WATER QUALITY STANDARDS REVIEW
STREAM REDESIGNATION EVALUATION

FURNACE RUN
LANCASTER & LEBANON
COUNTIES
Segment: Basin
Stream Code: 07693
Drainage List O

ASSESSMENT SECTION (TES)
DIVISION OF WATER STANDARDS
BUREAU OF WATER STANDARDS AND FACILITY REGULATION
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OCTOBER 2006

INTRODUCTION

Furnace Run is currently designated Trout Stocking (TSF). A mix of open fields, wood lots, light agriculture, and low-density residential land uses characterizes the lower portion of the watershed. However, the presence of well-established riparian cover, high gradient stream flow, and the relatively undisturbed natural setting of its headwaters, suggest that Furnace Run may support cold water fishes. The Lancaster County Conservation District collected low numbers of trout during an electrofishing survey of Furnace Run in July 2000 and notified the Pennsylvania Fish & Boat Commission (PFBC). Since the Department was reviewing a proposal to discharge treated sewage to Furnace Run, the Department requested PFBC to conduct a fisheries survey of the basin to clarify its existing use.

PFBC biologists conducted the survey in August 2000 and confirmed the presence of wild trout in the headwaters. During the course of that survey, PFBC observed that the indigenous benthic macroinvertebrate community was diverse and abundant and requested that the Department consider Furnace Run as a candidate for High Quality (HQ) or Exceptional Value Waters (EV) designation.

In order to resolve the existing use issue for the pending NPDES application, the Department conducted its survey on October 30, 2000. Results of this survey documented that the existing use for the upper reaches of Furnace Run is Cold Water Fishes (CWF). These results were then posted for public notification on the Department's "existing use" web page. In response to this existing use determination and local issues surrounding the permit application, a group of students from Conestoga Valley High School began a study of Furnace Run in April 2001. Based on the students' findings, their teacher—Kerrie Snavely, submitted a petition to the Department on their behalf requesting that Furnace Run be redesignated to EV. The Environmental Quality Board (EQB) accepted the students' petition on September 18, 2001.

GENERAL WATERSHED DESCRIPTION

Furnace Run originates in Heidelberg Township, Lebanon County and flows through Elizabeth and Clay Townships, Lancaster County where it enters Middle Creek. Furnace Run is locally viewed as a tributary to Segloch Run and was considered as such by the Smithsonian Environmental Research Center (SERC) as part of a Chesapeake Bay Watershed study. However, the Pennsylvania Gazetteer of Streams (DEP 1989) and federal 7.5' topographic maps (United States Geological Survey) officially depict Segloch Run as a tributary to Furnace Run. The designated use for the Furnace Run basin is Trout Stocking (TSF), except for Segloch Run, which is designated EV.

Furnace Run is a small stream that drains approximately 8.1 sq. mi. Most of the watershed is situated north of the Pennsylvania Turnpike (I-76). The land use in the headwaters consists of forestlands with some small rural/low-density residential open areas along PA Rt 501. There are several small ponds located in the headwaters as well. A portion of the petitioned area in the vicinity of I-76 is actively managed for commercial Christmas tree production. Most of the lower portion of the basin consists of rural, open fields bounded on the southern edge by low-density residential use along US-322. A very small portion of this

lower basin area near the mouth of Furnace Run supports some modest agriculture-related activity.

Because of the relatively undisturbed nature of Furnace Run, the basin has been the subject of several stream ecology studies and projects. The Hopewell Farm (Center for Education and Conservation) is located in the basin and local high school and college student groups frequent the stream for educational purposes (Hopewell Farm, 2001).

WATER QUALITY AND USES

Surface Water

There is limited water quality data available for Furnace Run. SERC had a monitoring station at the mouth of Furnace Run in the mid-90's as part of a study of Chesapeake Bay tributaries and collected nutrient and pH data. From mid 1994-mid 1996, total nitrates and pH ranged from approximately 1.35-2.5 mg/l and 7.4-7.9, respectively. Dissolved phosphates and ammonia ranged from .002-.05 mg/l and .02-.065 mg/l, respectively. No other long-term water quality chemistry data were available to allow a direct comparison to water quality criteria.

