

MESSENGER RUN

WARREN COUNTY

Stream Designation Evaluation Report Water Quality Standards Review

Segment: Basin
Drainage List: Q
Stream Code: 55290



WATER QUALITY MONITORING & ASSESSMENT (ADK)
DIVISION OF WATER QUALITY ASSESSMENT & STANDARDS
BUREAU OF WATER SUPPLY & WASTEWATER MANAGEMENT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

November 2004

Messenger Run (55290)
Warren County
Drainage List Q

GENERAL WATERSHED DESCRIPTION

Messenger Run is a small headwater stream located within the Allegheny National Forest (ANF) and flows approximately 1.7 miles in an easterly direction into Tionesta Creek through Sheffield Township south of Warren, Pennsylvania near the village of Henrys Mills (Figure 1). The Messenger Run basin drains approximately 0.9 square miles of the North Central Appalachians - Non-glaciated Allegheny High Plateau sub-ecoregion. Local land use is nearly 100% forested, with a few homes located at the mouth. Road access is limited to the State Route 666 bridge crossing the mouth. The North Coventry Trail, part of the ANF trail system, parallels the mainstem of Messenger Run, providing easy access to the entire stream length.

Messenger Run was evaluated based on an inquiry by the Pennsylvania Fish and Boat Commission (PFBC) regarding its Chapter 93 aquatic life use designation. During an ongoing study to document wild trout populations in the ANF, the PFBC noticed that a designated use for Messenger Run was not listed in Chapter 93. Messenger Run's designated use was inadvertently omitted during earlier compilations of Chapter 93. Department staff conducted a survey of the Messenger Run basin on December 5-6, 2001 (Table 1).

WATER QUALITY AND USES

Surface Water

No long-term water quality data were available to allow direct comparison to water quality criteria. Field chemistry measurements taken near the mouth of Messenger Run revealed the presence of a slightly acidic, soft water stream (pH = 6.7 and conductivity = 50 μ mhos/cm). No direct comparison of the field chemistry data to applicable water quality criteria can be made due to the instantaneous nature of the grab sampling. The indigenous aquatic community is a better indicator of long-term conditions and is used as a measure of ecological significance.

There are no permitted ground or surface water withdrawals or NPDES discharges in the Messenger Run basin.

Aquatic Biota

An assessment of the physical habitat in the Messenger Run basin revealed optimal habitat for aquatic biota (Table 3). Most habitat criteria scored 16 or greater, which is indicative of optimal habitat conditions.

Benthic macroinvertebrates were sampled from the best available riffle habitats at a single station using the Department's PaDEP-RBP benthic sampling methodology, which was adapted from EPA's Rapid Bioassessment Protocols manual. This single station exhibited a biologically diverse benthic community of 26 total taxa with sensitive, pollution intolerant genera being well represented (Table 4).

The PFBC documented the presence of a coldwater fishery in the Messenger Run basin during an electrofishing survey conducted on July 27, 1999. The PFBC's survey station was a 100-meter reach of the mainstem located approximately 50 meters upstream of Route SR666. The PFBC estimated the brook trout (*Salvelinus fontinalis*) biomass at this location as 21.65 kg/ha, which classifies Messenger Run as Class B wild trout waters. Two other fish species commonly found in coldwater streams, the blacknose dace (*Rhinichthys atratulus*) and the mottled sculpin (*Cottus bairdi*) were collected from Messenger Run. Additionally, the fantail darter (*Etheostoma flabellare*) was also found at this location.

BIOLOGICAL USE QUALIFICATIONS

The biological use qualifying criterion applied to Messenger Run was the integrated benthic macroinvertebrate score test described at § 93.4b(a)(2)(i)(A). This score is calculated from a subsample of approximately 100 individuals that were randomly selected from the total sample and enumerated following the Department's benthic sample processing protocols (Table 4). Five benthic macroinvertebrate metrics, including taxa richness, modified EPT index, modified HBI, percent dominant taxon, and percent modified mayflies (Table 5), were used in an integrated comparison of the station on Messenger Run (1MR) with a reference station established in Jacks Run basin. The reference station (1JR) was selected based on sub-ecoregion, drainage area, and documented biological integrity. Both the Messenger Run and Jacks Run basins are located entirely within the North Central Appalachians - Non-glaciated Allegheny High Plateau sub-ecoregion. Drainage areas for station 1MR and 1JR are 0.9 and 1.7 square miles, respectively. The Jacks Run basin is located entirely within the Hickory Creek Federal Wilderness Area and currently designated as Exceptional

Value (EV) in Chapter 93. Both Messenger Run and Jacks Run biological samples were taken within the same 24-hour period.

