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PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
February 22, 2018

WATER: Nis Hollow (502B) Carbon County

EXAMINED: July 2012

BY: Fisheries Management Area 5: Arnold, Chikotas, and Vernoski

Bureau Director Action: _____ Date: _____

Division Chief Action: _____ Date: _____

CW Unit Leader Action: _____ Date: _____

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AREA COMMENTS:

Section 01 of Nis Hollow supported natural reproduction of brook trout and brown trout, with brook trout being the dominant species in the headwaters and brown trout being the dominant species in the lower reaches of the stream. It was not possible to ascertain the region of transition where brook trout became the dominant species due to posting.

The percentage of the total section length examined in 2012 was 14 percent (RM 1.47, 3 percent and RM 0.09, 11 percent). The biomass of brown trout and brook trout based on a Petersen estimate at site RM 0.09 was 62.82 kg/ha for brown trout and 22.28 kg/ha for brook trout, with brown trout being the dominant species. The estimated biomass for brown trout alone was sufficient for being designated as a Class A wild trout water ($\geq$ 40.00 kg/ha). However, the total combined biomass was 85.10 kg/ha of which, brown trout comprised 73.8 percent and brook trout comprised 26.2 percent of the total trout biomass. The sample site length at site RM 0.09 comprised 11 percent of the total section length and was sufficient for recommending that this section be officially designated as a Class A mixed wild brook and brown trout population, as outlined in 58 PA Code §57.8a.

The sample site at RM 1.47 was added in an attempt to ascertain the possible transition area of where brook trout become the dominant species. The total site length was 152 m long, a little more than half the recommended minimum site length of 300 m. The short length of the site was due to a limited workable area of stream. Brook trout were the only trout species present. The estimated CPUE biomass for brook trout was 31.97 kg/ha, of which 48 percent (15.32 kg/ha) were young-of-the-year. Due to being unable to survey at least 300 m in this area, these data were not utilized for the establishment of a Class A brook trout section on Nis Hollow.

The current 25 PA Code Chapter 93 Water Quality Standards listing of Cold Water Fishes, Migratory Fishes for the Nis Hollow basin does not adequately protect the existing flora and fauna present within the basin. Based on the presence of a Class A mixed wild brook trout and brown trout population, the water quality criteria that would provide the proper protection of the streams flora and fauna is High Quality–Cold Water Fishes, Migratory Fishes (HQ-CWF, MF). In addition, retaining the placement of Nis Hollow, Section 01,

on the wild trout waters list will afford greater protection to the flora and fauna within its basin.

AREA RECOMMENDATIONS:

1. Submit Nis Hollow (02B), Section 01, for addition to the Commission's Class A wild trout waters list for a mixed wild brook trout and brown trout population.

2. Submit Nis Hollow (02B), Section 01, to upgrade its water quality designation from Cold Water Fishes, Migratory Fishes to High Quality-Cold Water Fishes, Migratory Fishes, as the current water quality designation does not adequately protect the stream's flora and fauna.

3. Retain Nis Hollow (02B), Section 01, on the PFBC list of stream sections that support natural reproduction of trout.

4. Continue to manage Nis Hollow (02B), Section 01, under Commonwealth Inland Waters angling regulations with no stocking.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH & BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION

Nis Hollow (502B)
Section 01
Fisheries Management Report

Prepared by
David A. Arnold and Bryan A. Chikotas

Fisheries Management Database Name: Nis Hollow
Lat/Lon: 40°48'10"/75°40'33"

Date Sampled: July 2, 2012 Date Prepared: November, 2012

Introduction

Nis Hollow is located in Carbon County and is a 4.59 km (2.85 mi) long tributary to the Lehigh River at River Mile (RM) 40.18, 40°48'10" latitude and 75°40'33" longitude. This stream has a drainage area of 6.22 km^2 (2.4 mi^2) and flows easterly to its confluence with the Lehigh River. The current water quality designation of Nis Hollow is Cold Water Fishes, Migratory Fishes (CWF, MF). Nis Hollow can be found on the Lehighton, PA United States Geological Survey 7.5 minute quadrangle.

