SPRING RUN AND SNYDER RUN COLDWATER CONSERVATION PLAN



Clearfield County Conservation District 511 Spruce Street, Suite 6 Clearfield, PA 16830

SPRING AND SNYDER RUNS COLDWATER CONSERVATION PLAN

INTRODUCTION AND BACKGROUND

Spring Run is a 1,209 acre watershed that flows into Chest Creek 2.0 miles north of Westover Borough in Clearfield County, Pennsylvania. From its headwaters in Burnside Township, the stream flows east through Chest Township before flowing into Chest Creek. Chest Creek is designated as a Cold Water Fishery and is a tributary to the Upper West Branch of the Susquehanna River. Spring Run is designated as a Cold Water Fishery and is not yet on the PA Fish and Boat Commission List of Naturally Reproducing Trout Streams.

There are several water quality concerns within the Snyder Run watershed. First is human encroachment. There are numerous areas where the stream flows through backyards and in close proximity to homes which has greatly cut down on the stream side riparian buffer in areas. Additionally, there are several man made ponds in the watershed that create the potential for a thermal impact on Snyder Run. Near the mouth of the stream there is a large spoil pile adjacent to Hugill Sanitation. This spoil has gradually washed into the stream and is coating the bottom of Snyder Run in this section. Lastly there is the potential for increased gas well drilling with the Marcellus Shale play.

Nearby Spring Run is a 1,375 acre watershed that flows into Chest Creek 2.5 miles north of Westover Borough in Clearfield County, Pennsylvania. From its headwaters in Burnside Township, the stream flows east through Chest Township before flowing into Chest Creek. Currently the stream is designated as a Cold Water Fishery and is already listed on the PA Fish and Boat Commission List of Naturally Reproducing Trout Streams.

Water quality concerns in this watershed include potential impacts from the Rosebud Mining Harmony Deep Mine. Not only does this include potential ground or surface water contamination but also increased sedimentation. Owens Road runs adjacent to Spring Run throughout much of its length and the constant heavy truck traffic pummels the road and greatly increases sediment runoff to the stream. Additionally, as Spring and Snyder Runs are so close, there is also the potential for increased Marcellus Shale gas well drilling.

PROJECT GOALS

- Identify current and potential sources of pollution within these watersheds
- Collect baseline water quality and macroinvertebrate data
- Develop a list of recommendations to improve current problems and protect the stream from future problems

DESCRIPTION OF STUDY

We started by conducting a reconnaissance of both watersheds, looking for any current pollution sources or impact as well as locating areas where sampling should occur. We walked the streams and tributaries and conducted a driving tour of the watershed where appropriate. Based on our observations in each watershed and the need to collect useful baseline water quality throughout the Spring and Snyder Runs, we chose 4 sampling locations throughout the two watersheds. We collected water samples at these location 3 times during the project. At each location, as identified in Appendix A, the pH, conductivity, temperature, dissolved oxygen, and flow were taken. See Appendix E for pictures of these locations.

All chemical samples were collected as grab samples utilizing new polyethylene bottles provided by Mahaffey Laboratory. Bottles were rinsed 3 times with the sample water before the final sample was collected. Each sample was taken at mid-stream and at mid-depth. Smaller sample bottles were fixed with nitric acid following sample collection. The bottle specifically for the methane test had been pre filled with acid to fix the sample. To

fill the bottle, water was poured from the large bottle (after rinsing), until the water was completely to the top of the bottle. Once the cap fit on, it was necessary for us to make sure there were no air bubbles in the sample bottle or the sample had to be retaken with a fresh bottle. All water quality samples were analyzed for acidity, alkalinity, chlorides, sulfates, total dissolved solids (TDS), total suspended solids (TSS), methane, total hardness, aluminum, iron, manganese, barium, and calcium. Water quality results can be found in Appendix B.

Macroinvertebrates were sampled using a kick net. Two kicks were conducted at each site and organisms were identified to the Order level stream side. The benthic metric used was the total number of taxa to measure overall variety of the macroinvertebrates which would decrease with increased pollution. We also used the EPT taxa or the number of taxa in the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Tricoptera (caddisflies). The EPT Taxa are considered more sensitive to pollution and so this number would also decrease with increased pollution. Our results were only compared to each other and not to a reference stream. The results of the macroinvertebrate sampling can be found in Appendix C.

Lastly, Stream Habitat Assessments were completed at the same points that macroinvertebrates were collected. We utilized the assessment forms found in the DEP ICE Protocol which can be found in Appendix D. The habitat scores range from 0 to 240, with 240 indicating the best possible habitat. It was used to gauge the suitability of the habitat for the biological community as well as the integrity of the riparian zones in each watershed.

WATERSHED DESCRIPTION

Land Use

Approximately 90% of the Snyder Run watershed is forested. Agriculture accounts for approx. 3% of the land use and is found mostly in the headwaters of Snyder Run. Another 5% of the land use is accounted for by roads and utility right of ways with the last 2% being composed of commercial/industrial usage at the Hugill Sanitation location.

