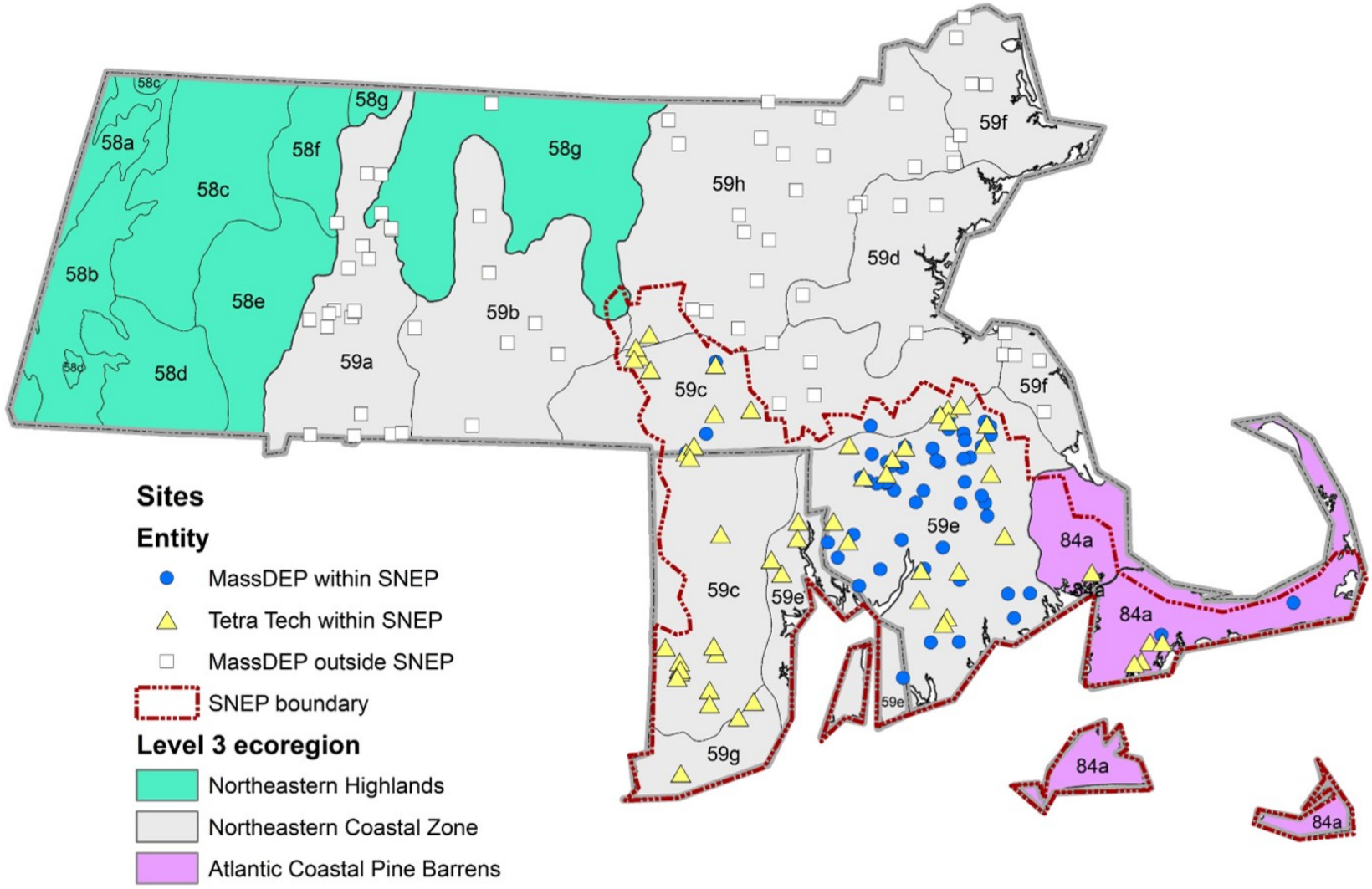

Figure 1. Locations of sites in the SNEP low gradient IBI development dataset (n=109 unique sites), coded by sampling entity (MassDEP or Tetra Tech), with Level 3 ecoregions as the backdrop. An additional 69 low gradient sites in MA that are outside the SNEP boundary were included in some of the analyses.

2.1.2 Collection method

Macroinvertebrate data were collected by MassDEP and Tetra Tech field crews. The MassDEP samples were collected in accordance with MassDEP's standard operating procedures (Nuzzo 2003) and Quality Assurance Project Plan (QAPP) (MassDEP 2004) and the SNEP samples were collected following the SNEP IBI Sampling Analysis Plan (Tetra Tech 2019). Samples consisted of a composite of 10 jabs, sweeps, or kicks from multiple habitats within a 100-meter reach. Samples were collected from July 1 through September 30 when baseflows are typically at the lowest of the year and levels of stress to aquatic organisms are presumed to be greatest. Major habitat types included submerged wood, submerged vegetation, undercut banks, overhanging vegetation, and hard substrate. Habitats were sampled in rough proportion to their occurrence within the reach. For example, if the habitat was 50% submerged wood, 30% submerged vegetation and 20% vegetated margins/banks, then five jabs were taken from submerged wood, three from submerged vegetation, and two from vegetated margins/banks. Field crews used a kick-net with 500 to 600-µm mesh. Table 2 summarizes the MassDEP and SNEP low gradient protocols. The main differences between the protocols were that MassDEP used a brush on woody debris and Tetra Tech field crews used a net with a smaller frame size (28-cm wide opening vs. 46-cm for MassDEP). The SNEP protocols also specify a time limit on each jab (between 30 to 45 seconds), while MassDEP protocols do not. However, MassDEP uses a comparable level of effort (James Meek (MassDEP), personal communication).

Samples were labeled and preserved in the field with denatured 95% ethanol, then brought to the lab for sorting. The sorting procedure entailed distributing whole samples in pans, selecting grids within the pans at random, and sorting specimens from the other materials in the sample until approximately 300 organisms were extracted. Specimens were identified to genus or species as allowed by available keys, specimen condition, and specimen maturity. Cole Ecological, Inc. processed and identified the samples. As a quality control (QC) measure, ten randomly selected samples from the 2019 dataset were independently identified and enumerated both by Cole Ecological, Inc. and Watershed Assessment Associates. The results, which are provided in Attachment A, met the data quality objectives in the MassDEP and SNEP sampling plans.