Section 01 encompasses the entire 4.59 km of Nis Hollow. The stream flows through private property of which 88 percent is chiefly closed to public fishing (upstream of South Dieters Hill Road), and the lower eight percent is open to fishing. The remaining four percent of Section 01 (near its confluence with the Lehigh River) consists of right-of-ways for the Commonwealth of Pennsylvania (the right-of-way area adjacent to SR 0476 (PA Turnpike NE Extension) and the Railroad). The human population density as per the 2000 census is 54 persons per km^2. The percent of stream within 100, 300, and 500 meters of a road is 64, 77 and 100 percent, respectively.

Nis Hollow was surveyed in 2011 as part of the Unassessed Waters Program to gather baseline information on the resource for management purposes and to document the presence of a reproducing population of trout (Arnold and Chikotas, 2012). The sole sample site at RM 0.09 (311 m in length) covered only seven percent of the total section length, and did not meet the recommended minimum of 10 percent to officially classify a trout biomass designation. The site supported natural reproduction of brown trout and brook trout. The estimated biomass of brown trout and brook trout was 32.60 kg/ha and 17.49 kg/ha, respectively, for a total trout biomass of

50.09 kg/ha. The biomass proportion of brown trout and brook trout was 65 and 35 percent, respectively. The 2011 report recommended that the stream be resampled in 2012 in order to cover a sufficient percentage of the section length to assign a biomass classification.

The 2012 sampling of Nis Hollow, 02B, Section 01, was conducted as a follow-up to the 2011 sampling which found the presence of a Class A mixed wild brook trout and brown trout population. Based on the findings of this survey the proper trout biomass classification will be assigned to this section and any applicable changes in water quality criteria will be pursued.

Methods

The examination of Nis Hollow was conducted in July 2012. All procedures were carried out according to those outlined by Weber et al. (2011). Two sample sites were surveyed in 2012 covering 14 percent (RM 1.47, three percent, and RM 0.09, 11 percent) of the section length. Sample Site RM 1.47 was added in 2012 to assist in determining the transition zone between dominance of brook trout and brown trout. However, upon surveying the basin this was the only place that was accessible and workable upstream of site RM 0.09.

Physical characteristics, physical-chemical values, and fish communities were examined. Rapid bioassessment protocols (RBP) were used to assess the in stream and riparian habitats (Barbour et al. 1999). The fish community was sampled using an electrobackpack equipped with a Appalachian Aquatics Model AA-24 variable voltage electrofisher set at 100 volts (RM 1.47 in 2012) AC-Alternating Current (battery backpack). At sample site RM 1.47, wild trout were measured and recorded in 25 mm (1.0 inch) length groups. Statewide average weights calculated for each length group were used to generate the biomass estimate. Wild trout densities were determined by using the number of trout collected in a single electrofishing pass. At sample site RM 0.09, wild trout were measured, recorded in 25 mm (1.0 inch) length groups, given an identifying upper caudal fin clip and released during the initial electrofishing pass to facilitate a mark-recapture population estimate. On the second electrofishing pass all captured trout were measured to the nearest millimeter (mm), weighed to the nearest gram (g), examined for caudal clips, and released. Average weights were calculated for each length group to generate a biomass estimate. Wild trout estimates of abundance and biomass were determined by using the Chapman modification of the Petersen estimator or M+C-R when R was less than three. We identified all fish captured to species following taxonomic information on scientific and common names of fish referenced on the Integrated Taxonomic Information System website (http://www.itis.gov).