Spring Run is also mostly forested, approximately 92%. Roads and utility rights of way account for approximately 5% of the watershed with the remaining 3% being commercial/industrial use at the Rosebud Harmony Deep Mine.

Geography and Physiography

Both Spring Run and Snyder Run are in the Appalachian Plateaus Province in the Pittsburgh Low Plateau Section. Both streams start out in Burnside Township just north of Harmony and flow east through Chest Township before entering Chest Creek in the Five Points area.

According to USGS Topographic maps, elevations in the Snyder Run watershed range from 1810 feet to 1314 feet and elevations in the Spring Run watershed range from 1800 feet to 1334 feet.

Geology

Rock formations in both of these watersheds are listed in the Pennsylvania Series. From this series, the Allegheny and Glenshaw formations can be found in the Spring and Snyder Run watersheds. The Allegheny formation is composed of clay shale, claystone, siltstone, sandstone, limestone, and coal while the Glenshaw Formation is composed of sandstone, siltstone, shale, claystone, limestone and coal.

Both watersheds also sit in the Main Bituminous Coal Field of Pennsylvania and include the Upper and Lower Freeport and the Upper, Middle, and Lower Kittanning coal seams.

<u>Soils</u>

Soils in the Spring and Snyder Run watersheds consist primarily of the Rayne channery silt loam association which are deep well drained soils found in the upland areas of both watersheds. It consists of residuum weathered from shale and siltstone and is considered well drained. To a smaller extent, the watersheds also contain Ernest silt loam and Rayne-Gilpin complex. The Ernest silt loam consists of very deep, moderately well drained soils formed from shale, siltstone, and some sandstone. The Rayne-Gilpin complex consists of well drained soils that are moderate to very deep.

PREVIOUS STUDIES/ANALYSIS OF WATERSHED

As identified in the Operation Scar Lift report of the 1960's, there are several abandoned mine land features in both watersheds. In Snyder Run there are spoil piles near the mouth of the stream, as noted previously in this report. In the Spring Run watershed there are more features including spoil piles and a dry strip mines. Since 2008, Rosebud Mining's Harmony Deep Mine, Permit # 17071301 has been an active underground mine complex that extends throughout most of the headwaters of Spring Run and even a small portion of the very headwaters of Snyder Run.

The Pennsylvania Fish and Boat Commission has already evaluated Snyder and has classified it as having a population of native brook trout. In 2013, the CCCD will be working with Trout Unlimited to conduct the Unassessed Waters survey of Chest Creek and its tributaries to identify additional tributaries that support native trout, including Spring Run.

AREAS OF CONCERN AND POTENTIAL CONFLICTS

Human Encroachment/Sedimentation: Snyder and Spring Run

There are numerous areas within the Snyder Run watershed where the stream is flowing through backyards which have greatly impacted the riparian buffer in certain areas. This is leading to increased run off potential, trash in the stream, and increased stream bank erosion.

In Spring Run, there is a dirt road that runs the length of the creek. There is very heavy truck traffic on this road travelling to and from the Rosebud Harmony Deep Mine which is greatly increasing runoff of sedimentation. This sedimentation can coat the bottom of Spring Run and degrade macroinvertebrate habitat and destroy spawning areas for fish.

Thermal Pollution: Snyder Run

There are several man made ponds along Snyder Run that, coupled with the lack of trees in the riparian area, could possibly increase the temperature in Snyder Run making it less suitable as a brook trout fishery.

Abandoned Mine Drainage (AMD) and Spoil Piles: Snyder and Spring Run

Mine drainage is formed when pyrite found in and around coal, coal refuse, and overburden is exposed to oxygen and water during the mining process. This results in water that is high in acidity and metal concentrations (including iron, aluminum, and manganese) and low pH. Iron and aluminum are the most lethal as they can coat the gills of fish and aquatic insects and can coat the substrate which is the habitat for macroinvertebrates and spawning ground for fish. AMD is the primary water quality concern in Clearfield County as we contribute more than 51% of all the AMD pollution to the West Branch of the Susquehanna River. More than 630 of the counties 700 stream/river miles are impacted in some way by AMD and many of them are devoid of life.

The Rosebud Harmony Deep Mine in the Spring Run watershed has the potential to impact the stream. Water flowing out of the mine must be treated with care by the Operator in order to prevent mine discharges to Spring Run. Any overburden brought out of the mine with coal refuse in it has the potential to create acidic runoff as well.

Near the mouth of the Snyder Run is a large spoil pile adjacent to Hugill Sanitation which has gradually washed into the stream and is coating the bottom of Snyder Run in this section virtually destroying the habitat in the last half mile of Snyder Run.

Oil and Gas: Snyder and Spring Run

Conventional gas well drilling is present in a few locations in both the Spring and Snyder Run watersheds. However, the concern here is more with unconventional drilling into the Marcellus Shale (and possibly other shale layers in the future). Concerns related to unconventional gas well drilling include road and pad construction meaning increased sedimentation potential; stream pollution by "flow back" water containing salts, chemicals used in the fracking process, and heavy metals that could have a devastating impact to the fishery in both of these streams; and diesel fuel and other possible leakages from the pad site. Nearby areas are seeing Marcellus Shale which will eventually come to the Chest Creek watershed and ultimately to Spring and Snyder Runs.