There are no existing point source discharges in the study area. Water withdrawals in the Furnace Run basin are limited to several wells serving domestic and local business needs.

Aquatic Biota

In the absence of sufficient chemical data, the indigenous aquatic community can be used as an indicator of long-term water quality conditions and as a measure of ecological significance. Habitat and benthic macroinvertebrate data were collected from three stations on Furnace Run and one reference station on Segloch Run on January 23, 2002.

Habitat. Instream habitat conditions were evaluated at each station where benthic macroinvertebrates were sampled by rating twelve habitat parameters to derive a station habitat score. Total habitat scores for Furnace Run (Table 1) ranged from 169-201 with the highest habitat score (201) found at the headwater station (1FR). The habitat scores of the lower stations - 176 at 1.5FR and 169 at 2aFR, were similar to that of Segloch Run (179).

Benthos. Furnace Run supports a diverse benthic macroinvertebrate population. Benthic macroinvertebrate samples were collected using the PA-DEP RBPIII benthic sampling methodology. Furnace Run macroinvertebrate communities sampled in January 2002 (Table 2) yielded 23-25 taxa compared to 26 collected from Segloch Run. Most of the macroinvertebrates collected are indicators of good-to-excellent water quality. The macroinvertebrate communities found at all stations were healthy, diverse, and contained a number of pollution sensitive genera - indicating the stream has not been subjected to chronic or acute degradation.

Fish. Twenty-two species of fish were captured in Furnace Run during a PFBC August 2000 survey that intensively sampled three stations along the length of Furnace Run (0101, 0102, & 0201) and included a cursory survey in the headwaters (Figure 1). The fish

occurrence results are presented in Table 3 and are consistent with fish community trends found naturally along an upstream-downstream gradient. Typically, fewer species and individuals are found in headwater areas and those numbers usually increase at sites further downstream. The PFBC collected 5 species from the uppermost station (0101), 13 from the intermediate station (0102), and 20 at the lowermost station (0201).

The most significant PFBC finding was the presence of a small, naturally reproducing brook trout population at Stations 0101 and 0102, confirmed by DEP at Station 1FR in October 2000. The sustained presence of trout indicates long-term water quality conditions better than normally associated with TSF designated waters.

The DEP sampling of the headwaters yielded 8 taxa but at least five species (green sunfish, bluegill, largemouth bass, pumpkinseed, and golden shiner) are not indigenous to cold water, high gradient mountain streams. They most probably escaped from local headwater ponds.

BIOLOGICAL USE QUALIFICATIONS

This assessment of Furnace Run included a biological metric scoring test employing the following benthic macroinvertebrate indicators: taxa richness, modified EPT index, modified HBI, percent dominant taxon, and modified percent mayflies (Table 2). Comparisons of integrated benthic macroinvertebrate metric scores were made between Furnace Run stations and a reference station on Segloch Run. Segloch Run is an EV stream and was used as a reference because it is an adjacent watershed with the same geologic setting and similar drainage area to the upper reaches of Furnace Run. Further, Segloch Run had served as an EV reference stream in several other Departmental surveys.

Biological Assessment. Results of biological metrics comparisons based on January 2002 data are presented in Table 2. The HQ integrated benthic macroinvertebrate scoring criterion of >83% was met at Station 1FR (86.7%). This score indicates that the upper portion of Furnace Run exceeds the 83% comparability required to redesignate the stream segment as High Quality Waters.

The October 2000 score for Station 2FR was less than 83% and thus, did not meet the HQ requirements. However, after the October 2000 survey, it was determined that 2FR was situated in the middle of a stream restoration project. In order to better characterize the natural conditions of this lower reach, Stations 1.5- and 2aFR were established at points upstream from the restored stream section and sampled in January of 2002. The percent comparison values for the lower mainstem stations (1.5FR & 2aFR) were 60 and 67%, respectively. These scores do not qualify these segments of Furnace Run for the High Quality (HQ) protected use designation under the Department's regulations and support the original conclusion drawn from Station 2FR.