Results

Site River Mile: 1.47

Sample site RM 1.47 was located at the upstream side of the Lower Nis Hollow Drive (T-354) Bridge, 40°48'32" latitude and 75°41'38" longitude. The 152 m long station averaged 2.0 m in width (Table 1) and approached the headwaters of the stream (Figure 1). The stream meanders through a rural park-like setting with grass mowed to stream edges and trees providing partial shade over the channel. There are no understory shrubs along or near the stream banks. A small pond is next to and flows into the stream. The stream channel consists almost exclusively of shallow riffles and run habitats with no pools or deeper water (> 0.5 m) present for larger fish. Limited overhanging stream bank grasses and undercut banks provide fish cover. The stream substrate consists mostly of clean gravel, with occasional cobble and rubble. Bank erosion was rated to be light to moderate. Upstream of the site the stream is very small and less than a meter wide. Immediately downstream of the site the channel is overgrown with multiflora rose and dense shrubs, and closed to public access making it unworkable and inaccessible. The RBP analysis yielded a final score of 109 (Table 2).

Physical-chemical parameters and their associated values measured under normal flow conditions were as follows: air temperature 29.1°C, water temperature 19.5°C, specific conductance 100 umhos, pH 6.9 standard units, and total alkalinity 80 mg/l (Table 3). These results indicate that the stream is more suitable for cold water species.

Six fish species were captured at site RM 1.47, including brook trout *Salvelinus fontinalis*. Species composition included fish common to a cold to warm water environment. Fish common to a cold water environment were the most prevalent (Table 4).

Brook Trout

One hundred and forty-two wild brook trout ranging from 50 mm to 199 mm in total length (TL) were captured during the survey with five (four percent) being greater than or equal to the legal harvestable length (175 mm: 7 in). Total brook trout biomass, based on a CPUE estimate, was 31.97 kg/ha. Brook trout abundance was estimated at 935 trout/km (1505 trout/mi) with 33 trout/km (53 trout/mi) being of legal length or longer (Table 5).

Site River Mile: 0.09

Sample site RM 0.09 was located at 15 meters downstream from the upstream side of the Pennsylvania Turnpike (SR 0476) tunnel, 40°48'12" latitude and 75°40'27" longitude. The 492 m long station averaged 3.5 m in width (Table 1). This portion of the stream flowed primarily through a dense forest habitat, with one private residence located near the start of the site. Bank erosion was

light and stream substrate consisted primarily of bedrock, boulder, rubble and gravel.

Only trout species were recorded at site RM 0.09. Trout species captured included, brown trout *Salmo trutta*, brook trout, and tiger trout *Salmo trutta x Salvelinus fontinalis* (Table 4).

Brown Trout

Four hundred and seventy-three wild brown trout ranging from 50 mm to 324 mm in total length (TL) were captured during the survey with fifty (11 percent) being greater than or equal to the legal harvestable length (175 mm: 7 in). Total brown trout biomass was estimated to be 62.82 kg/ha. Brown trout abundance was estimated at 1541 trout/km (2481 trout/mi) with 114 trout/km (184 trout/mi) being of legal length or longer (Table 6).

Brook Trout

Two hundred and sixteen wild brook trout ranging from 25 mm to 249 mm in total length (TL) were captured during the survey with twenty-seven (13 percent) being greater than or equal to the legal harvestable length (175 mm: 7 in). Total brook trout biomass was estimated to be 22.28 kg/ha. Brook trout abundance was estimated at 655 trout/km (1055 trout/mi) with 59 trout/km (95 trout/mi) being of legal length or longer (Table 7).

Tiger Trout

One tiger trout in the 125 mm size group was captured during this survey. The origin of this fish was unknown.

Discussion

Section 01 of Nis Hollow supported natural reproduction of brook trout and brown trout, with brook trout being the dominant species in the headwaters and brown trout in the lower region of the stream. It was not possible to ascertain the region of transition where brook trout became the dominant species due to posting.

