2022 Work Plan for
Protected Instream Flow Program Field Activities

(Baseline Data Collection, Protected Instream Flow Studies, and Long-Term Monitoring)

North Branch River, Antrim, NH – Pilot near real-time water level station at USGS-01084000 in 2021

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Introduction

The New Hampshire Instream Flow Program annually collects and manages environmental data pursuant to three categories of field data needs:

- Environmental data necessary to establish baseline conditions on designated rivers in advance of Protected Instream Flow Studies, in many cases to eliminate data gaps to facilitate such studies.
- Environmental data collected as part of Protected Instream Flow Studies.
- Long-term environmental monitoring data to assess the effectiveness of instream flow protection and the Water Management Plans on meeting Water Quality Standards as demonstrated by long-term trends in biological conditions.

This Work Plan describes the tasks to be performed during the 2022 field season in support of these objectives, to organize activities associated with all three categories in a way that maximizes efficiency. This work plan also serves to inform associated NHDES Bureaus, other State departments, and the public of the Instream Flow Program's planned activities.

Baseline Environmental Data Collection

Baseline environmental data are needed to assess the effectiveness of instream flow protection and the Water Management Plans on maintaining or improving water quality as demonstrated by long-term trends in hydrological conditions. Baseline data will be used to evaluate the effectiveness of the Water Management Plans on meeting instream flow objectives and the Water Quality Standards.

Lack of sufficient baseline environmental data can be a data gap which impedes performing a Protected Instream Flow Study for a designated river. A substantial portion of Instream Flow Program resources are dedicated to elimination of data gaps, primarily stream flow data quality and quantity, for the most part through contracts with private and public entities, such as US Geological Survey for stream gage development and rating curve maintenance. NHDES' Instream flow Program staff provide contract development, technical review, and, in the way of field activities, limited field oversight of data acquisition activities. In 2022, NHDES will install eight (8) near-real-time streamflow stations to eliminate data gaps on ungaged designated rivers.

In addition, baseline environmental data are also collected to assess conditions at possible, future long-term monitoring stations. Future long-term monitoring stations are selected from among existing electrofishing and other sampling stations. One or two of these stations are selected to represent each Target Fish Community segment. Final selection of the representative long-term monitoring station for each segment will be based on observations and photos taken during deployment and retrieval, representativeness of the positions of the stations within the Target Fish Community segment, and evaluation of the suitability for electrofishing by the Biomonitoring Section staff. Baseline environmental data are collected primarily by deploying dataloggers at points of interest along designated rivers and their major tributaries and includes electrofishing and riparian habitat surveys.

Protected Instream Flow Study Environmental Data Collection

Instream Flow Program staff collect environmental data to support certain components of Protected Instream Flow Studies performed on designated rivers included on the Priority List (see the Instream Flow webpage for the

current Priority List). Refer to Administrative Rule Env-Wq 1904 for further details regarding the components of a Protected Instream Flow Study. At this time, such data collection is limited to the following tasks:

- A windshield survey of the length of the designated river, to identify flow-dependent instream public uses, including:
    - Access points/parking for the On-The-Water Stream Survey.
    - Broad characterization of stream classification, including Gradient Class and Size Class.
    - Documentation of recreational uses of the river.
    - Location and identification of access to existing electrofishing stations.
    - Preliminary identification/inspection of potential hydraulic and floodplain transect locations.
- An On-the-Water Stream Survey of the length of the designated river, to document the following items:
    - The location of each previously identified instream public use.
    - Characterization of riparian ecosystems located along the designated river.
    - Identification of future riparian ecosystem long-term monitoring transects.
- Perform Riparian Ecosystem Surveys at future riparian ecosystem long-term monitoring transects in accordance with SOP *NHDES Protocols for Long-Term Monitoring of Riparian Ecosystems.*

In addition, the Instream Flow Program contracts many of the tasks associated with Protected Instream Flow Studies to outside contractors. Instream Flow Program staff typically perform limited field oversight of these contractors, coordinating field activities with other Instream Flow Program activities to the degree possible. For example, the Instream Flow Program will contract the Aquatic Habitat Survey, which is accomplished during an On-the-Water Survey; Instream Flow Program staff will identify their Riparian Ecosystem Survey transects during an On-the-Water Survey synchronously with their contractor, maximizing data compatibility and communication between the program and its contractor, as well as providing an opportunity for quality control/quality assurance.

Protected Instream Flow Long-Term Monitoring

Long-term monitoring is performed to assess the effectiveness of instream flow protection and the Water Management Plans on meeting Water Quality Standards, by looking for long-term trends in physical and biological conditions. These results will determine whether the Water Management Plans are meeting Water Quality Standards, or whether the Water Management Plans should be modified using adaptive management practices. The program collects environmental data at long-term monitoring stations on each Designated River, located within segments having similar character under its Target Fish Community assessment.

NHDES' Instream Flow Program conducts long-term monitoring on the designated Lamprey and Souhegan Rivers, the only two designated rivers with Water Management Plans (with the Cold River plan expected during 2022). The components of the long-term monitoring program under the Water Management Plans are subject to revision utilizing adaptive management practices, if the proposed management activities do not prove to be effective in meeting the Water Quality Standards. The assessment measures and methods of this program are designed to measure changes in the protected entity communities resulting from the application of management for maintaining protected instream flow. At this time, such data collection is limited to the following tasks:

- Daily comparison of mean daily discharge at selected USGS gages to protected instream flow values.
- Monitoring of relief pulses in response to Critical or Rare Flow events relative to protected instream flow values.
- Periodic aquatic habitat monitoring utilizing the following environmental data:
    - Water quality monitoring using dataloggers to determine aquatic habitat suitability.

    - Electrofishing in accordance with SOP *NHDES Protocols for Collection, Identification, and Enumeration of Freshwater Fishes* to identify the fish species present in the river.
- Periodic Riparian Ecosystem Surveys at riparian ecosystem long-term monitoring transects in accordance with SOP *NHDES Protocols for Long-Term Monitoring of Riparian Ecosystems.*

In addition to the above-listed long-term monitoring stations, the Instream Flow Program coordinates with the Watershed Bureau's River Trend Monitoring and Biomonitoring Programs to identify locations for water quality/quantity data collection that may provide datasets for the future long-term monitoring stations on the designated Ashuelot, Cold, Isinglass, Pemigewasset, and Warner Rivers.

Proposed Environmental Data Collection Activities for 2022

Baseline Water Quantity/Quality Data Collection

Streamflow Data Collection

During 2021, the Instream Flow Program successfully installed and operated an Onset® MicroRX 2104 near real-time streamflow station at former USGS gage 01084000, in Antrim, on the designated North Branch. This streamflow station continues to operate and will be maintained during 2022. Following up on the success of this effort, the Program will install eight (8) more Onset® near real-time stations on designated rivers across the state.

In support of this effort, USGS remains contracted by NHDES to make discharge measurements at three (3) of these stations (USGS-01084000, USGS-01090812, and USGS-01137940) between 2021 and 2022 and update their rating curves based on these measurements. The addition of NHDES' wireless, near-real time water level stations at these locations will allow the Instream Flow Program to transform river stage data to streamflow data and extend the period-of-record for the gage, both by collecting new streamflow data and by applying the new streamflow data to estimation of discharge during the data gaps using the QPPQ Method. For the remaining 6 streamflow stations, Instream Flow Program staff will make discharge measurements following their installation, and update or create their rating curves based on these measurements. The near real-time data available will posted to NHDES' Instream Flow webpage, using the Public Dashboard feature of Onset® Cloud storage/reporting.

Table 1 summarizes the proposed streamflow stations. Figure 1a depicts the proposed streamflow stations in the designated Ammonoosuc River, and Figure 1b depicts the proposed streamflow stations in the designated Exeter, Lamprey, and Piscataquog River watersheds.