The January 2002 result (86.7%) for the upper section of Furnace Run (1FR) differs from the October 2000 result (66.7%) at the same station. The metric comparison score from October 30, 2000 did not support an HQ or EV recommendation. However, the presence of naturally reproducing brook trout in this section indicated that a CWF designation was more appropriate than the current TSF designation. The January 2002 survey indicated

that existing use had improved to HQ-CWF. This more recent data supercede previous results and are used to support the HQ recommendation.

No special conditions were found during this survey that would qualify Furnace Run as Exceptional Value waters under § 93.4b(b).

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 October 7, 2000 (29 Pa.B 5199). A similar notice was also published in the Lebanon Daily News newspaper on October 13, 2000. In addition, Heidelberg (Lebanon Co.) and Elizabeth (Lancaster Co.) Townships were notified of the evaluation in a letter dated September 26, 2000. The Lebanon and Lancaster County Planning Commissions were also notified at the same time.

While no data on Furnace Run were received in immediate response to these notices, some water chemistry, instream habitat, and aquatic community information came forward from sources supporting Conestoga Valley High School's petition efforts.

CONCLUSIONS AND RECOMMENDATIONS

The Department concludes that the existing use of the upper portion of the Furnace Run basin is High Quality – Cold Water Fishes (HQ-CWF). The reasons for this conclusion are the presence of an established, naturally reproducing brook trout population and an aquatic macroinvertebrate community that qualifies this portion of the stream based on biological evaluation metric scoring comparisons at § 93.4b(a)(2)(i)(A).

Based on applicable regulatory definitions and requirements of §93.4b, the Department recommends that the protected use of the upper portion of the Furnace Run basin from its source to the SR 1026 road crossing be changed from Trout Stocking (TSF) to High Quality - Cold Water Fishes (HQ-CWF). The portion of Furnace Run downstream from SR 1026 should remain TSF. This recommendation provides protection commensurate with the significance of the aquatic resources as defined by the aquatic biota documented in the upper reaches.

This recommendation would affect approximately 5.5 miles of the upper Furnace Run basin.

REFERENCES

Department of Environmental Protection. 1989. Pennsylvania Gazetteer of Streams. (Formerly Department of Environmental Resources). DER #456-11/89. 323 pp.

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_____. 2002. Snavely/High School Student Petition; Furnace Run. Central Office File information.

Pennsylvania Fish & Boat Commission. 2000. Furnace Run (607J) Fisheries Management August 30, 2000 Survey. File information.