STUDY RESULTS

Snyder Run: Water Quality

As shown in the chart below the average pH values at the four sample locations are between 6.0 and 7.0 which is ideal for aquatic life. Additionally, a comparison of the alkalinity vs. acidity shows that at each sampling location, we saw more alkalinity than acidity meaning Snyder Run is alkaline in nature and is capable of neutralizing any acidic pollution flowing into the stream.





As thermal impacts were a concern in Snyder Run, you will see a chart outlining the average temperatures measured throughout the stream below. According to the Pennsylvania Fish and Boat Commission, the brook trout prefers water that is below 65° F or 18.3° C. The chart below shows that the temperature at each sampling location averages less than 15° C and would be tolerable to our native brook trout. This also shows us that the ponds on Snyder Run do not increase the temperature of the stream significantly and therefore do not have as great an impact on Snyder Run as was thought.



Drilling impacts, primarily future impacts, were a big concern in the watershed as well. Below you will see a chart detailing the average chloride levels at our sampling locations. According to the State Drinking Water Standards, 250 mg/L is the highest allowable value for chlorides in drinking water. Higher concentrations can indicate problems such as road runoff or sewage input. Gas waste fluids contain extremely high levels such as 100,000 mg/L. Our results show that we did register some chlorides at each sampling point but the averages were all well below 250 mg/L. This baseline water quality data will be important should unconventional gas well drilling ever occur in this watershed.



On average at Snyder A, dissolved oxygen was 10.7 mg/L, conductivity was 142.7uS/cm, sulfate levels were 11.3 mg/L, total dissolved solids were 66.7 mg/L, total suspended solids were <5.0 mg/L, total hardness was 2.2 mg/L, barium was 0.1 mg/L, calcium was 9.5 mg/L, aluminum was 0.1 mg/L, iron was 0.2 mg/L, manganese was 0.02 mg/L, methane was <0.3 mg/L, and magnesium was 3.4 mg/L.

On average at Snyder B, dissolved oxygen was 10.06 mg/L, conductivity was 74.67 uS/cm, sulfate levels were 10.0 mg/L, total dissolved solids were 44.0 mg/L, total suspended solids were <5.0 mg/L, total hardness was 1.3 mg/L, barium was <0.5 mg/L, calcium was 5.85 mg/L, aluminum was 0.09 mg/L, iron was 0.11 mg/L, manganese was 0.02 mg/L, methane was < 0.3 mg/L, and magnesium was 1.93 mg/L.

On average at Snyder C, dissolved oxygen was 11.09 mg/L, conductivity was 106.0 uS/cm, sulfate levels were 13.0 mg/L, total dissolved solids were 60.0 mg/L, total suspended solids were <5.0 mg/L, total hardness was 1.9 mg/L, barium was <0.5 mg/L, calcium was 8.45 mg/L, aluminum was 0.11 mg/L, iron was 0.29 mg/L, manganese was 0.04 mg/L, methane was < 0.3 mg/L, and magnesium was 2.84 mg/L.

And on average at Snyder D, dissolved oxygen was 10.85 mg/L, conductivity was 118.00 uS/cm, sulfate levels were 14.0 mg/L, total dissolved solids were 64.33 mg/L, total suspended solids were <5.0 mg/L, total hardness was 2.23 mg/L, barium was <0.5 mg/L, calcium was 9.98 mg/L, aluminum was 0.07 mg/L, iron was 0.30 mg/L, manganese was 0.08 mg/L, methane was < 0.3 mg/L, and magnesium was 3.22 mg/L.

Overall, total dissolved solids values at each location stayed well below the state drinking water standard of 500 mg/L. Methane, which could result from natural conditions or from gas well drilling were not detected in Snyder Run at any of our sampling locations. Iron, aluminum, and manganese were also shown to not be concerning as the average for each metal at each sampling point was shown to be less than their respective drinking water standards (0.3 mg/L iron, 0.2 mg/L aluminum, and 0.05 mg/L of manganese). The complete results can be found in Appendix B.

Snyder Run: Macroinvertebrate Study

We encountered just 4 individuals at Snyder A with just 1 individual in the EPT taxa. This site was highly impacted by human encroachment and the habitat was just not suitable for macroinvertebrate life.

At Snyder we encountered a total of 17 individuals from 5 different taxa. The number of EPT taxa was 11, which was more than half of the total number of individuals observed.

We encountered 76 individuals at Snyder C with 65 individuals in the EPT taxa, nearly 86% of the observed macroinvertebrates. This site had more flow and suitable habitat for macroinvertebrates as well as less human encroachment.

We were not able to collect macroinvertebrates at Snyder D because we were not able to locate suitable riffles to conduct the kick survey. Further explanation of the habitat can be found further on in the Habitat Assessment section of this narrative.