Table 1: Proposed Streamflow Stations on the Designated Ammonoosuc, Contoocook, Exeter, Lamprey, and Piscataquog Rivers

Station	Station Type	Town	Latitude (D.ddddd°)	Longitude (D.ddddd°)
Ammonoosuc River (Data Gap Elimination)				
USGS-01137940	Onset® MicroRX 2104	Lisbon	44.21250° N	-71.91417° W
28G-AMM	Onset® MicroRX 2104	Crawford's Purchase	44.26306° N	-71.40737° W
Contoocook River (Data Gap Elimination)				
USGS-01084000*	Onset® MicroRX 2104	Antrim	43.08166° N	-71.97885° W
Exeter River (Data Gap Elimination)				
EXETER-04	Onset® MicroRX 2104	Exeter	42.98012° N	-70.94296° W

Lamprey Designated River (Data Gap Elimination)				
01-LTR	Onset® MicroRX 2104	Epping	43.11133° N	-71.01196° W
USGS-01073460	Onset® MicroRX 2104	Lee	43.08417° N	-71.04191° W
03-PIS	Onset® MicroRX 2104	Newmarket	43. 06895° N	-70.96195° W
03R-PAR	Onset® HOBO U20L-004 datalogger	Nottingham	43. 07239° N	-71. 14000° W
NBR-08	Onset® HOBO U20L-004 datalogger	Candia	43. 07339° N	-71. 27900° W
Piscataquog River (Data Gap Elimination)				
USGS-01090812*	Onset® MicroRX 2104	Goffstown	43.024104° N	-71.628427° W
01-MIP	Onset® MicroRX 2104	New Boston	43.005869° N	-71.664191° W

D.ddddd° – Degrees to five decimal places

* - deployed in 2021, maintained during 2022, not pictured

Figure 1a: Proposed Streamflow Stations on the Designated Ammonoosuc River

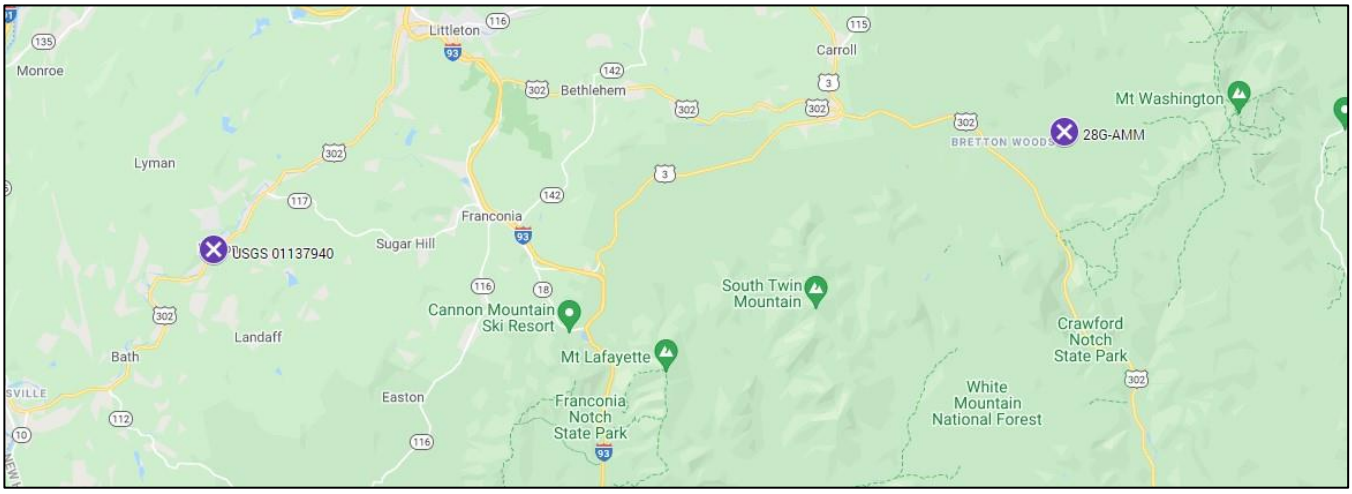
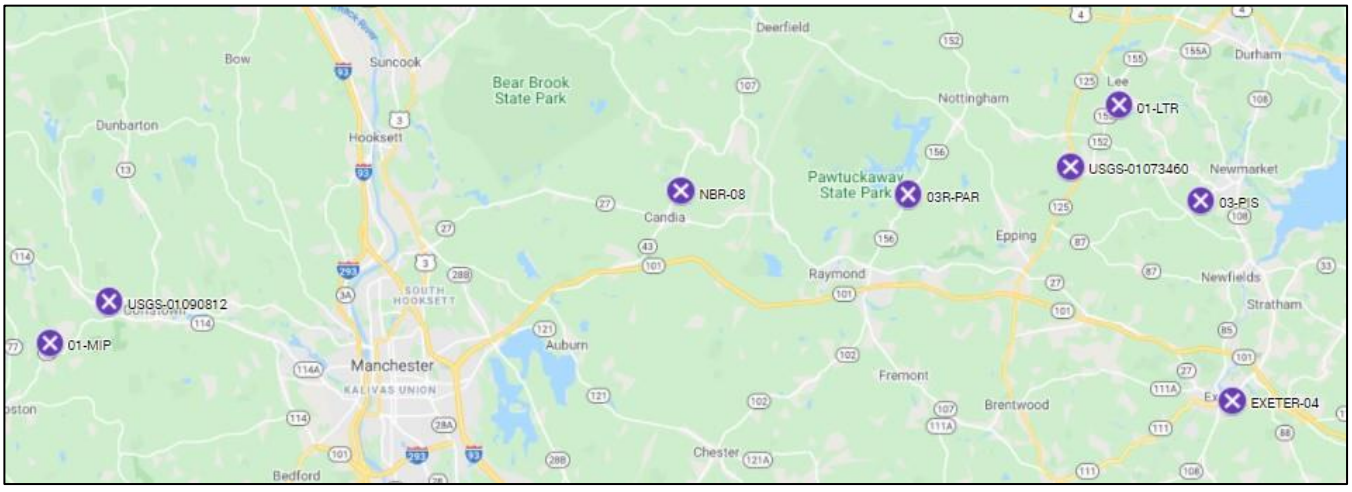


Figure 1b: Proposed Streamflow Stations on the Designated Exeter, Lamprey, and Piscataquog Rivers



Surface Water Data Collection

The sampling design for the designated Ashuelot, Cold, Isinglass, Pemigewasset, and Warner Rivers is intended to collect baseline water quality and quantity data pertinent to water use, including impoundments/withdrawals, recreational use, the maintenance and support of fish and aquatic life and riparian habitats. These data will be used to develop the Water Management Plan for each designated river. The water quality and quantity data include the following parameters:

- Evaluate conductivity as an indicator of water quality at select stations where water quality issues are suspected.
- Evaluate water temperature as a parameter related to:
    - The relationship between impoundments and river reaches in the Designated River.
    - The use of water temperature as a surrogate for dissolved oxygen for use as an aquatic habitat suitability.
    - The suitability of the river for Target Fish Communities previously identified within the Designated River.
- Evaluate water depth as a surrogate for discharge at stations remote from current US Geological Survey gages or at discontinued US Geological Survey gages, to improve the understanding of the hydrology of each designated river.
- To eliminate critical gaps in the US Geological Survey gage network where water depth data, combined with stream flow measurements, can be used as a surrogate.
- To document the retention and alteration of water passing through impoundments along the rivers.
- To extend the record for prior sampling performed by other parties (i.e., US Geological Survey and NH Fish and Game Department).

The following sampling design is boosted by receipt of a grant of seventeen (17) dataloggers to the Instream Flow Program from the US Environmental Protection Agency in Spring 2021.

During the 2022 field season, twenty-two (22) baseline measurement stations will be utilized in the designated Ashuelot River, six (6) baseline measurement stations will be utilized in the Cold River, eight (8) baseline measurement stations will be utilized in the Isinglass River, ten (10) baseline measurement stations will be utilized in the Pemigewasset River, and two (2) baseline measurement stations will be utilized in the Warner River. The monitoring station locations are based on expanding the datasets available for existing monitoring stations, as well as the locations of confluences with major tributaries and impoundments, and possible future electrofishing and floodplain transect stations. Dataloggers will be used to measure conductivity, temperature, and/or water level at the stations. The dataloggers will be deployed in the spring as soon as each river allows for safe wading access and recovered in the fall before the rivers and their banks freeze and become unsafe. Refer to *NHDES Instream Flow Monitoring Protocols for Conductivity, Temperature, and Water Level Dataloggers* (Appendix A) for details regarding deployment, recovery, and data management methods. Table 2 summarizes the proposed datalogger deployment stations in the Ashuelot Designated River watershed. Figure 2a depicts the datalogger

deployment stations in the designated Ashuelot River watershed, Figure 2a depicts the datalogger deployment stations in the designated Isinglass River watershed, Figure 2b depicts the datalogger deployment stations in the designated Ashuelot River watershed and Figure 2a depicts the datalogger deployment stations in the designated Ashuelot River watershed. See the Schedule section of this work plan for the estimated schedule of these activities.

