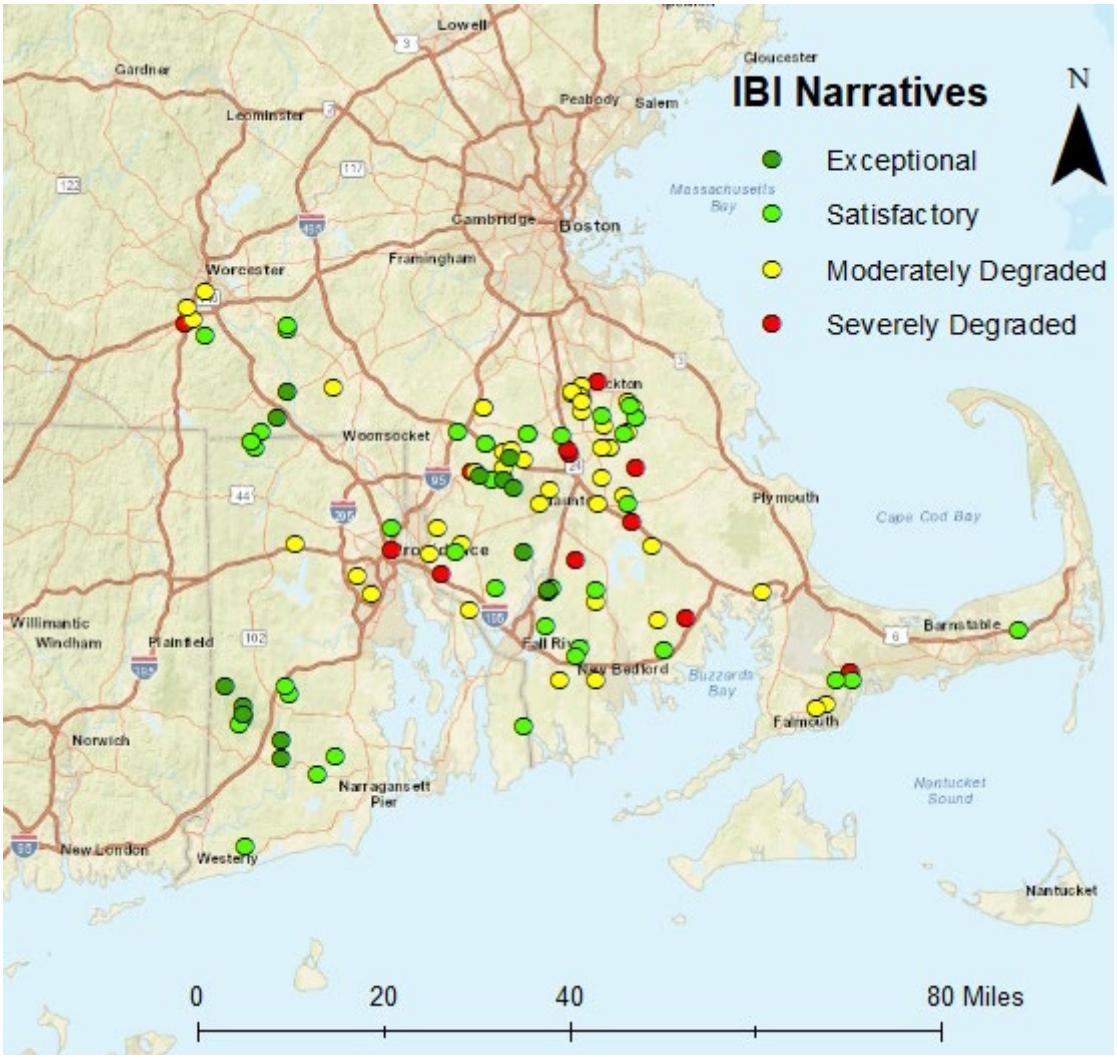

Figure 30. Low gradient, multihabitat sites in the SNEP region color-coded by biological condition category based on the recommended IBI thresholds in Table 17.

7 Applications

The SNEP IBI improves the ability of resource managers in the Southeast New England region to identify degradation in biological integrity and water quality in low gradient, non-tidal, wadeable streams. The IBI is comprised of biological metrics that were found to be responsive to a general stressor gradient, are ecologically meaningful, diverse in response mechanisms and represent multiple metric categories (composition, functional feeding group, tolerance, and voltinism). During calibration, the IBI had minimal error when discriminating between reference and stressed sites. When validated with independent data, the IBI also performed well, showing the expected direction of response in relation to various measures of anthropogenic disturbance. The IBI was calibrated using the Reference Condition approach, which bases biological expectations on least-disturbed reference sites. If a site receives an IBI score that does not resemble reference scores, it indicates that there might be stressors influencing the biological condition at that site.

The IBI can be calculated using information presented in this report to assemble valid sample data, calculate metrics from revised traits, score metrics, and calculate the index. However, an option for calculating the IBI is also available through a free R-based tool (referred to as a Shiny app). The IBI calculator can be accessed via this weblink:

https://tetratech-wtr-wne.shinyapps.io/SNEPtools

Shiny apps are interactive web applications that are linked to R software, which is an open source programming language and software environment for statistical computing. The IBI calculator is easy to operate and only requires an input dataset (formatted in a specific way) to function. Users should keep in mind that they can run any data through the IBI calculator and get a result. However, if samples do not meet the criteria listed below, results should be interpreted with caution.

Criteria:

- Geographic area: the Southeast New England region of Massachusetts and Rhode Island (Figure 1)
- Stream type: low gradient, non-tidal, wadeable, perennial, slow moving streams with soft or hard substrate, with at least one of the following habitats: snags, root wads, leaf packs, aquatic macrophytes, undercut banks, overhanging vegetation, or hard bottom.
- Subsample size: 300-count samples are recommended for best performance, but the IBI can also be applied to 200 or 100-count samples
- Taxonomic resolution: lowest practical level
- Collection gear: Aquatic Kick Net with 500-µm mesh
- Collection method: 10 kicks, sweeps, and/or jabs from multiple habitats (listed above) taken over a 100-m reach and then composited into a single sample. Habitats are sampled in proportion to their occurrence
- Collection period: July 1–September 30

The macroinvertebrate IBI can be used to assess stream degradation relative to least-disturbed multihabitat streams. Some state biomonitoring programs take the additional step of establishing numeric IBI thresholds in their Surface Water Quality Standards (SWQS) to designate different categories of biological condition and to assess attainment of aquatic life use standards. MassDEP and RI DEM explored potential thresholds for four biological condition categories (Exceptional Condition, Satisfactory Condition, Moderately Degraded, and Severely Degraded). The thresholds proposed in this report are preliminary and subject to further review, refinement, and approval by MassDEP and RI DEM before they are applicable in biological assessment programs. Moving ahead, in addition to further exploring potential IBI thresholds, MassDEP, RI DEM and other biomonitoring