Snyder Run: Habitat Assessments

Sample point Snyder A at the mouth of northern branch of Snyder Run scored 130 out of 240. Snyder A was highly impacted by human encroachment in the form of hand placed dams, weirs, and bridges. It scored very low in Riparian Vegetative Zone Width, Channel Alterations, Velocity & Depth Regimes, Epifaunal Substrate, and Instream Cover.

Sample point Snyder B at the mouth of the southern branch of Snyder Run scored 204, the highest of the three Snyder Run points. There is some but much less human encroachment to this branch so it scored high in Instream Cover, Epifaunal Substrate, Frequency of Riffles, Channel Flow Status, and Bank Vegetative Protection.

Sample point Snyder C was located just upstream of the first bridge crossing Snyder Run on Five Points Road and scored 197 out of 240. Due to its proximity to the road the habitat was somewhat degraded but not as bad

as other locations on the stream. This location scored high in Epifaunal Substrate, Embeddedness, and Frequency of Riffles but scored low in the Riparian Vegetative Zone Width and Channel Alteration.

Sample point Snyder D was a very degraded site. There were immeasurable amounts of "red dog" in the stream and there were no larger stones present, everything was approximately 3" in diameter or smaller. We were not able to locate suitable riffle locations to sample for macroinvertebrates but did conduct a habitat assessment to document the conditions we encountered. Snyder D scored just 117 out 240. This location scored low in every category except Bank Vegetative Protection.

Snyder Run: Water Quality

As shown in the chart below the average pH values at the four sample locations are between 6.0 and 7.2 which is ideal for aquatic life. Additionally, a comparison of the alkalinity vs. acidity shows that at Spring 1, 2, and 4 we saw more alkalinity than acidity meaning these locations in Spring Run are alkaline in nature and capable of neutralizing any acidic pollution flowing into the stream. As you can see, acidity was actually higher than alkalinity at Spring 3 which is a small trib that flows into Spring Run from the north. As there are no high metals or total dissolved solids readings, this may potentially be occurring from acid deposition to this tributary.





One of the primary concerns in Spring Run is impacts from mining practices and so below you will see a chart comparing the levels of iron, aluminum, and manganese in the stream as well as a chart outlining the average sulfate levels. EXPLAIN SULFATES



As you can see in the chart below, iron levels were 0.17 mg/L. 0.24 mg/L, 0.09 mg/L, and 0.27 mg/L. These levels were all below the State Drinking Water Standard level of 0.3 mg/L. Aluminum, which is much more toxic to fish, exceed the State Drinking Water Standard of 0.2 mg/L at Spring 2 just below the Harmony Deep Mine with a level of 0.23 mg/L and again at the mouth at Spring 4 with a level of 0.21 mg/L. It is possible that the aluminum being detected is coming from the Harmony Deep Mine but it is also just as likely that this can be a legacy aluminum in the watershed from the identified AML features noted earlier. Further investigation will have to take place to determine the exact cause. Lastly, the State Drinking Water Standards for Manganese (0.05 mg/L were also exceed at Spring 2 and 4 with levels of 0.06 mg/L and 0.08 mg/L, respectively. Again, this could be a product of the Harmony Deep Mine but it could also be legacy mining issues in the watershed and further investigation would be needed to confirm the source.



Potential impacts from any future development of the Marcellus Shale are a big concern in the watershed as well. Below you will see a chart detailing the average chloride levels at our sampling locations. According to the State Drinking Water Standards, 250 mg/L is the highest allowable value for chlorides in drinking water. The Alliance for Aquatic Resource Monitoring, who were involved in training numerous Trout Unlimited Chapters around the state to monitor in areas with Marcellus Shale drilling states uses 25 mg/L as a check point. Higher

concentrations can indicate problems such as road runoff or sewage input. Gas waste fluids contain extremely high levels such as 100,000 mg/L. Our results show that we did register some chlorides at each sampling point but the averages were all well below both the 250 mg/L and 25 mg/L levels indicated by the above agencies. This baseline water quality data will be important should unconventional gas well drilling ever occur in this watershed.



Overall, on average at Spring 1 dissolved oxygen was 11.24 mg/L, conductivity was 283.33 uS/cm, sulfate levels were 17.3 mg/L, total dissolved solids were 133.33 mg/L, total suspended solids were <5.0 mg/L, total hardness was 3.33 mg/L, barium was 0.09 mg/L, calcium was 15.9 mg/L, aluminum was 0.91 mg/L, iron was 0.17 mg/L, manganese was 0.05 mg/L, methane was <0.3 mg/L, and magnesium was 4.21 mg/L.

On average at Spring 2 dissolved oxygen was 11.72 mg/L, conductivity was 259.33 uS/cm, sulfate levels were 25.0 mg/L, total dissolved solids were 146.67 mg/L, total suspended solids were <5.0 mg/L, total hardness was 3.87 mg/L, barium was 0.08 mg/L, calcium was 18.3 mg/L, aluminum was 0.23 mg/L, iron was 0.24 mg/L, manganese was 0.06 mg/L, methane was <0.3 mg/L, and magnesium was 4.93 mg/L.