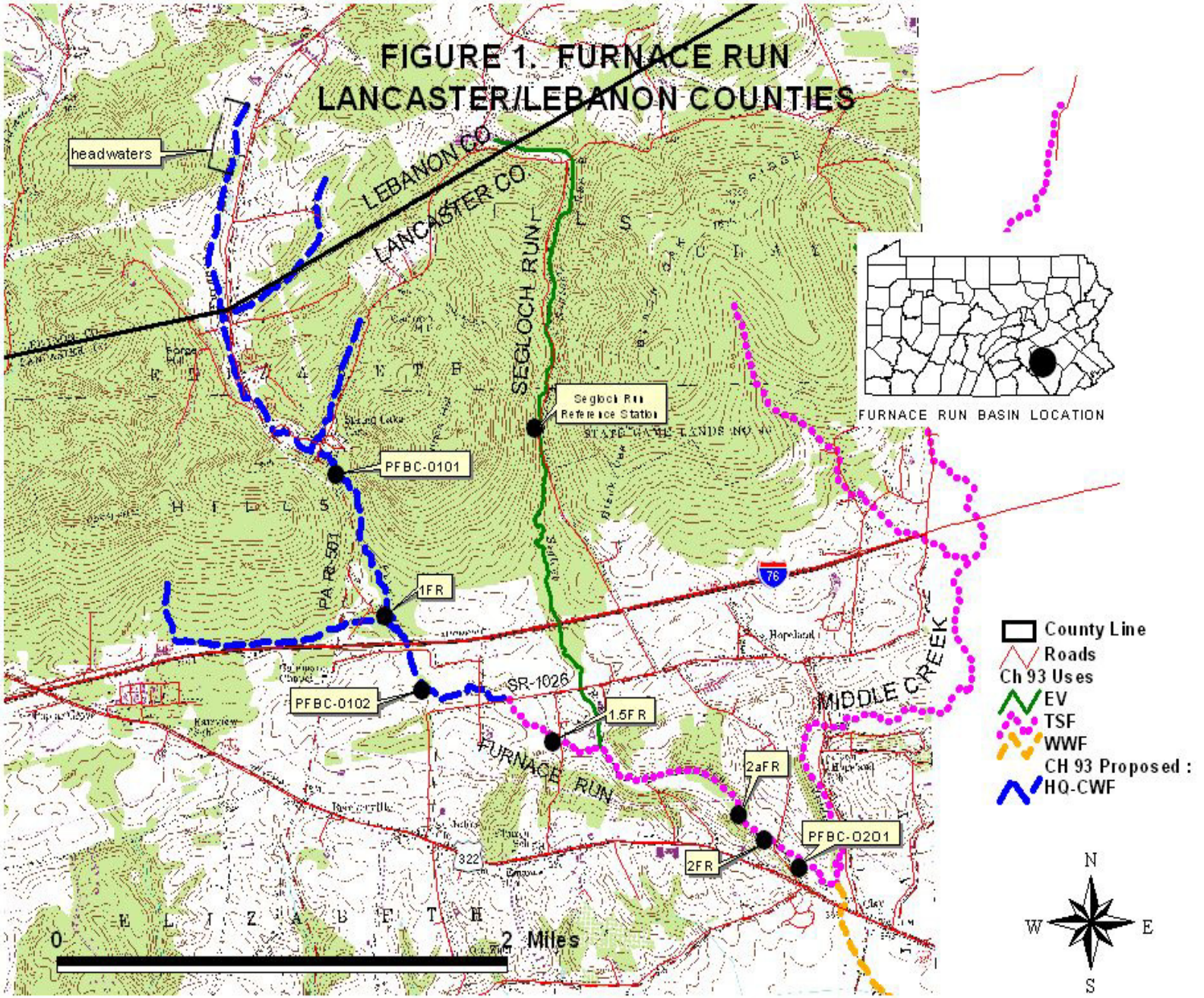
FIGURE 1. FURNACE RUN
LANCASTER/LEBANON COUNTIES
headwaters
LEBANON CO.
LANCASTER CO.
SEGLOCH RUN
Segloch Run
Reference Station
PFBC-0101
PA Rt 501
1FR
SR-1026
PFBC-0102
1.5FR
FURNACE RUN
MIDDLE CREEK
2aFR
PFBC-0201
2FR
76
322
0
2 Miles
FURNACE RUN BASIN LOCATION
County Line
Roads
Ch 93 Uses
EV
TSF
WWF
CH 93 Proposed :
HQ-CWF
N
W
E
S

TABLE 1
HABITAT ASSESSMENT SUMMARY
FURNACE RUN, LANCASTER/LEBANON COUNITES
January 23, 2002

HABITAT PARAMETER	scoring range	STATIONS			
		1FR	1.5FR	2aFR	Segloch Run
1 . instream cover	0 - 20	16	16	11	12
2 . epifaunal substrate	0 - 20	17	16	14	17
3 . embeddedness	0 - 20	13	12	11	11
4 . velocity/depth	0 - 20	15	10	12	11
5 . channel alterations	0 - 20	18	17	18	18
6 . sediment deposition	0 - 20	16	13	11	12
7 . riffle frequency	0 - 20	18	15	12	18
8 . channel flow status	0 - 20	17	18	16	16
9 . bank condition	0 - 20	18	18	14	17
10 . bank vegetation protection	0 - 20	17	16	16	16
11 . grazing/disruptive pressures	0 - 20	18	12	16	18
12 . riparian vagetation zone width	0 - 20	18	13	18	13
Total Score [1]	0 - 240	201	176	169	179