The total biological condition score for the Messenger Run station (1MR) was 100% of the reference station (1JR), which qualifies for an EV designation under the Department's 92% criterion for EV waters (§93.4b(b)(1)(v)).

PUBLIC RESPONSE AND PARTICIPATION SUMMARY

The Department provided public notice of this redesignation evaluation and requested any technical data from the general public through publication in the Pennsylvania Bulletin on April 22, 2000 (30 Pa.B 2071). A similar notice was also published in the Warren Times Observer on April 21, 2000. In addition, Sheffield Township and Warren County Planning and Zoning Commission were notified of the evaluation in a letter dated April 19, 2000. No technical data on water quality, instream habitat, or the aquatic community were received in response to these notifications.

RECOMMENDATIONS

Based on applicable water quality criteria, the Department recommends that the Messenger Run basin, from source to mouth, be designated in Chapter 93 as Exceptional Value (EV). This recommendation is based on Messenger Run's biological condition score (100%) that exceeds the 92% criterion for EV waters and affects 1.7 stream miles, the entire Messenger Run basin.

Figure 1: Messenger Run
Warren County

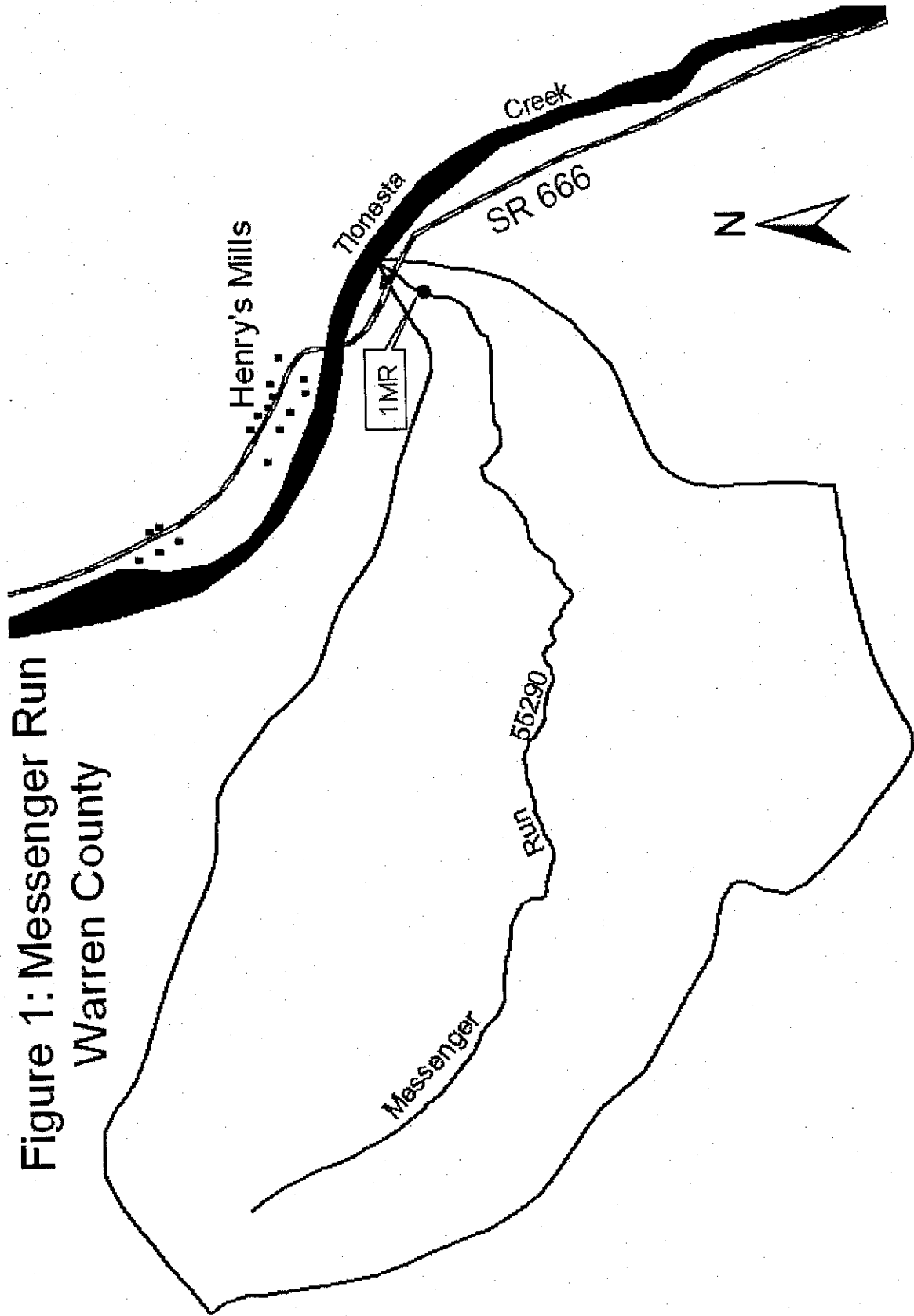


Table 1: Station Locations
Messenger Run - Warren County
 December 5-6, 2001

Identifier	Station	
	GISKEY	20011205-1250-AAK
Station	1MR	1JR
Stream Code	55290	55703
Location	Messenger Run - approx. 25 meters upstream from SR 666 in the Allegheny National Forest	Jacks Run - approx. 15 meters upstream from the mouth in the Hickory Creek Federal Wilderness Area
Ref/Cand	Candidate	Reference
Latitude	41°38'06"	41°39'59"
Longitude	-79°02'32"	-79°19'08"
RMI	0.06	0.05
Drainage Area	0.9 mi ²	1.7 mi ²

**Table 2: Water Chemistry Data
Messenger Run - Warren County
December 5, 2001**