At Spring 3 dissolved oxygen was 12.56 mg/L, conductivity was 57.50 uS/cm, sulfate levels were 15.5 mg/L, total dissolved solids were 34.0 mg/L, total suspended solids were <5.0 mg/L, total hardness was 1.15 mg/L, barium was < 0.05 mg/L, calcium was 4.56 mg/L, aluminum was 0.07 mg/L, iron was 0.09 mg/L, manganese was 0.02 mg/L, methane was <0.3 mg/L, and magnesium was 1.96 mg/L.

Lastly, at Spring 4 dissolved oxygen was 11.74 mg/L, conductivity was 231.33 uS/cm, sulfate levels were 32.33 mg/L, total dissolved solids were 127.67 mg/L, total suspended solids were 5.67 mg/L, total hardness was 3.90 mg/L, barium was 0.06 mg/L, calcium was 17.77 mg/L, aluminum was 0.21 mg/L, iron was 0.27 mg/L, manganese was 0.08 mg/L, methane was <0.3 mg/L, and magnesium was 5.58 mg/L.

Overall, total dissolved solids values at each location stayed well below the state drinking water standard of 500 mg/L. Methane, which could result from natural conditions or from gas well drilling were not detected in Spring Run at any of our sampling locations. And levels of iron, aluminum, and manganese showed impacts from mining from either the Harmony Deep Mine or legacy mining in the area.

The complete results can be found in Appendix B.

Spring Run: Macroinvertebrate Study

We encountered 65 individuals from 5 different taxa at Spring 1 with 32 individuals (nearly 50%) in the EPT taxa.

At Spring 2 we encountered a total of 35 individuals from 4 different taxa. The number of EPT taxa was 21, which was approximately 60% of the total number of individuals observed.

Spring 3 was dry on the date macroinvertebrates were collected so were not able to collect any at this site.

At Spring 4 we encountered 122 individuals from 6 different taxa. This was the highest overall count from any location in the study. The number of EPT taxa was 117 or 96% of the total number of individuals observed, this was also the highest EPT count observed during the study. This value was composed of more than 100 individuals in the Plecoptera Family (caddisflies) which are not as sensitive as either mayflies (Ephemeroptera) or stoneflies (Tricoptera) so this value, though great, would be even better if members of the Ephemeroptera and Tricoptera families were the primary constituents.

Snyder Run: Habitat Assessments

Sample point Spring 1 upstream of the Harmony Deep Mine scored 201 out of 240. Spring 1 was slightly impacted due to its proximity to Owens Road and as such it scored lower in the Condition of Banks and Riparian Vegetative Zone Width. It scored higher in every other category.

Sample point Spring 2 downstream of the Harmony Deep Mine but upstream of a beaver dam area mid way through the watershed 204 with its highest marks in Channel Alteration, Instream Cover, Epifaunal Substrate, and Sediment Deposition. This is the highest score for any of the Spring Run locations.

As Spring Run 3, the only tributary to Spring Run, was dry when we were conducting the habitat assessment we did not complete one as it would be difficult to rate the tributary on many of the categories listed on the assessment sheet.

Lastly sample point Spring 4 was located just near the mouth of Spring Run and scored 163 out of 240. There was a man made bridge crossing Spring Run and a mowed field within the study stretch that impacted the habitat on this stretch of Spring Run. This location scored lower in Instream Cover, Embeddedness, Sediment Deposition, and Riparian Vegetative Zone Width. It scored higher in Bank Vegetative Protection and Epifaunal Substrate.

RECOMMENDATIONS AND NEXT STEPS

Spring Run:

1) Sedimentation is one of the largest problems with Spring Run. Owens Road, which runs within 60 feet of Spring Run throughout most of its length, is heavily travelled by heavy truck traffic from the Rosebud Mining Harmony Deep Mine. Although they appear to have maintained the road since their permit was issued in January 2008, it is clear that a lot of sediment is getting into Spring Run and is having a negative impact on both the habitat in the stream and macroinvertebrate population. We recommend continued maintenance of this road throughout the life of the mine as well Rosebud Mining investigating ways to better keep the sediment from the road from getting into the stream. This road may possibly someday be a candidate for a Dirt and Gravel Road project which would help with the sediment issues.

2) Water quality and macroinvertebrate populations indicate that the Rosebud Mining Harmony Deep Mine or legacy mining in the watershed may be having a slightly negative impact on the water quality of Spring Run.

With only 3 samples analyzed during the life of this project we recommend more intense sampling by either the local watershed group or Rosebud Mining to get a better sense of the water quality above and below the Mine to ensure the water quality does not continue to degrade.

3) Water quality showed that the trib containing Spring 3 may be experiencing impacts from acid deposition, this should be investigated further.

Snyder Run:

1) As seen on aerial photos, there is a large boney pile just west of Hugill Sanitation at the mouth of Snyder Run. Judging by the incredible amount of boney in the last quarter mile of Snyder Run, this pile is definitely impacting the stream. There is no real bed or habitat in the stream and there is no macroinvertebrate life. We recommend that the landowners, including Hugill Sanitation, investigate the removal or reclamation of this boney pile.