The percentage of the total section length examined in 2012 was 14 percent (RM 1.47, three percent and RM 0.09, 11 percent). The biomass of brown trout and brook trout based on a Petersen estimate at site RM 0.09 was 62.82 kg/ha for brown trout and 22.28 kg/ha for brook trout, with brown trout being the dominant species. The estimated biomass for brown trout alone was sufficient for being designated a Class A wild trout water ($\geq$ 40.00 kg/ha; PFBC 2011). However, the total combined biomass was 85.10 kg/ha of which, brown trout comprised 73.8 percent and brook trout comprised 26.2 percent of the total trout biomass. The sample site length at site RM 0.09 comprised 11 percent of the total section length and was sufficient for recommending that this section be officially designated as a Class A mixed wild brook and brown trout population, as outlined in 58 PA Code §57.8a.

The sample site at RM 1.47 was added in an attempt to ascertain the possible transition area of where brook trout become the dominant species. The total site length was only 152 m long, a little more than half the recommended minimum site length of 300 m. The short length of the site was due to a limited workable area of stream. Brook trout were the only trout species present. The estimated CPUE biomass for brook trout was 31.97 kg/ha, of which 48 percent (15.32 kg/ha) were young-of-the-year. Due to being unable to survey at least 300 m in this area, these data were not utilized for the establishment of a Class A brook trout section on Nis Hollow.
The current 25 PA Code Chapter 93 Water Quality Standards listing of Cold Water Fishes, Migratory Fishes (CWF, MF) for the Nis Hollow basin does not adequately protect the existing flora and fauna present within the basin. Based on the presence of a Class A mixed wild brook trout and brown trout population, the water quality criteria that would provide the proper protection of the streams flora and fauna is High Quality–Cold Water Fishes, Migratory Fishes (HQ-CWF, MF). In addition, retaining the placement of Nis Hollow, Section 01, on the wild trout waters list will afford even greater protection to the flora and fauna within its basin.

Management Recommendations

1. Submit Nis Hollow (02B), Section 01, for addition to the Commission's Class A wild trout waters list for a mixed wild brook trout and brown trout population.

2. Submit Nis Hollow (02B), Section 01, to Pennsylvania Department of Environmental Protection to upgrade it's water quality designation from Cold Water Fishes, Migratory Fishes to High Quality-Cold Water Fishes, Migratory Fishes, as the current water quality designation does not adequately protect the stream's flora and fauna

3. Retain Nis Hollow (02B), Section 01, on the PFBC list of stream sections that support natural reproduction of trout.

4 Continue to manage Nis Hollow (502B), Section 01, under Commonwealth Inland Waters angling regulations with no stocking.

Literature Cited

Arnold, D. A., and B. A. Chikotas. 2012. Unassessed waters stream sampling report of Nis Hollow, 02B, Section 01, July 2011. PFBC files, 450 Robinson Lane, Bellefonte, PA.

Barbour, M.T., J. Gerritson, B.D. Snyder, and J.B. Stribling. 1999. Rapid bioassessment protocols for use in wadeable streams and Rivers. USEPA. Report 841-99-002, Washington, DC.

Pennsylvania Fish and Boat Commission. 2011. Operational guidelines for the management of trout fisheries in Pennsylvania waters. PFBC Files, 450 Robinson Lane, Bellefonte, PA.

Weber, R., R.T. Greene, and D. Miko. 2011. Protocols for conducting biological assessments of unassessed trout waters. Pages 95-101 in D. Miko, editor. Sampling protocols for Pennsylvania's wadeable streams. Pennsylvania Fish and Boat Commission. Harrisburg, PA.

Table 1. Nis Hollow (02B), Section 01, Carbon County, site sampling location, length surveyed, average site width and site area.

Site Date	Rivermile	Downstream limit description	Length (m)	Ave. Width (m)	Site Area (ha)
7/26/2012	1.47	Upstream side of T- 354 Bridge (Lower Nis Hollow Drive)	152	2.0	0.03
7/26/2012	0.09	15 meters downstream from the upstream side of Pa. Turnpike tunnel.	492	3.5	0.17

Table 2. High Gradient Rapid Bioassessment Protocol ratings for Nis Hollow (02B), Carbon County, conducted at site RM 1.47 on July 26, 2012.