Chemical Parameter	Candidate Station	
	Messenger Run 1MR	
Field Parameters		
	Result	Units
1 Temperature	9.3	degrees celcius
2 pH	6.7	pH units
3 Dissolved Oxygen	9.7	mg/L
4 Conductivity	50	µmhos/cm
Laboratory Parameters		
	Result	Units
1 pH	6.9	pH units
2 Alkalinity (CaCO ₃)	17.2	mg/L
3 Hot Acidity	0.00	mg/L
4 Hardness	23	mg/L
5 Total Dissolved Solids (TDS)	34	mg/L
6 Total Suspended Solids (TSS)	20	mg/L
7 Ammonia (NH ₃ - N) Nitrogen	<0.02	mg/L
8 Nitrite (NO ₂ - N) Nitrogen	0.01	mg/L
9 Nitrate (NO ₃ - N) Nitrogen	0.24	mg/L
10 Total Phosphorus (P)	0.020	mg/L
11 Calcium (Ca)	5.58	mg/L
12 Magnesium (Mg)	2.26	mg/L
13 Chloride (Cl)	1.0	mg/L
14 Sulfate (SO ₄)	<20.0	mg/L
15 Dissolved Arsenic (As-D)	<4.0	µg/L
16 Total Arsenic (As-T)	<4.0	µg/L
17 Dissolved Cadmium (Cd-D)	<0.20	µg/L
18 Total Cadmium (Cd-T)	<0.20	µg/L
19 Hexavalent Chromium (Cr-HEX)	<10.0	µg/L
20 Total Chromium (Cr-T)	<50	µg/L
21 Dissolved Copper (Cu-D)	<4	µg/L
22 Total Copper (Cu-T)	<4	µg/L
23 Iron (Fe)	60.00	µg/L
24 Dissolved Lead (Pb-D)	<1.0	µg/L
25 Total Lead (Pb-T)	<1.0	µg/L
26 Manganese (Mn)	<10.00	µg/L
27 Dissolved Nickel (Ni-D)	<4.0	µg/L
28 Total Nickel (Ni-T)	<4.0	µg/L
29 Dissolved Zinc (Zn-D)	<5.0	µg/L
30 Total Zinc (Zn-T)	<5.0	µg/L
31 Aluminum (Al)	42.80	µg/L
32 Fecal Coliforms	<20	coliforms/100mL
33 Oil & Grease	<5.0	mg/L

**Table 3: Habitat Assessment Data
 Messenger Run - Warren County
 December 5-6, 2001**

Habitat Parameter	Candidate Station	Reference Station
	Messenger Run 1MR	Jacks Run 1JR
1 instream cover	18	19
2 epifaunal substrate	17	18
3 embeddedness	13	16
4 velocity/depth regimes	17	17
5 channel alterations	18	19
6 sediment deposition	16	19
7 riffle frequency	18	17
8 channel flow status	15	20
9 bank condition	15	20
10 bank vegetation protection	18	20
11 grazing/disruptive pressures	16	20
12 riparian vegetation zone width	18	20
Total Score	199	225
Rating	Optimal	Optimal