Long-term Monitoring Data Collection

To track water quality and quantity necessary to maintain and support fish and aquatic life in the Souhegan Rivers, three (3) stations will be used to measure conductivity, water level, and temperature at established long-term monitoring stations within the watershed of each Designated River. The dataloggers will be deployed in the spring as soon as each river allows for safe wading access and recovered in the fall before the rivers and their banks freeze and become unsafe. Refer to NHDES Standard Operating Procedure (SOP) *Instream Flow Monitoring Protocols for Conductivity, Temperature, and Water Level Dataloggers* (Appendix A) for details regarding deployment, recovery, and data management methods.

Datalogger Deployment Parameters

Frequency: Annual

Tasks:

- Late Spring - Conductivity/temperature/water level dataloggers are deployed, with simultaneous hand-held measurements for specific conductance, conductivity, temperature and water depth (for QA/QC);
- Mid-Summer - The dataloggers are checked mid-deployment to confirm their locations remain representative, data collected to date are downloaded, and mid-season hand-held QA/QC check.
- Late Fall - The dataloggers are recovered at the end of the season, with simultaneous hand-held measurements for specific conductance, conductivity, temperature, and water depth (for QA/QC).
- Data download and data management.

Applicable Standard Operating Procedure(s):

- *Instream Flow Monitoring Protocols for Conductivity, Temperature, and Water Level Dataloggers* (2020)

Table 2 summarizes the proposed datalogger deployment stations. Figure 2a depicts the proposed datalogger deployment stations in the designated Ashuelot River watershed; Figure 2b depicts the proposed datalogger deployment stations in the Cold River watershed; Figure 2c depicts the proposed datalogger deployment stations in the Isinglass River watershed; Figure 2d depicts the proposed datalogger deployment stations in the Pemigewasset River watershed; Figure 2e depicts the proposed datalogger deployment stations in the Souhegan River watershed; and Figure 2f depicts the proposed datalogger deployment stations in the Warner River watershed.

Table 2: Stations Proposed for Datalogger Deployment on the Designated Ashuelot, Cold, Isinglass, Pemigewasset, Souhegan, and Warner Rivers

Station	Datalogger Parameters	Town	Latitude (D.ddddd°)	Longitude (D.ddddd°)
Ashuelot River (Baseline Data Collection)				
01-ASH	Conductivity/Temperature	Hinsdale	42.77999° N	-72.49054° W
02-ASH	Temperature*	Hinsdale	42.78599° N	-72.48628° W
05Q-ASH	Temperature	Winchester	42.77267° N	-72.41009° W
07-ASH	Temperature	Winchester	42.77116° N	-72.38617° W
12-ASH	Temperature	Winchester	42.83800° N	-72.36124° W
USGS-01160350	Temperature	Swanzey	42.87139° N	-72.32809° W
16-ASH	Conductivity/Temperature	Swanzey	42.88620° N	-72.28655° W
16C-ASH	Conductivity/Temperature	Swanzey	42.89150° N	-72.28018° W
01-SBA	Temperature/Water Level	Swanzey	42.88898° N	-72.27602° W
16T-ASH	Temperature	Keene	42.91851° N	-72.27880° W
USGS-01158110	Temperature	Keene	42.91926° N	-72.27926° W
01-TBR	Temperature/Water Level	Keene	42.91912° N	-72.27857° W
20A-ASH	Temperature	Keene	42.96115° N	-72.30250° W
21-ASH	Temperature	Surry	42.99216° N	-72.30786° W
21J-ASH	Temperature	Surry	43.01362° N	-72.30998° W
23C-ASH	Temperature	Gilsum	43.05860° N	-72.23970° W
23C-ASH (BARO)	Air Temperature/Barometric Pressure	Gilsum	43.05860° N	-72.23970° W
23T-ASH	Temperature	Gilsum	43.09230° N	-72.19970° W
25-ASH	Temperature	Marlow	43. 13998° N	-72. 19244° W
ASHWASO	Temperature/Water Level	Washington	43.14932° N	-72.15419° W
26-ASH	Temperature	Washington	43.17108° N	-72.15450° W
27-ASH	Temperature	Lempster	43.19894° N	-72.13370° W
28-ASH	Temperature	Washington	43.22555° N	-72.11885° W
Cold River (Baseline Data Collection)				
01V-CLD	Temperature*	Walpole	43.13688° N	-72.40032° W
06-CLD	Temperature	Acworth	43.18677° N	-72.25527° W
WARALSEB	Temperature/Water Level	Alstead	43.12206° N	-72.29736° W
12-WAB	Temperature	Alstead	43.12226° N	-72.29799° W
CREACWX	Temperature/Water Level	Acworth	43.26711 ° N	-72.24045 ° W
09-CLD	Temperature	Acworth	43.26717 ° N	-72.23792 ° W
Isinglass River (Baseline Data Collection)				
01-ISG	Conductivity/Temperature	Rochester	43.23177° N	-70.95781° W
02-ISG	Conductivity/Temperature*	Rochester	43.23344° N	-70.95550° W
03-ISG	Conductivity/Temperature	Barrington	43.24771° N	-70.98473° W
04-ISG	Temperature	Barrington	43.24771° N	-70.98473° W
07-ISG	Temperature	Barrington	43.24002° N	-71.05485° W
08-ISG	Temperature*	Strafford	43.24337° N	-71.14332° W
USGS-01072845	Temperature/Water Level	Strafford	43.25261° N	-71.10356° W
11-ISG	Temperature	Strafford	43.24337° N	-71.14332° W

Pemigewasset River (Baseline Data Collection)				
01-PMI	Temperature	Franklin	43.44182° N	-71.65748° W
07-PMI	Temperature	Bristol	43.59070° N	-71.73122° W
13-PMI	Temperature	Ashland	43.70892° N	-71.65422° W
18-PMI	Temperature	Campton	43.81042° N	-71.66534° W
21-PMI	Temperature	Thornton	43.91727° N	-71.68311° W
23-PMI	Conductivity/Temperature*	Woodstock	44.02204° N	-71.68119° W
24-PMI	Temperature	Lincoln	44.03003° N	-71.68484° W
02-EBP	Temperature	Lincoln	44.04218° N	-71.66445° W
25-PMI	Temperature	Lincoln	44.04678° N	-71.68549° W
28-PMI	Temperature	Franconia	44.14330° N	-71.68347° W
Souhegan River (Long-term Monitoring)				
19-SHG	Conductivity/Temperature Temperature/Water Level**	Greenville	42.77666° N	-71.80647° W
19-SHG (BARO)	Air Temperature/Barometric Pressure	Greenville	42.77666° N	-71.80647° W
08M-SHG	Conductivity/Temperature Temperature/Water Level**	Milford	42.83024° N	-71.62768° W
Warner River (Baseline Data Collection)				
10-WNR	Temperature*	Bradford	43.26752° N	-71.91880° W
05B-WNR	Temperature**	Warner	43.27697° N	-71.81168° W

D.ddddd° – Degrees to five decimal places

* - deployed by NHDES' Trend Program ** - deployed by NHDES' Synoptic Program

Figure 2a: Proposed Baseline Data Collection Stations on the Designated Ashuelot River