RM 1.47 - 2012			
Habitat Parameter	Score	Habitat Parameter	Score
Epifaunal Substrate / Available Cover	9	Left Bank Stability	5
Embeddedness	16	Right Bank Stability	5
Velocity / Depth Regime	10	Left Bank Vegetative Protection	2
Sediment Deposition	13	Right Bank Vegetative Protection	2
Channel Flow Status	15	Left Bank Riparian Vegetative Width	2
Channel Alteration	12	Right Bank Riparian Vegetative Width	2
Frequency of Riffles or bends	16	**Total Score**	**109**

Table 3. Chemistries collected in Nis Hollow (02B), Carbon County. Sample site(s) are within Section 01 in 2012 sample year.

Parameter	RM 1.47
Sample Date	07/26/2012
Time (24 hour)	1330
Water Temperature (C)	19.5
pH Field Colorimetric (SU)	6.9
Specific Conductance (*umhos*)	100
Total Alkalinity Field Mixed Indicator (MG/L)	80
Air Temperature (C)	29.1

Table 4. Fish species occurrence from Nis Hollow (02B), Section 01, Carbon County, at sample sites RM 1.47 and RM 0.09 in July 2012.

Common Name	Scientific Name	RM 1.47	RM 0.09
		2012	2012
Blacknose Dace	*Rhinichthys atratulus*	X	-
Bluegill	*Lepomis macrochirus*	X	-
Brook Trout	*Salvelinus fontinalis*	X	X
Brown Trout	*Salmo trutta*	-	X
Creek Chub	*Semotilus atromaculatus*	X	-
Largemouth Bass	*Micropterus salmoides*	X	-
Smallmouth Bass	*Micropterus dolomieu*	X	-
Tiger Trout	*Salmo trutta x Salvelinus fontinalis*	-	X

Table 5. Wild brook trout catch and biomass estimates at sample site RM 1.47 on Nis Hollow (502B), Carbon County, on July 26, 2012.

Size Group	Catch	Mean Wt(g)	Wt Source	Kg/Ha	Num/ Ha	Num/ Km
50	90	2.45	StateMeanWt	7.25	2961	592
75	41	5.98	StateMeanWt	8.07	1349	270
100	1	13.68	StateMeanWt	0.45	33	7
125	2	24.41	StateMeanWt	1.61	66	13
150	3	41.09	StateMeanWt	4.06	99	20
175	5	64.0	StateMeanWt	10.53	164	33
Totals	142			31.97	4672	935

Table 6. Wild brown trout Petersen abundance and biomass estimates at sample site RM 0.09 on Nis Hollow (502B), Carbon County, in July 2012.

RM 0.09 - 2012						
Size Group	Estimate	Low95CI	High95CI	NumHa	KgHa	NumKm
50	489	376	636	2840	7.18	994
75	162	113	239	941	6.01	329
100	7			41	0.58	14
125	17	8	38	99	2.60	35
150	27	18	44	157	6.88	55
175	17	9	32	99	6.63	35
200	16	9	32	93	9.02	33
225	11	5	24	64	8.61	22
250	5	2	13	29	5.30	10
275	6			35	8.25	12
300	1			6	1.76	2
Totals	758			4404	62.82	1541

Table 7. Wild brook trout Petersen abundance and biomass estimates at sample site RM 0.09 on Nis Hollow (502B), Carbon County, in July 2012.

RM 0.09 - 2012						
Size Group	Estimate	Low95CI	High95CI	NumHa	KgHa	NumKm
25	1			6	0.01	2
50	251	180	360	1458	3.57	510
75	7	3	18	41	0.24	14
100	11	6	23	64	0.87	22
125	11			64	1.56	22
150	13	6	26	75	3.10	26
175	20	12	37	116	7.43	41
200	6	3	15	35	3.22	12
225	3			17	2.28	6
Totals	323			1876	22.28	655