1 - 240-181: OPTIMAL
180-121: SUB-OPTIMAL
120-61: MARGINAL
<=60: POOR

TABLE 2. SEMI-QUANTITATIVE BENTHIC MACROINVERTEBRATE DATA AND RBP METRIC COMPARISONS: FURNACE RUN, LANCASTER / LEBANON COUNTIES

		Segloch Run		Furnace Run				
		Reference		1FR		1.5FR	2aFR	2FR
		10/30/00	1/23/02	10/30/00	1/23/02	1/23/02	1/23/02	10/30/00
MAYFLIES								
Baetidae		-	-	-	-	-	-	1
Ameletidae	***Ameletus***		1		2	-	-	-
Ephemerellidae	***Ephemerella***	8	15	1	16	-	-	-
	Eurylophella		1		-	-	-	-
	Serratella		-		-	6	2	-
Ephemeridae	***Ephemera***		-		-	-	1	-
Heptageniidae	***Epeorus***	23	21	1	8	-	1	-
	Heptagenia		-		-	-	1	-
	Rhithrogena		1		-	-	-	-
	Stenonema	-	2	-	2	8	11	2
	Stenacron	-	-	-	1	-	-	-
Isonychidae	***Isonychia***	-	-	-	-	-	4	4
Leptophlebiidae	***Habrophlebiodes***		-		-	1	-	-
	Paraleptophlebia	18	10	5	1	-	-	1
STONEFLIES								
Capnidae	***Allocapnia***	2	-	4	1	1	-	1
Chloroperlidae	***Alloperla*** n.r.	1	-	-	-	-	-	-
	Sweltsa		-		-	1	1	-
Nemouridae			1		-	-	-	-
	Prostoia	-	-	-	16	3	10	-
Peltoperlidae	***Tallaperla***		1		-	-	-	-
Perlidae	***Acroneuria***	1	1	-	-	2	-	-
	Isoperla	-	4	-	2	-	-	-
Taeniopterigidae	***Strophopteryx***		2		-	11	14	-
	Taeniopteryx	12	1	33	2	1	1	2
CADDISFLIES								
Glossosomatidae	***Glossosoma***	-	-	-	-	-	-	1
Hydropsychidae	***Cheumatopsyche***	-	2	6	4	18	19	39
	Diplectrona	9	4	9	3	-	-	-
	Hydropsyche	1	3	11	7	14	12	33
Lepidostomatidae	***Lepidostoma***	1	-	-	-	-	-	-
Limnephilidae	***Pycnopsyche***	2	1	-	-	-	-	-
Philopotamidae	***Chimarra***	-	-	1	-	13	7	9
	Dolophilodes	6	3	9	6	-	-	-
Psycomyidae	***Lype***	-	-	-	-	-	1	-
Rhyacophilidae	***Rhyacophila***	1	1	4	5	2	2	-
Uenionidae	***Neophylax***	-	-	-	-	1	1	-
TRUE FLIES								
Ceratopogonidae		2	-	-	1	-	-	-
Chironomidae		1	6	5	3	16	8	15
Simuliidae	***Prosimulium***	-	13	-	7	-	1	-
	Simulium	1	-	-	-	-	1	-
Tipulidae	***Antocha***	-	-	-	-	1	1	6
	Dicranota	-	1	-	-	2	3	-
	Hexatoma	13	3	1	-	-	2	-
	Limonia n.r.	-	-	1	-	-	-	-
	Limnophila n.r.	1	-	-	-	-	-	-
	Tipula	1	-	2	-	-	-	-
MISC. INSECT TAXA								
Gomphidae	***Stylogomphus***	-	-	-	1	-	-	-
Elmidae	***Optioservus***	-	1	2	3	13	3	3
	Oulimnius	8	15	5	8	1	-	-
	Promoresia	-	6	3	16	1	-	-
	Stenelmis	-	-	-	-	2	5	4
Psephenidae	***Ectopria***	-	-	-	1	-	-	4
	Psephenus	-	-	-	-	5	3	-
Ptilodactylidae	***Anchytarsus***	-	-	-	-	1	-	-
NON-INSECT TAXA								
Gastropoda - Physidae		-	-	-	-	-	-	1
Oligochaeta - Lumbriculidae		1	-	-	-	-	-	-
Metric								
T Rich.		21	26	18	23	23	25	16
score (c/r)		-	-	0.857	0.885	0.885	0.962	0.714
bc score		6	6	6	6	6	6	4
mEPT		12	17	9	13	11	14	7
score (c/r)		-	-	0.75	0.765	0.647	0.824	0.58
bc score		6	6	4	4	4	6	2
mHBI		1.58	2.06	2.6	2.28	4.19	3.9	5.041
score (c-r)		-	-	1.02	0.220	2.130	1.840	3.46
bc score		6	6	4	6	0	0	0
%dom		20.35	17.5	32.04	13.8	14.5	16.5	31.97
score (c-r)		-	-	11.69	-3.700	-3.000	-1.000	11.62
bc score		6	6	4	6	6	6	4
m %Mayfly		43.36	42.5	6.8	25.9	11.3	17.4	5.74
score (r-c)		-	-	36.56	16.6	31.2	25.1	37.62
bc score		6	6	2	4	2	2	2
BCS total		30	30	20	26	18	20	12
as cand/ref %		-	-	66.7	86.7	60.0	66.7	40.0
Ch 93 recommendation:		-	-	NC	HQ	NC	NC	NC