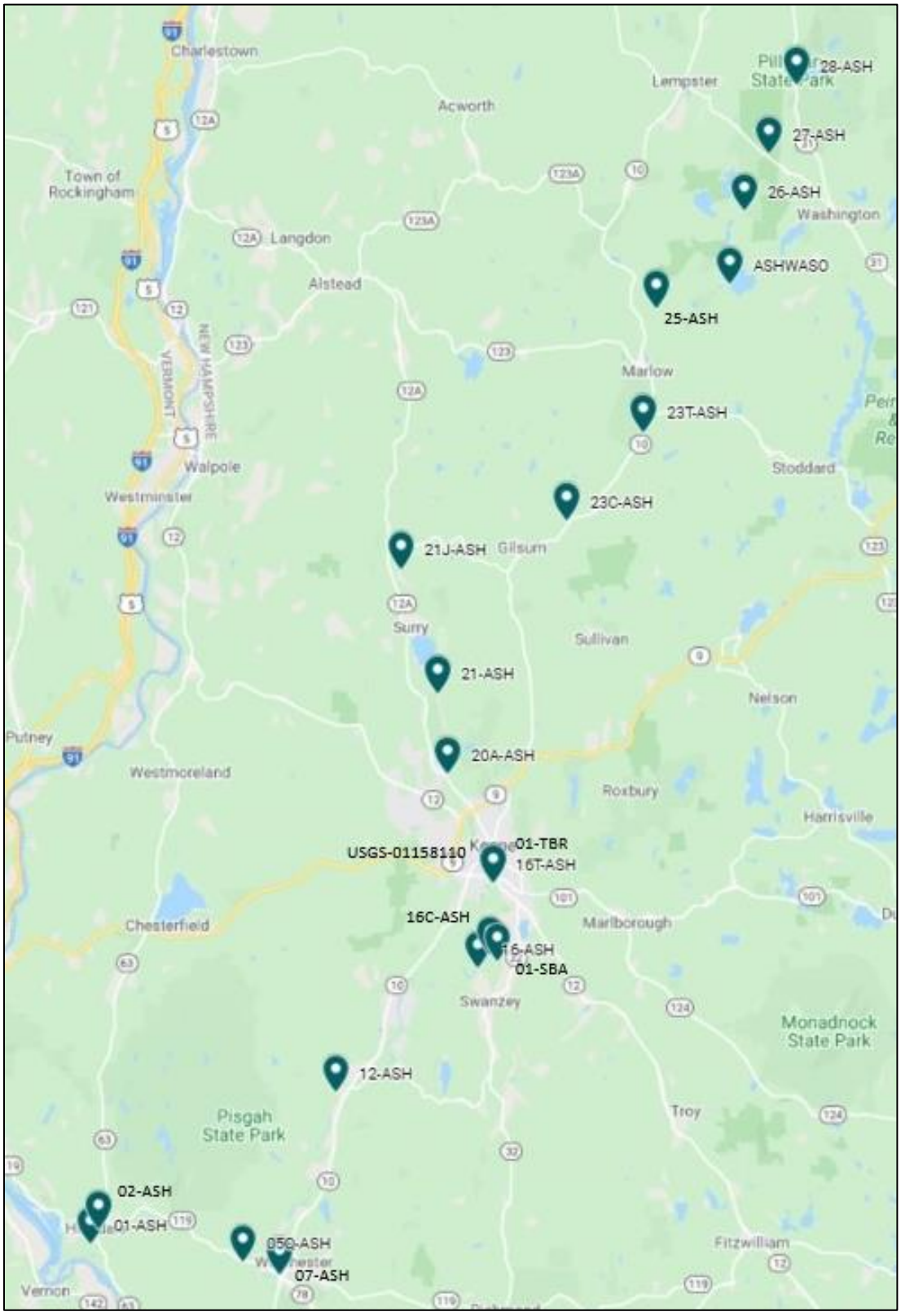


Figure 2b: Proposed Baseline Data Collection Stations on the Cold River

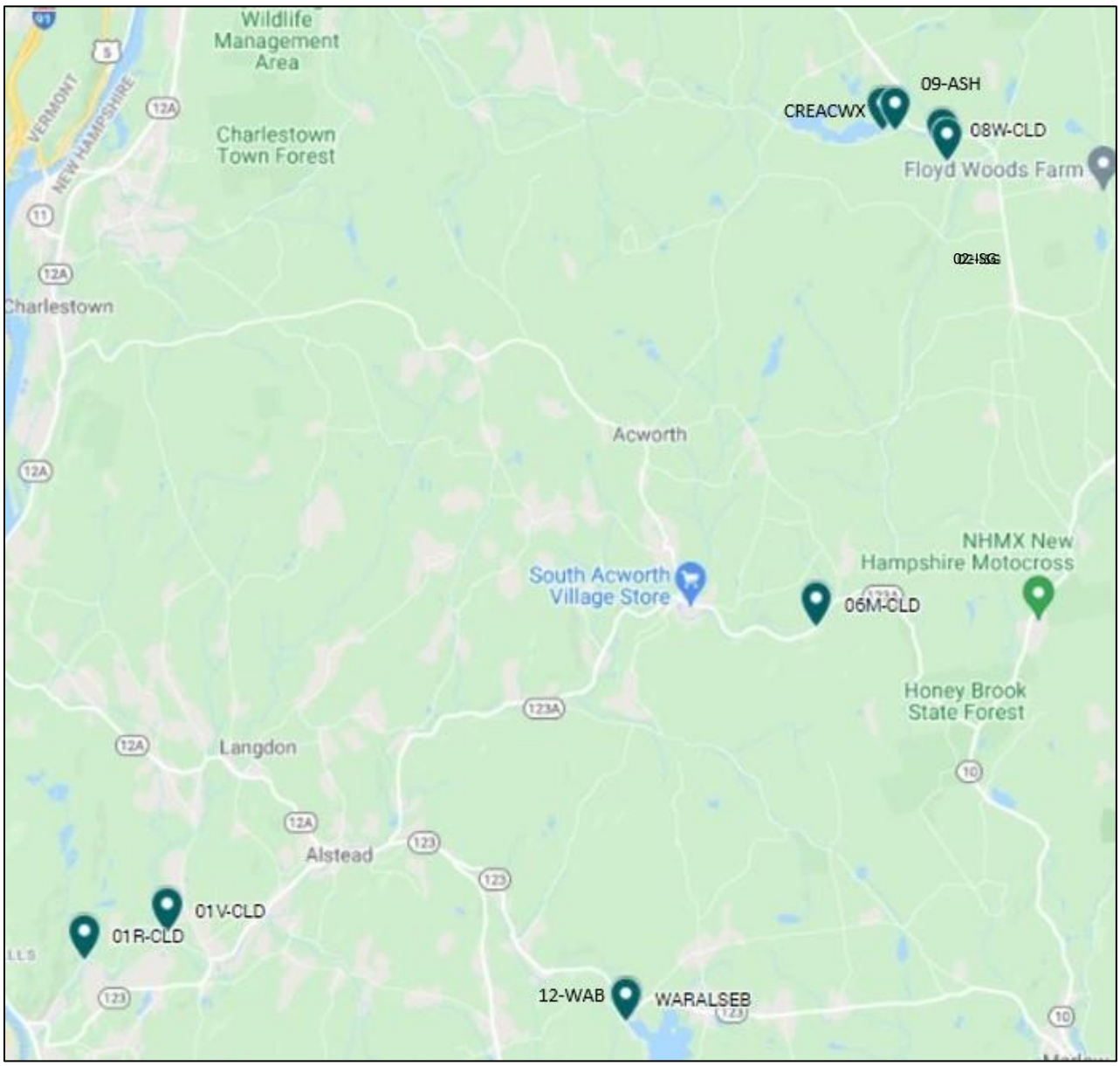


Figure 2c: Proposed Baseline Data Collection Stations on the Isinglass River

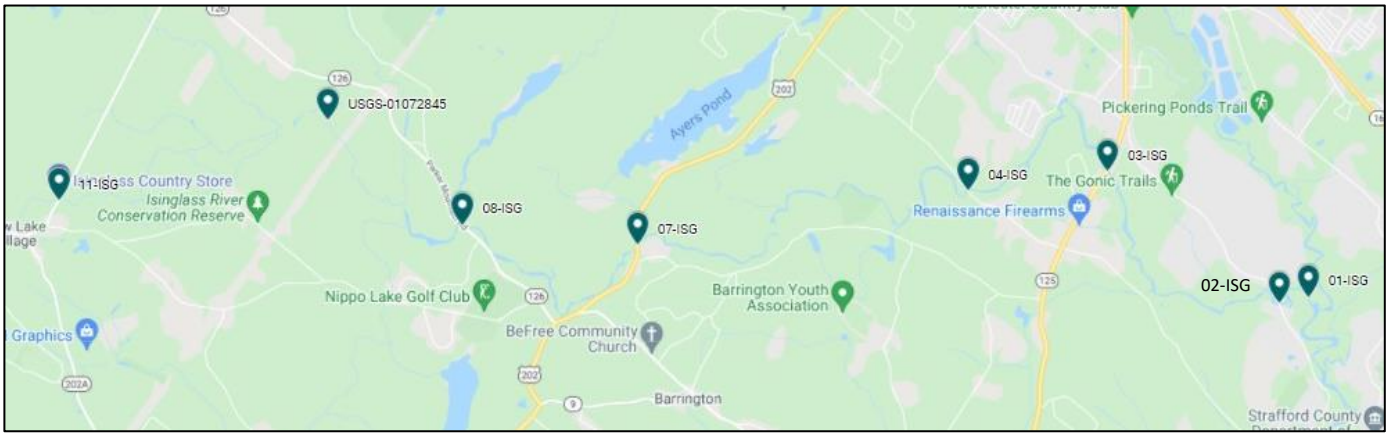


Figure 2d: Proposed Baseline Data Collection Stations on the Pemigewasset River

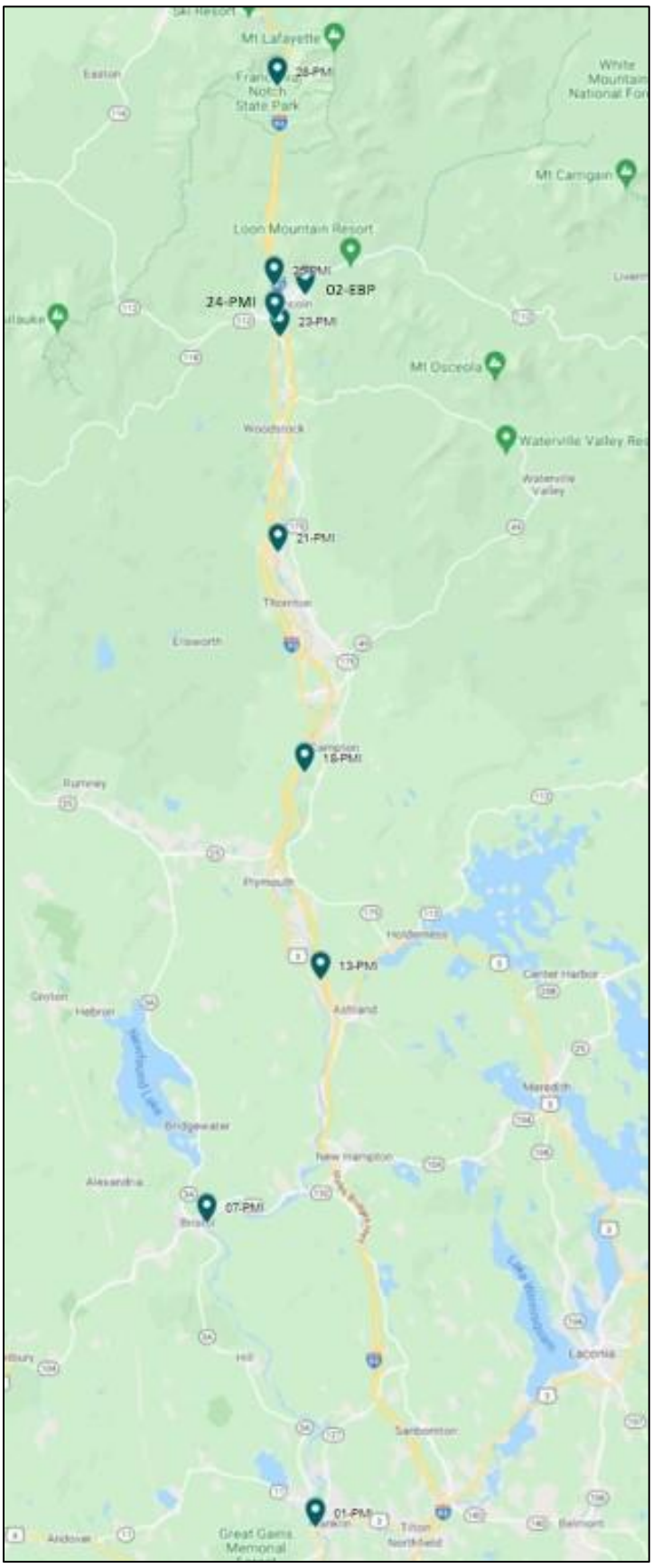


Figure 2e: Proposed Long-term Monitoring Stations on the Souhegan River

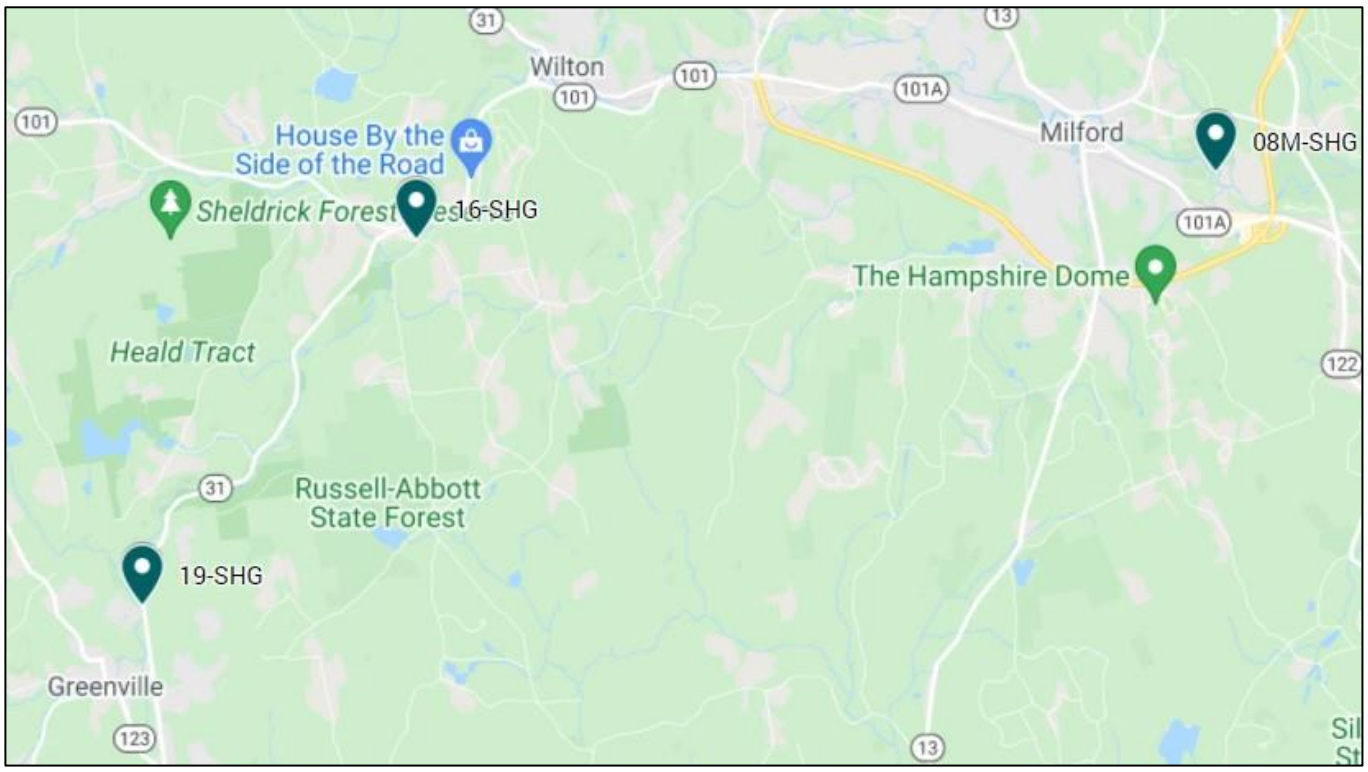


Figure 2f: Proposed Baseline Data Collection Stations on the Warner River

Electrofishing

Baseline Data Collection

During its Protected Instream Flow Study, a number of electrofishing locations were used to identify the Target Fish Community for different reaches of the designated Warner River. With the completion of the Warner River Protected Instream Flow Study anticipated during 2022 and the Warner River Water Management Plan anticipated in 2023, baseline data collection for comparison to future long-term monitoring for changes in ecosystem conditions, will begin in 2022. Regular Target Fish Community monitoring is performed in each designated river under its Water Management Plan for three consecutive years, followed by a five-year hiatus. The first of three rounds of baseline electrofishing are proposed on the Warner River at two (2) locations: 11P-WNR and 05B-WNR.

