Legion SF Oct 2023

Hemlock recovery at Whittemore Grove, Peoples State Forest, 2 years after release

The Upper Farmington River May 2023

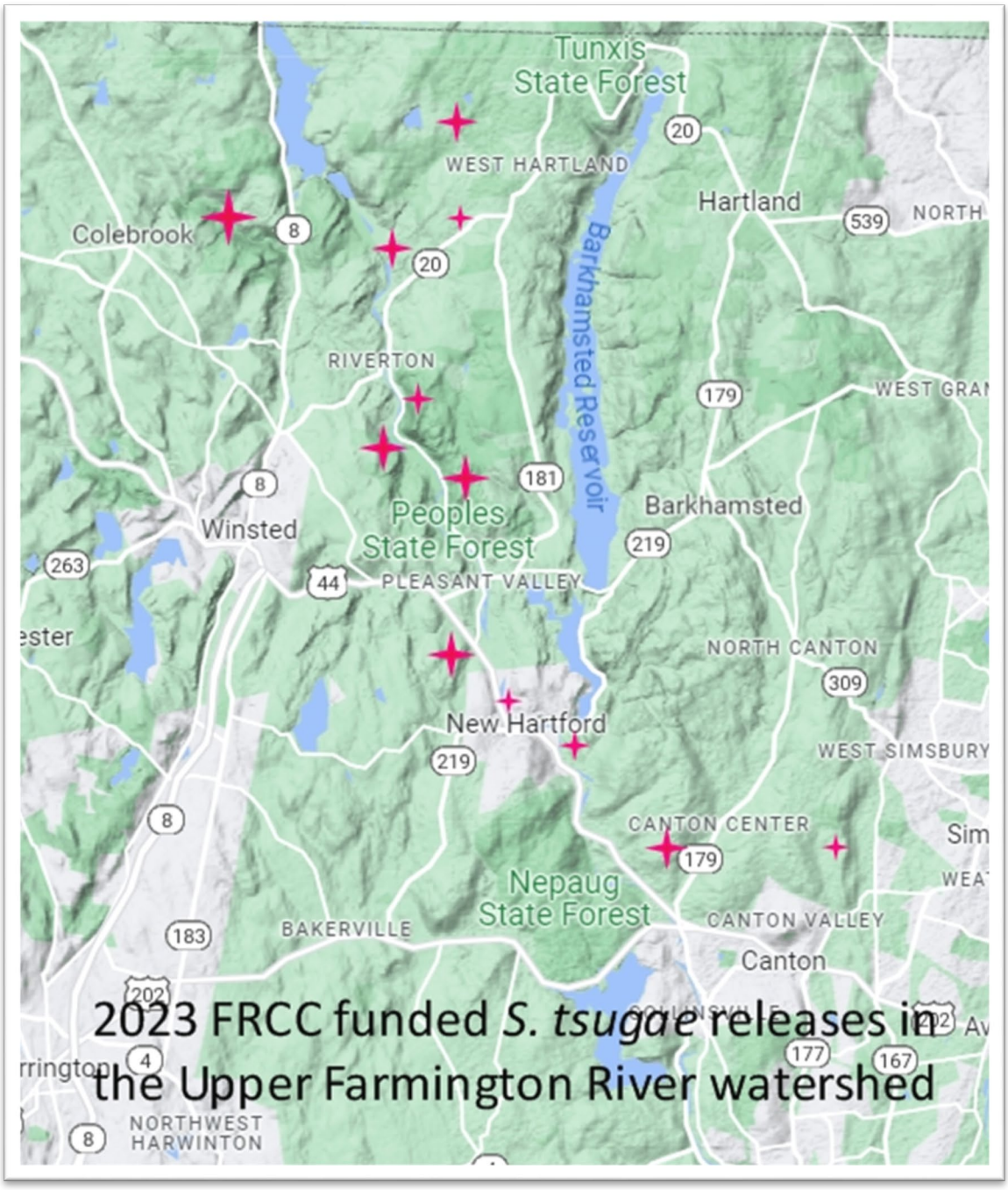

Figure 1. Map showing the areas 5,000 *S. tsugae* were released on HWA infested hemlocks in June 2023 in the Upper Farmington River watershed forests





FALPS and FRCC members helped to release 1500 beetles along the Farmington River at Mathies Grove, Peoples State Forest and at Austin Hawes campground, American Legion State Forest, June 6, 2023




CT DEEP state foresters released beetles along Howells Brook, Tunxis SF, and Sandy Brook, Algonquin State Forest June 16, 2023


Members of Hartland Land Trust released beetles at Mill District Preserve June 6, 2023







Releasing beetles at the Pratt Preserve on Cherry Brook, with the Farmington River Stewards and members of Canton CLT during the Canton Conservation Land Trust AGM, June 4

Releasing beetles in Werner Woods, Nepaug SF, along Jim Brook at the Roaring Brook Nature Center June 15, 2023

In late fall 2023 into 2024, the PI detected spotty HWA infestations along the Upper Farmington and along several tributaries. The infestations were new and occurred on the new growth of recovering hemlocks, possibly indicating new invasions along the water courses. It may be prudent to continue biological control releases of *S. tsugae* in such areas in 2024 to continue suppression efforts over the entire watershed area to help preserve the hemlocks. To date, emergent HWA has been detected in new areas along East Mountain Brook, at New Hartford LT properties; lower Jim Brook, Nepaug State Forest, Canton; and at Peoples and American Legion State Forests along the Farmington River. Scouting will be expanded and will continue through the winter of 2024 to assess other riparian corridors along the Upper Farmington River and its tributaries.

Funding support at the same level to purchase 5,000 *S. tsugae* from Tree Savers in 2024 for continuation of the expanded 2023 HWA biological control along the Upper Farmington and its tributaries is requested.

Prepared by Carole Cheah