**Table 4: Macroinvertebrate Data
 Messenger Run - Warren County
 December 5-6, 2001**

TAXA	Candidate Station	Reference Station
	Messenger Run 1MR	Jacks Run 1JR
EPT Taxa		
Ephemeroptera (mayflies)		
<i>Ephemerellidae; Ephemerella</i>	1	2
<i>Ephemeridae; Ephemera</i>	---	4
<i>Heptageniidae; Epeorus</i>	27	1
<i>Stenonema</i>	2	3
<i>Leptophlebiidae; Paraleptophlebia</i>	---	7
<i>Oligoneuriidae; Isonychia</i>	---	2
Plecoptera (stoneflies)		
<i>Capniidae; Allocapnia</i>	14	--
<i>Paracapnia</i>	1	5
<i>Leuctridae; Leuctra</i>	1	2
<i>Peltoperlidae; Tallaperla</i>	1	---
<i>Perlidae; Acroneuria</i>	---	23
<i>Perlodidae; Isoperla</i>	---	1
<i>Pteronarcyidae; Pteronarcys</i>	4	---
<i>Taeniopterygidae; Taeniopteryx</i>	---	1
Trichoptera (caddisflies)		
<i>Hydropsychidae; Cheumatopsyche</i>	2	17
<i>Diplectrona</i>	12	4
<i>Hydropsyche</i>	---	2
<i>Limnephilidae; Pycnopsyche</i>	2	---
<i>Odontoceridae; Psilotreta</i>	---	2
<i>Philopotamidae; Wormaldia</i>	2	---
<i>Polycentropidae; Polycentropus</i>	---	1
<i>Rhyacophilidae; Rhyacophila</i>	2	2
<i>Uenoidae; Neophylax</i>	3	1
Other Insect Taxa		
Coleoptera (beetles)		
<i>Elmidae; Optioservus</i>	2	---
<i>Oulimnius</i>	2	3
<i>Psephenidae; Ectopria</i>	3	---
<i>Psephenus</i>	---	1
<i>Ptilodactylidae; Anchyrtarsus</i>	---	7
Diptera (true flies)		
<i>Chironomidae sp. (midges)</i>	12	3
<i>Simuliidae; Prosimulium</i>	1	---
<i>Tabanidae; Tabanus</i>	1	---
<i>Chrysops</i>	---	2
<i>Tipulidae; Dicranota</i>	---	2
<i>Hexatoma</i>	1	2

**Table 4: Macroinvertebrate Data
 Messenger Run - Warren County
 December 5-6, 2001**

TAXA	Candidate Station	Reference Station
	Messenger Run 1MR	Jacks Run 1JR
<i>Psuedolimnophila</i>	---	1
<i>Pilaria</i>	1	---
<i>Tipula</i>	3	---
Megaloptera (alderflies, dobsonflies)		
<i>Corydalidae; Nigronia</i>	---	2
<i>Sialidae; Sialis</i>	1	---
Odonata (dragonflies, damselflies)		
<i>Aeshnidae; Boyeria</i>	---	1
<i>Gomphidae; Lanthus</i>	2	1
Non-Insect Taxa		
<i>Cambaridae; Cambarus</i> (crayfish)	1	---

**Table 5: RBP Metric Comparison
 Messenger Run - Warren County
 December 5-6, 2001**

Metric		Candidate Station	Reference Station
		Messenger Run 1MR	Jacks Run 1JR
1	Taxa Richness	26	29
	Cand/Ref (%)	90	---
	Biol Cond Score	8	8
2	Modified EPT Index	13	15
	Cand/Ref (%)	87	---
	Biol Cond Score	8	8
3	Modified Hilsenhoff	2.27	2.6
	Cand-Ref	-2.3	---
	Biol Cond Score	8	8
4	% Dominant Taxa	26	21.9
	Cand-Ref	4.1	---
	Biol Cond Score	8	8
5	% Modified Mayflies	28.8	18.1
	Ref-Cand	-10.7	---
	Biol Cond Score	8	8
Total Site Score		40	40
% Comparability to Reference		100%	---