TABLE 3. FISH OCCURRENCE [1]

FURNACE RUN, LANCASTER/LEBANON COUNTIES

	station data source [2]	headwaters PFBC	0101 PFBC	**1FR** **DEP**	0102 PFBC	0201 PFBC
Salvelinus fontinalis ,	**brook trout**	-	5/5 [3]	**2/1** [3]	2/0 [3]	-
Exoglossum maxillingua ,	**cutlips minnow**	-	-	**R**	P	P
Notropis cornutus ,	**common shiner**	-	-	**P**	C	A
N. hudsonius ,	**spottail shiner**	-	-	**-**	-	R
N. procne ,	**swallowtail shiner**	-	-	**-**	-	R
Rhinichythys atratulus ,	**blacknose dace**	X	A	**A**	A	A
R. cataractae ,	**longnose dace**	-	-	**P**	C	C
Semotilus corporalis ,	**fallfish**	-	-	**-**	-	A
S. atromaculatus ,	**creek chub**	X	A	**A**	A	C
Catastomus commersoni ,	**white sucker**	X	P	**R**	P	A
Hypentelium nigricans ,	**N. hogsucker**	-	-	**-**	P	P
Noturus insignis ,	**margined madtom**	-	-	**-**	-	P
Ambloplites rupestris ,	**rock bass**	-	-	**-**	-	R
Micropterus dolomieui ,	**smallmouth bass**	-	-	**-**	-	2
M. salmoides ,	**largemouth bass**	X	-	**-**	4	4
Etheostoma olmstedi ,	**tessellated darter**	-	-	**R**	C	C
Lepomis cyanellus ,	**green sunfish**	X	-	**-**	R	P
L. macrochirus ,	**bluegill**	X	-	**-**	P	P
L. gibbosus ,	**pumpkinseed**	X	P	**-**	R	P
Notemigonus crysoleucas ,	**golden shiner**	X	-	**-**	**-**	-
Fundulus diaphanus ,	**banded killifish**	-	-	**-**	-	P
Pimephales notatus ,	**bluntnose minnow**	-	-	**-**	-	A
	TOTAL TAXA	8	5	**8**	13	20

1 - X = ocurrence; R - rare, P - present, C - common, A - abundant; counts for significant game fish indicat
2 - DEP: 10/30/00; PFBC: 8/30/0(
3 - juvenile/adul