2) Human encroachment is a problem on Snyder Run. There are numerous homes within 60 feet of the stream, numerous ponds that could cause thermal pollution to Snyder Run, some perched culverts, and human manipulation of the stream bed (such as hand placed dams). Efforts could be made to educate the landowners on the importance of floodplains, stream bank maintenance, pond management, and in stream habitat. Improvement of some of these conditions should also be priority such as proper in stream habitat construction per PA Fish and Boat Commission recommendations and repair of perched culverts.

Overall:

1) Since one of the goals of this project was to collect baseline water quality data in the event that unconventional gas well drilling occurs in these watersheds, every effort should be made to publicize the existence of this report. Both Burnside and Chest Townships will be provided with copies of the report and will be asked to share it with companies that are interested in doing work in these watersheds.

2) Continued monitoring should be done by the watershed group to maintain up to date water quality information on these streams. Should drilling or mining activity increase, the watershed group should intensify their monitoring efforts and focus them on extreme changes in either metals and pH (for mining impacts) or TDS, specific conductance, and chlorides for gas well drilling impacts.

3) We were not able to get these streams surveyed for fish populations in 2012. It was indicated that in 2013 Trout Unlimited will likely be spearheading an effort to survey the entire Chest Creek watershed as part of the PA Fish and Boat Commission Unassessed Waters Program. At that time, both Spring and Snyder Runs will be surveyed.

APPENDIX A MAP



APPENDIX B WATER QUALITY RESULTS

Snyder A

Date Sampled	Field pH	Field Cond.	DO	Field Temp	Acidity	Alkalinity	Chloride	Lab pH	Specific Cond.	Sulfate	TDS	TSS	
		uS/cm	mg/L	Celsius	mg/L	mg/L	mg/L		uS/cm	mg/L	mg/L	mg/L	
10/20/2011	6.2	110	11.49	10.4	-1	25	9.9	6.6	151	11	65	<	5
3/6/2012	6.5	110	13.86	12.9	10	10	10.3	6.5	104	12	57	<	5
7/3/2012	7.16	180	6.74	17.9	-24	43	14.7	7	173	11	78	<	5
Average	6.6	133.3	10.7	13.7	-5.0	26.0	11.6	6.7	142.7	11.3	66.7	<	5.0
Min	6.2	110	6.74	10.4	-24	10	9.9	6.5	104	11	57	<	5
Max	7.16	180	13.86	17.9	10	43	14.7	7	173	12	78	<	5

Date Sampled	Methane		Total Hardness	Aluminum	Bar	rium	Calcium	Iron	Magnesium	Mang	anese
	mg/L		gpg	mg/L	m	g/L	mg/L	mg/L	mg/L	៣រួ	g/L
10/20/2011	<	0.3	1.9	0.24	<	0.05	8.3	0.48	2.91		0.03
3/6/2012	<	0.3	1.5	0.05	<	0.05	6.22	0.07	2.28	<	0.02
7/3/2012	<	0.3	3.3	0.09		0.05	14.1	0.09	4.99	<	0.02
Average		0.3	2.2	0.1		0.1	9.5	0.2	3.4		0.02
Min		0.3	1.5	0.05	<	0.05	6.22	0.07	2.28	<	0.02
Max		0.3	3.3	0.24		0.05	14.1	0.48	4.99		0.03

Snyder B

Date Sampled	Field pH	Field Cond.	DO	Field Temp	Acidity	Alkalinity	Chloride	Lab pH	Specific Cond.	Sulfate	TDS	TSS	
		uS/cm	mg/L	Celsius	mg/L	mg/L	mg/L		uS/cm	mg/L	mg/L	mg/L	
10/20/2011	6	70	11.3	10.2	9	12	4.1	6.1	79	10	42	<	5
3/6/2012	6.45	70	13.88	2.2	12	6	3.2	6.3	65	11	39	<	5
7/3/2012	6.67	80	5.01	16.5	6	13	6.1	6.5	80	9	51	<	5
Average	6.37	73.33	10.06	9.63	9.00	10.33	4.47	6.30	74.67	10.00	44.00	<	5.00
Min	6.00	70.00	5.01	2.20	6.00	6.00	3.20	6.10	65.00	9.00	39.00	<	5.00
Max	6.67	80.00	13.88	16.50	12.00	13.00	6.10	6.50	80.00	11.00	51.00	<	5.00

			Total										
Date Sampled	Methane		Hardness	Alum	iinum	Bar	ium	Calcium	Ire	on	Magnesium	Mang	anese
	mg/L		gpg	m	g/L	៣រួ	g/L	mg/L	mį	g/L	mg/L	៣រួ	;/L
10/20/2011	<	0.3	1.3		0.13	<	0.05	5.62		0.2	1.92		0.03
3/6/2012	<	0.3	1.1	<	0.05	<	0.05	5.05	<	0.05	1.7	<	0.02
7/3/2012	<	0.3	1.5		0.08	<	0.05	6.87		0.09	2.17		0.02
Average	<	0.30	1.30		0.09	<	0.05	5.85		0.11	1.93		0.02
Min	<	0.30	1.10	<	0.05	<	0.05	5.05	<	0.05	1.70	<	0.02
Max	<	0.30	1.50		0.13	<	0.05	6.87		0.20	2.17		0.03