Long-term Monitoring Data Collection

During its Protected Instream Flow Study, a number of electrofishing locations were used to identify the Target Fish Community for the upper and lower reaches of the designated Souhegan River. The Souhegan River Water Management Plan anticipates regular, long-term monitoring for changes in ecosystem conditions, such as the Target Fish Communities, which could reflect needs for changes to the Water Management Plan. Regular Target Fish Community monitoring is performed in each Designated River under its Water Management Plan for three consecutive years, followed by a five-year hiatus. The second round of electrofishing will be performed on the Souhegan River at two (2) locations: 19-SHG in the upper reach and 08M-SHG in the lower reach.

Electrofishing Parameters

Frequency: Annual for three consecutive years, followed by a five-year hiatus.

Tasks:

- Backpack electrofishing.
- Data management.

Applicable Standard Operating Procedure(s):

- *NHDES Protocols for Collection, Identification, and Enumeration of Freshwater Fishes* (2018)

Table 3 summarizes the proposed electrofishing stations. Figure 2b depicts the electrofishing stations in the Cold River watershed, Figure 2e depicts the electrofishing stations in the Souhegan River watershed, and Table 2f depicts the electrofishing stations in the Warner River watershed. See the Schedule section of this work plan for the estimated schedule of these activities.

Table 3: Stations Proposed for Electrofishing on the Designated Souhegan and Warner Rivers

Station	Station Information	Town	Latitude (D.ddddd°)	Longitude (D.ddddd°)
Cold River (Baseline Data Collection)				
01V-CLD	Lower Reach	Walpole	43.13688° N	-72.40032° W
06M-CLD	Upper Reach	Acworth	43.18677° N	-72.25527° W
Souhegan River (Long-term Monitoring)				
19-SHG	Upper Reach	Greenville	42.77666° N	-71.80647° W
08M-SHG	Lower Reach	Milford	42.83024° N	-71.62768° W
Warner River (Baseline Data Collection)				
11P-WNR	Entire Reach	Bradford	43.26752° N	-71.91880° W
05B-WNR	Entire Reach	Warner	43.27697° N	-71.81168° W

D.ddddd° – Degrees to five decimal places

In addition to the above-listed electrofishing stations, the Instream Flow Program coordinates with the Watershed Bureau's Biomonitoring Program to identify locations for electrofishing that may provide datasets for the possible, future long-term monitoring stations on the Ammonoosuc, Ashuelot, Cold, Connecticut, Exeter, Lower Merrimack and Warner Designated Rivers. The Instream Flow Program staff assists Biomonitoring Program staff with such sampling, who, reciprocally, assist with electrofishing at long-term monitoring locations.

Floodplain Transect Elevation and Riparian Ecosystem Surveys

Baseline Data Collection

During the 2021 Protected Instream Flow Study of the Ashuelot River, three (3) prospective floodplain transects were identified, albeit late in the field season. The Instream Flow Program will further investigate these prospective locations during the spring and summer portions of the 2022 field season, to complete their Elevation and Riparian Ecosystem Surveys.

Floodplain transect monitoring is typically performed at each floodplain transect at three times during the field season (Spring, Summer, and Fall), in order to account for seasonal changes in flow and vegetation; elevation survey is typically performed during the Spring survey to take advantage of minimum foliage. In addition, one or more permanent benchmarks will be installed at each floodplain transect, to facilitate reacquisition during future long-term monitoring.

Floodplain Transect Survey Parameters

Frequency: During Spring, Summer and Fall, baseline and repeated once every eight years.

Tasks:

- Floodplain transect elevation survey from an established benchmark using an autolevel/stadia rod during the Spring visit.
- Riparian ecosystem and vegetation surveys during the Spring, Summer and Fall visits.
- Data management.

Applicable Standard Operating Procedure(s):

- *NHDES Protocols for Stream Gradient and Floodplain Transect Survey* (2020).
- *NHDES Protocols for Assessing Long-term Monitoring of Riparian Ecosystems* (2020).

Table 4 summarizes the floodplain transects selected along the designated Ashuelot River. Figure 3 depicts the floodplain transects proposed for monitoring in the Ashuelot River watershed. See the Schedule section of this work plan for the estimated schedule of these activities.

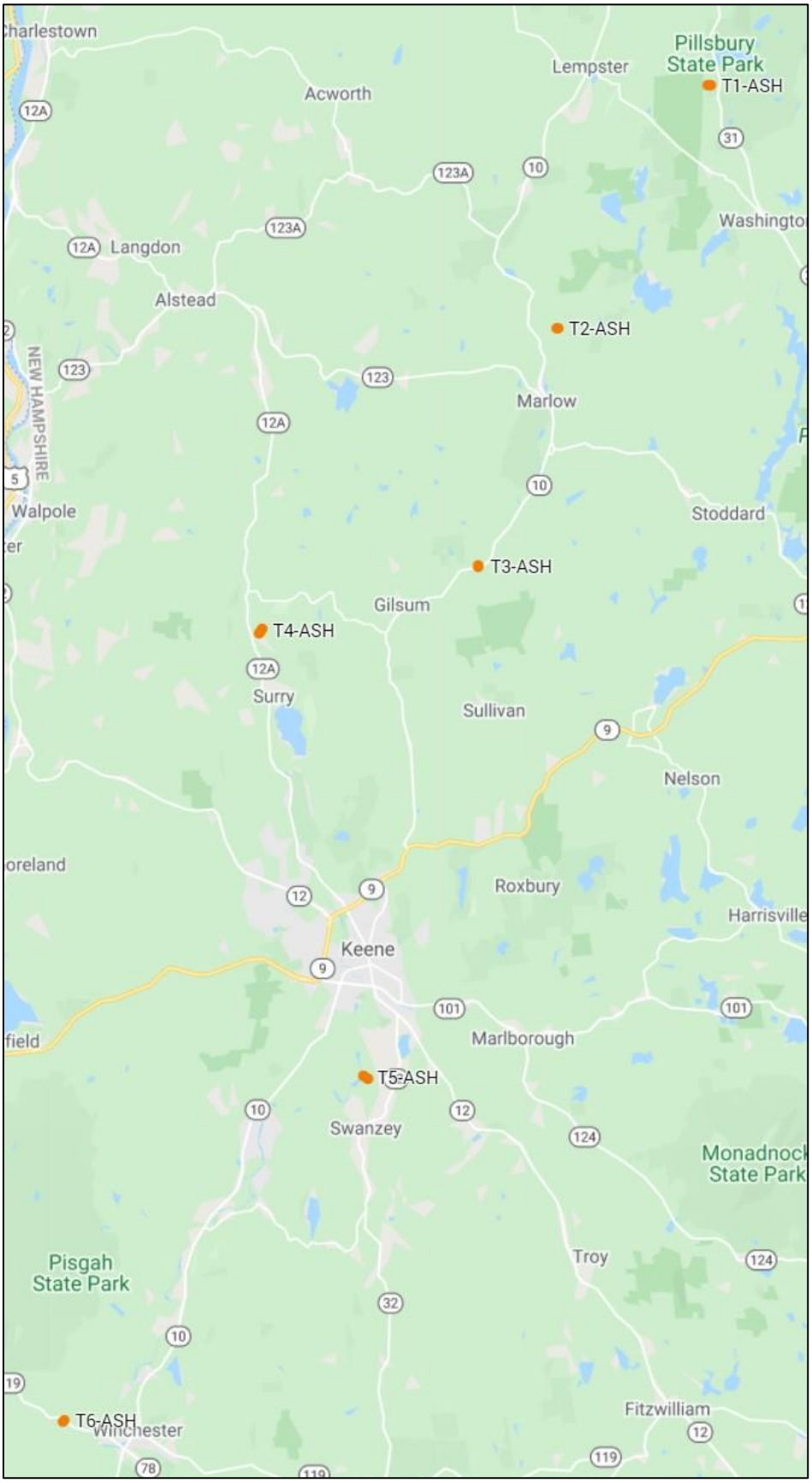
Table 4: Floodplain Transects Proposed for Riparian Ecosystem Surveys

Station	Transect Habitat	Town	Coordinates (Point 1) (D.ddddd°)*	Coordinates (Point2) (D.ddddd°)*
Ashuelot River				
T2-ASH 25-ASH	Red Maple Floodplain Forest	Marlow	43.01942° N -72.31249° W	43.01951° N -72.31135° W
T4-ASH 21J-ASH	Sycamore Floodplain Forest	Surry	43.05848° N -72.23973° W	43.05885° N -72.23965° W
T5-ASH 16C-ASH	Silver Maple Floodplain Forest	Swanzey	43.06038° N -72.23093° W	43.06065° N -72.23099° W

D.ddddd° – Degrees to five decimal places

* - coordinates are approximate, and will be determined during the study

Figure 3: Proposed Floodplain Transects on the Designated Ashuelot River



Other Field Support Activities

Contractor Oversight

During the 2022 field season, contractors to NHDES will be conducting a Protected Instream Flow Study for the designated Ashuelot River. NHDES Instream Flow Program staff will coordinate with the contractor to observe a variety of protected instream flow study field activities and familiarize themselves with each transect location, such that selected initial floodplain transects can be reacquired for use as long-term monitoring locations.