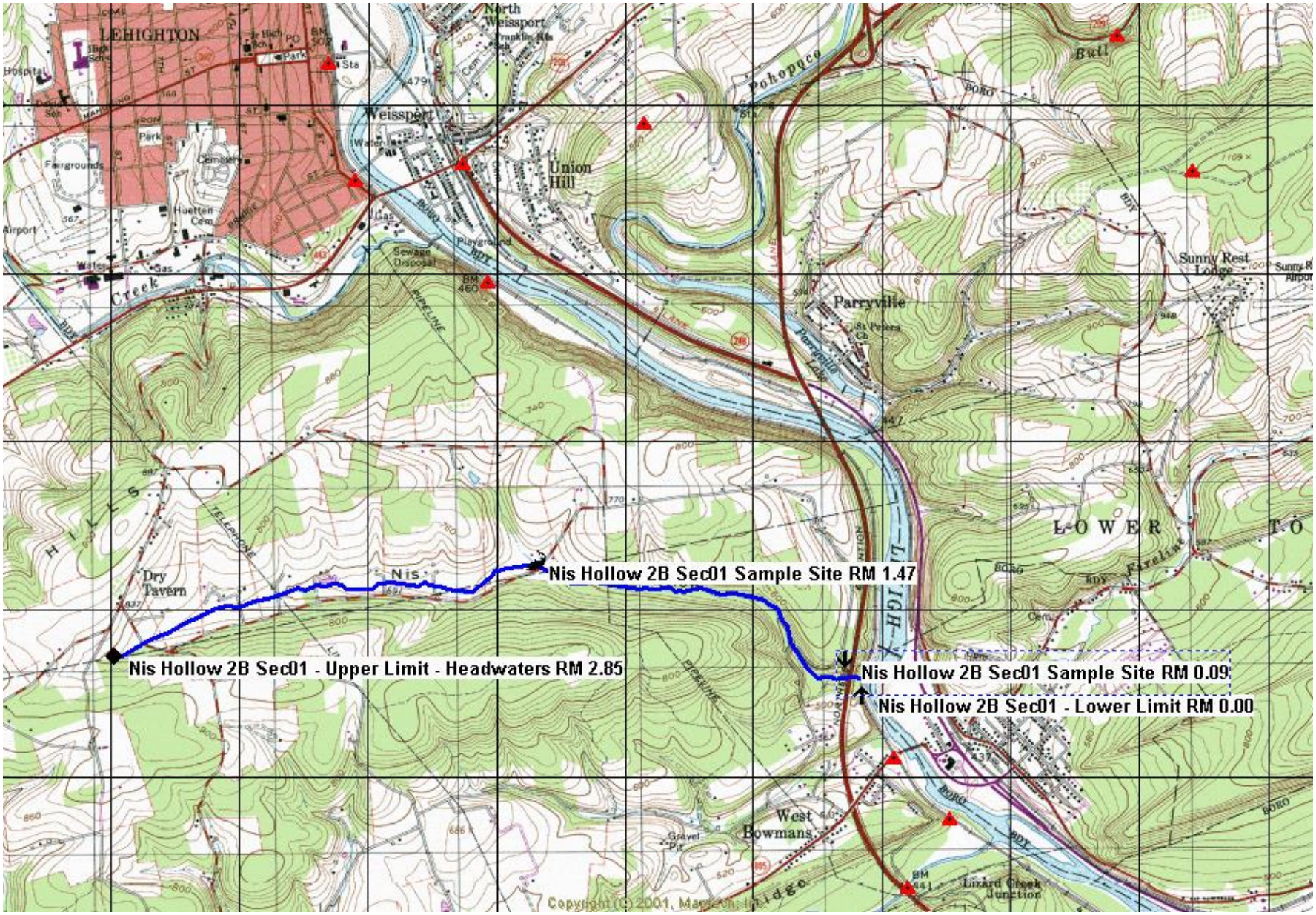

Figure 1. Location map for sample site river miles 1.47 (2012) and 0.09 (2011-2012 on Nis Hollow (502B), Carbon County, USGS Topographic Map – Lehighton, PA.