Snyder C

Date Sampled	Field pH	Field Cond.	DO	Field Temp	Acidity	Alkalinity	Chloride	Lab pH	Specific Cond.	Sulfate	TDS	TSS	
		uS/cm	mg/L	Celsius	mg/L	mg/L	mg/L		uS/cm	mg/L	mg/L	mg/L	
10/20/2011	5.9	90	11.44	10.6	2	21	6.7	6.4	102	12	54	<	5
3/6/2012	6.42	100	14.26	3.2	8	10	6.4	6.5	88	14	52	<	5
7/3/2012	6.66	140	7.57	20.4	-8	28	9.1	6.8	128	13	74	<	5
Average	6.33	110.00	11.09	11.40	0.67	19.67	7.40	6.57	106.00	13.00	60.00	<	5.00
Min	5.90	90.00	7.57	3.20	-8.00	10.00	6.40	6.40	88.00	12.00	52.00	<	5.00
Max	6.66	140.00	14.26	20.40	8.00	28.00	9.10	6.80	128.00	14.00	74.00	<	5.00

Date Sampled	Methane		Total Hardness	Aluminum	Bar	ium	Calcium	Iron	Magnesium	Mang	anese
	mg/L		gpg	mg/L	m	g/L	mg/L	mg/L	mg/L	mį	g/L
10/20/2011	<	0.3	1.8	0.07	<	0.05	7.76	0.14	2.69		0.03
3/6/2012	<	0.3	1.4	0.05	<	0.05	6.3	0.08	2.17	<	0.02
7/3/2012	<	0.3	2.5	0.22		0.05	11.3	0.64	3.65		0.06
Average	<	0.30	1.90	0.11		0.05	8.45	0.29	2.84		0.04
Min	<	0.30	1.40	0.05	<	0.05	6.30	0.08	2.17	<	0.02
Max	<	0.30	2.50	0.22		0.05	11.30	0.64	3.65		0.06

Snyder D

Date Sampled	Field pH	Field Cond.	DO	Field Temp	Acidity	Alkalinity	Chloride	Lab pH	Specific Cond.	Sulfate	TDS	TSS	
		uS/cm	mg/L	Celsius	mg/L	mg/L	mg/L		uS/cm	mg/L	mg/L	mg/L	
10/20/2011	6.0	90	11.14	10.5	0	22	6.8	7	107	12	55	'	5
3/6/2012	6.3	100	14.06	3.1	8	12	5.8	7	92	14	55	<	5
7/3/2012	6.69	170	7.34	20.0	-17	36	9.8	7	155	16	83	<	5
Average	6.33	120.00	10.85	11.20	-3.00	23.33	7.47	6.63	118.00	14.00	64.33		5.00
Min	6.00	90.00	7.34	3.10	-17.00	12.00	5.80	6.50	92.00	12.00	55.00	<	5.00
Max	6.69	170.00	14.06	20.00	8.00	36.00	9.80	6.80	155.00	16.00	83.00	· · · · ·	5.00

Date Sampled	Methane		Total Hardness	Aluminum	Bar	ium	Calcium	Iron	Magnesium	Mang	anese
	mg/L		gpg	mg/L	m	g/L	mg/L	mg/L	mg/L	៣រួ	g/L
10/20/2011	<	0.3	1.9	0.09	<	0.05	8.12	0.31	2.77		0.06
3/6/2012	<	0.3	1.5	0.06	<	0.05	6.71	0.13	2.25		0.02
7/3/2012	<	0.3	3.3	0.05		0.05	15.10	0.46	4.64		0.15
Average	<	0.30	2.23	0.07		0.05	9.98	0.30	3.22		0.08
Min	<	0.30	1.50	0.05	<	0.05	6.71	0.13	2.25		0.02
Max	<	0.30	3.30	0.09		0.05	15.10	0.46	4.64		0.15

SPRING 1

Date Sampled	Field pH	Field Cond.	DO	Field Temp	Acidity	Alkalinity	Chloride	Lab pH	Sp. Cond.	Sulfate	TDS	TSS	
		uS/cm	mg/L	Celsius	mg/L	mg/L	mg/L		uS/cm	mg/L	mg/L	mg/L	
1/6/2012	7.5	230	11.95	3.9	0.46	70	4.5	7	213	21	125		5
3/6/2012	6.4	190	13.4	3.9	-38	57	3.8	7.5	177	18	93	<	5
7/3/2012	7.77	350	8.36	17.7	-117	135	8.9	8.1	325	13	182	<	5
Average	7.22	256.67	11.24	8.50	-51.51	87.33	5.73	7.53	238.33	17.33	133.33		5.00
Min	6.40	190.00	8.36	3.90	-117.00	57.00	3.80	7.00	177.00	13.00	93.00	<	5.00
Max	7.77	350.00	13.40	17.70	0.46	135.00	8.90	8.10	325.00	21.00	182.00		5.00