Daily Review of US Geological Survey Gaging Station Time-Series Instream Flow Data

The Instream Flow Program Environmentalist will perform daily maintenance of the protected instream flow tracking spreadsheets using mean daily discharge data from the US Geological Survey stream gages listed in Table 5. Figure 4a depicts the location of the Cold River US Geological Survey gage, Figure 4b depicts the location of the Lamprey River US Geological Survey gage, and Figure 4c depicts the locations of the Souhegan River US Geological Survey gages.

Table 5: US Geological Survey Gaging Stations Used for Long-Term Instream Flow Monitoring

Station Name/US Geological Survey ID	Coordinates (D.ddddd°)	Protected Instream Flow Monitoring Spreadsheet
Cold River at High Street, at Alstead, NH / 01154950	43.14944° N -72.36167° W	Cold River Protected Instream Flow Tracking Tool
Lamprey River near Newmarket, NH / 01073500	43.10279° N -70.95246° W	Lamprey River Protected Instream Flow Tracking Tool
Souhegan River (Site WLR-1) near Milford, NH / 01093852	42.84679° N -71.67868° W	Upper Souhegan River Protected Instream Flow Tracking Tool
Souhegan River at Merrimack, NH / 01094000	42.85758° N -71.50617° W	Lower Souhegan River Protected Instream Flow Tracking Tool

D.ddddd° – Degrees to five decimal places

In addition, as streamflow data become available, the Instream Flow Specialist will develop and maintain streamflow dashboards using mean daily discharge data from the near real-time streamflow stations located on the North Branch River (USGS-01084000), as well as the near-real-time streamflow stations installed during 2022 (refer to the Streamflow Data Collection subsection, above).

Figure 4a: Protected Instream Flow Compliance Point on the Designated Cold River

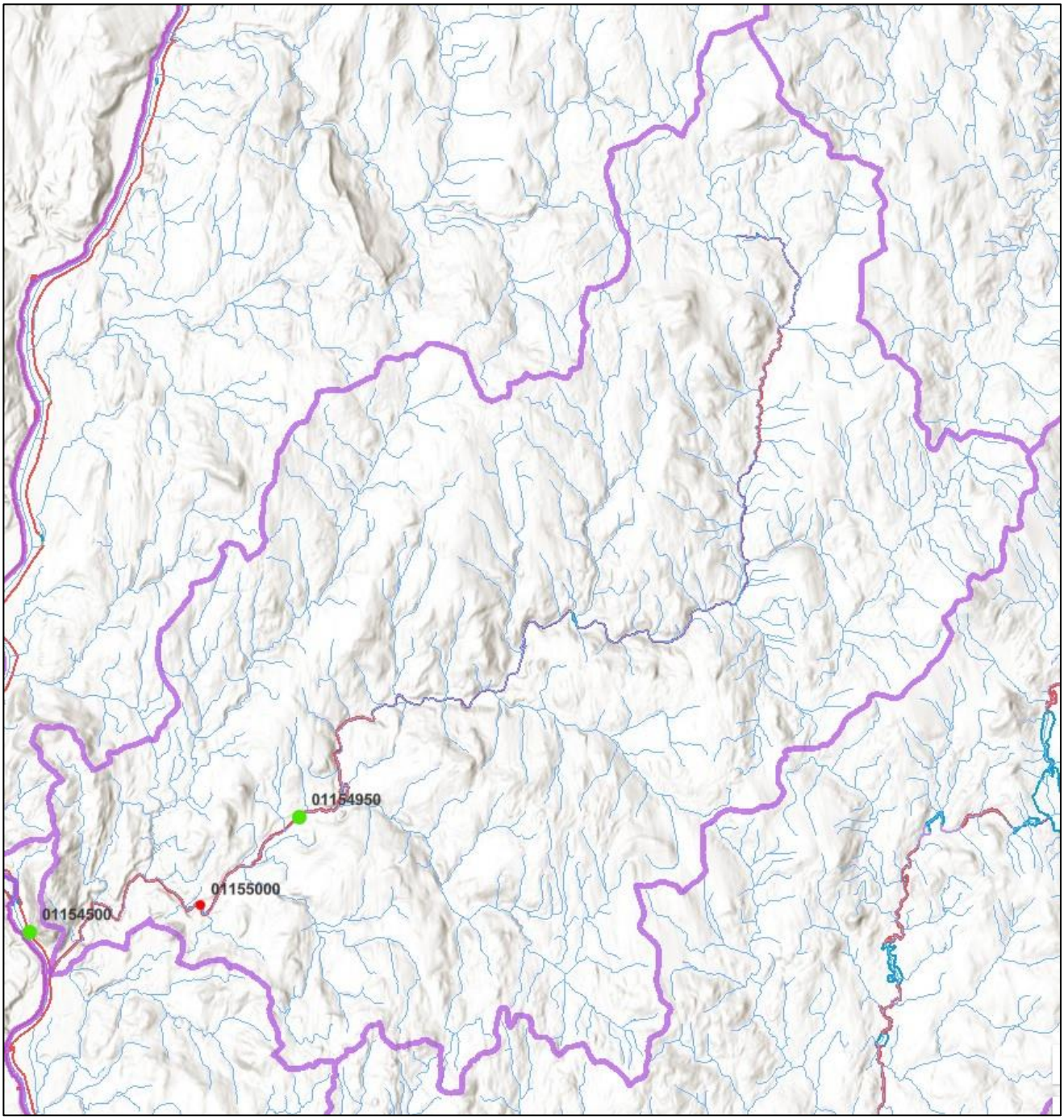


Figure 4b: Protected Instream Flow Compliance Point on the Designated Lamprey River

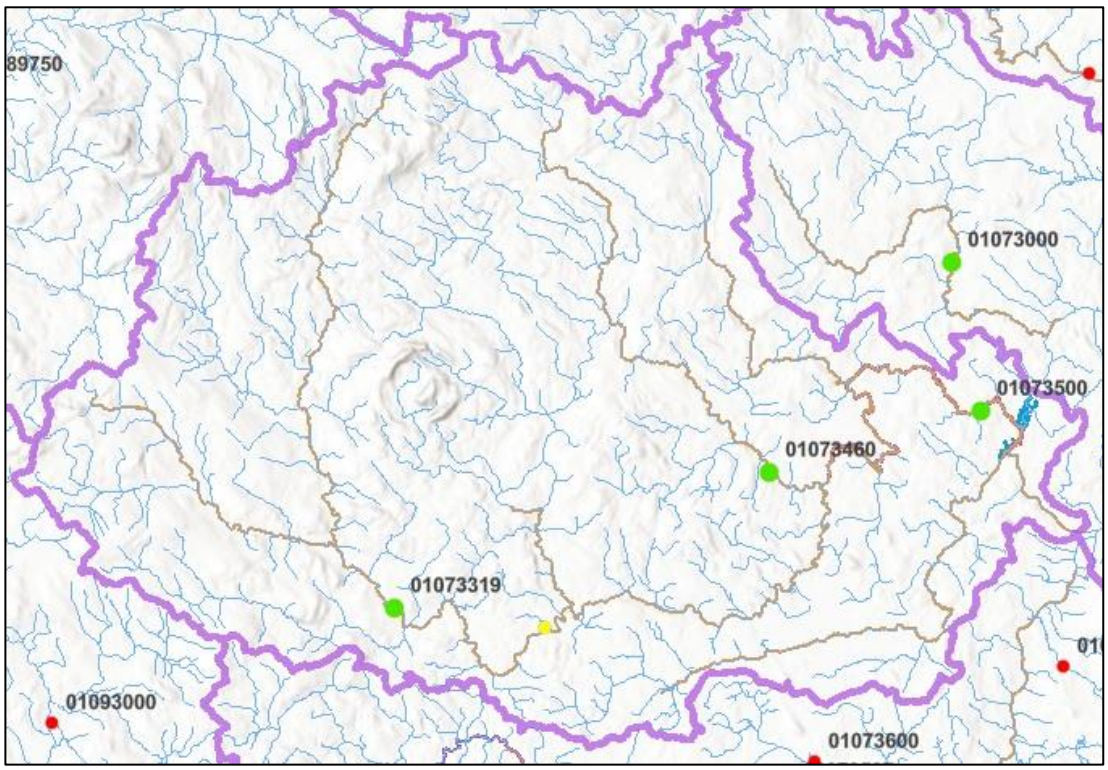
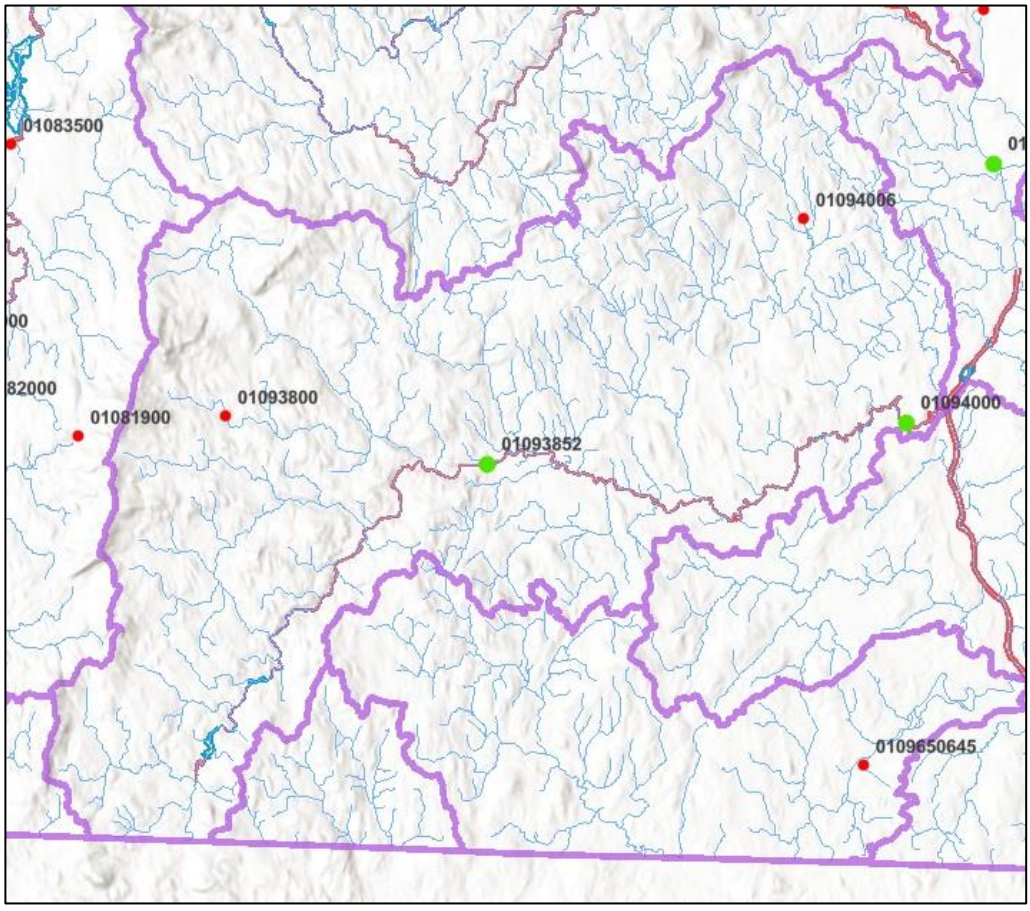


Figure 4c: Protected Instream Flow Compliance Points on the Designated Souhegan River



Schedule

The proposed schedule for tasks performed by NHDES staff depends on favorable streamflows and weather, as well as the availability of equipment, as noted previously. Table 6 summarizes the overall schedule for data acquisition tasks for the 2022 field season.

Table 6: Proposed Instream flow Program 2022 Field Activity Schedule

Schedule	Activity	Station(s)
First Week of May	Exeter and Lamprey River streamflow station installations	EXETER-04, 01-LTR, USGS-01073460, 03R-PAR
Second week of May	Isinglass and Souhegan River datalogger deployments	01-ISG, 03-ISG, 04-ISG, 07-ISG, USGS-01072845, 11-ISG, 08M-SHG, 16-SHG, 19-SHG
	Piscataquog River streamflow station installations	USGS-01090812, 01-MIP
Third week of May	Ashuelot River datalogger deployments	01-ASH, 05Q-ASH, 07-ASH, 12-ASH, USGS-01160350, 16-ASH, 16C-ASH, 01-SBA, 16T-ASH, USGS-01158110, 01-TBR, 20A-ASH, 21-ASH, 21J-ASH, 23C-ASH, 23C-ASH (BARO), 23T-ASH, 25-ASH, ASHWASO, 26-ASH, 27-ASH, 28-ASH
	Cold and Warner River datalogger deployments	06M-CLD, WARALSEB, 12-WAB, CREACWX, 09-CLD, 11P-WNR, 05B-WNR
Third week of May	Pemigewasset River datalogger deployments	01-PMI, 07-PMI, 13-PMI, 18-PMI, 21-PMI, 23-PMI, 24-PMI, 02-EBP, 25-PMI, 28-PMI
Fourth week of May	Ammonoosuc River streamflow station installations	28G-AMM, USGS-01137940
June-October	Bi-weekly streamflow measurements at Ammonoosuc, Exeter, Lamprey, and Piscataquog Streamflow stations	28G-AMM, EXETER-04, 01-LTR, USGS-01073460, 03R-PAR, 01-MIP
Early June	Ashuelot River elevation/ecosystem/vegetation surveys (contractor support)	T2-ASH, T4-ASH, T5-ASH
July	Cold River electrofishing	01V-CLD, 06M-CLD
	Souhegan River electrofishing	19-SHG, 08M-SHG
	Warner River electrofishing	11P-WNR, 05B-WNR
Last Week of July	Ashuelot River floodplain transect investigations	T2-ASH, T4-ASH, T5-ASH
First week of August	Isinglass and Lamprey River datalogger mid-season check	01-ISG, 03-ISG, 07-ISG, USGS-01072845, 11-ISG, 08T-LMP, 15D-LMP, 19-SHG, 08M-SHG
Second week of August	Ashuelot, Souhegan, and Warner Rivers datalogger mid-season checks	01-ASH, 05Q-ASH, 07A-ASH, 12-ASH, USGS-01160350, 16-ASH, 16C-ASH, 01-SBA, 16T-ASH, USGS-01158110, 01-TBR, 20A-ASH, 21-ASH, 21F-ASH, 23C-ASH, 23T-ASH, ASHWASO, 26-ASH, 27-ASH, 28-ASH
Third week of October	Pemigewasset River datalogger recoveries	01-PMI, 07-PMI, 13-PMI, 18-PMI, 21-PMI, 23-PMI, 24-PMI, 02-EBP, 25-PMI, 28-PMI
Fourth week of October	Cold and Warner River datalogger recoveries	06M-CLD, WARALSEB, 12-WAB, CREACWX, 09-CLD, 11P-WNR, 05B-WNR
First week of November	Ashuelot and Souhegan River datalogger recoveries	01-ASH, 05Q-ASH, 07-ASH, 12-ASH, USGS-01160350, 16-ASH, 16C-ASH, 01-SBA, 16T-ASH, USGS-01158110, 01-TBR, 20A-ASH, 21-ASH, 21J-ASH, 23C-ASH, 23C-ASH (BARO), 23T-ASH, 25-ASH, ASHWASO, 26-ASH, 27-ASH, 28-ASH, 08M-SHG, 16-SHG, 19-SHG
Second week of November	Isinglass River datalogger recoveries	01-ISG, 03-ISG, 04-ISG, 07-ISG, USGS-01072845, 11-ISG

Appendix A - *Instream Flow Monitoring Protocols for Conductivity, Temperature, and Water Level Dataloggers* (2020)

Appendix B - *NHDES Protocols for Collection, Identification, and Enumeration of Freshwater Fishes* (2018)

Appendix C - *NHDES Protocols for Stream Gradient and Floodplain Transect Survey* (2020)

Appendix D - *NHDES Protocols for Assessing Long-Term Monitoring of Riparian Ecosystems* (2021)