Date Sampled	Methane		Total Hardn	Aluminum	Barium	Calcium	Iron	Magnesium	Manganese
	mg/L		gpg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1/6/2012	<	0.3	3.1	0.19	0.08	14.3	0.16	4.29	0.05
3/6/2012	<	0.3	2.6	0.12	0.06	12.1	0.13	3.29	0.04
7/3/2012	<	0.3	4.3	0.26	0.13	21.3	0.22	5.06	0.05
Average		0.30	3.33	0.19	0.09	15.90	0.17	4.21	0.05
Min	<	0.30	2.60	0.12	0.06	12.10	0.13	3.29	0.04
Max	[]	0.30	4.30	0.26	0.13	21.30	0.22	5.06	0.05

Spring 2

Date Sampled	Field pH	Field Cond.	DO	Field Temp	Acidity	Alkalinity	Chloride	Lab pH	Sp. Cond.	Sulfate	TDS	TSS	
		uS/cm	mg/L	Celsius	mg/L	mg/L	mg/L		uS/cm	mg/L	mg/L	mg/L	
1/6/2012	7.5	270	12.46	3.1	-57	79	5.3	7.2	265	34	156		6
3/6/2012	6.37	190	14.13	2.4	-27	46	3.2	7.3	167	22	92	<	5
7/3/2012	7.55	360	8.56	16.8	-114	135	8.8	8.1	346	19	192	<	5
Average	7.14	273.33	11.72	7.43	-66.00	86.67	5.77	7.53	259.33	25.00	146.67		5.33
Min	6.37	190.00	8.56	2.40	-114.00	46.00	3.20	7.20	167.00	19.00	92.00	<	5.00
Max	7.55	360.00	14.13	16.80	-27.00	135.00	8.80	8.10	346.00	34.00	192.00		6.00

Date Sampled	Methane		Total Hardn	Aluminum	Barium	Calcium	Iron	Magnesium	Manganese
	mg/L		gpg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1/6/2012	<	0.3	4.3	0.33	0.08	19.8	0.34	5.75	0.09
3/6/2012	<	0.3	2.7	0.09	0.05	12.6	0.12	3.58	0.05
7/3/2012	<	0.3	4.6	0.26	0.11	22.5	0.26	5.46	0.05
Average	<	0.30	3.87	0.23	0.08	18.30	0.24	4.93	0.06
Min	<	0.30	2.70	0.09	0.05	12.60	0.12	3.58	0.05
Max	<	0.30	4.60	0.33	0.11	22.50	0.34	5.75	0.09

Spring 3

Date Sampled	Field pH	Field Cond.	DO	Field Temp	Acidity	Alkalinity	Chloride Lab p		linity Chloride Lab pH Sp. Cond. Sulfat		de Lab pH Sp. Cond.		Sulfate	TDS
		uS/cm	mg/L	Celsius	mg/L	mg/L	mg/L			uS/cm	mg/L	mg/L		
1/6/2012	6	60	11.72	2.6	13	7		2 6.1 60		16	46			
3/6/2012	6.15	50	13.4	3.3	14	6	<	2	6.3	55	15	22		
7/3/2012	DRY													
Average	6.08	55.00	12.56	2.95	13.50	6.50		2.00	6.20	57.50	15.50	34.00		
Min	6.00	50.00	11.72	2.60	13.00	6.00	<	2.00	6.10	55.00	15.00	22.00		
Max	6.15	60.00	13.40	3.30	14.00	7.00		2.00	6.30	60.00	16.00	46.00		

Date Sampled	TSS		Methane		Total Hardness Aluminum		Barium		Calcium	Iron	Magnesium	Manganese	
	mg/L		mg/L	ng/L		mg/L	m	g/L	mg/L	mg/L	mg/L	mį	g/L
1/6/2012	<	5	<	0.3	1.2	0.09	<	0.05	4.77	0.11	2.15	<	0.02
3/6/2012	<	5	<	0.3	1.1	0.05	<	0.05	4.35	0.07	1.76	<	0.02
7/3/2012													
Average		5.00	<	0.30	1.15	0.07	<	0.05	4.56	0.09	1.96	<	0.02
Min	<	5.00	<	0.30	1.10	0.05	<	0.05	4.35	0.07	1.76	<	0.02
Max		5.00	<	0.30	1.20	0.09	<	0.05	4.77	0.11	2.15	<	0.02

Spring 4

Date Sampled	Field pH	Field Cond.	DO	Field Temp	Acidity	Alkalinity	Chloride	Lab pH	Sp. Cond.	Sulfate	TDS	TSS	
		uS/cm	mg/L	Celsius	mg/L mg/L		mg/L		uS/cm	mg/L	mg/L	mg/L	
1/6/2012	7.5	210	12.22	2.6	-17	42	3.6	6.8	204	42	124		7
3/6/2012	6.42	170	14.44	1.9	-12	32	2.3	7.3	155	30	86	<	5
7/3/2012	7.36	350	8.56	17.6	-104	124	7.7	8.0	335	25	173	<	5
Average	7.09	243.33	11.74	7.37	-44.33	66.00	4.53	7.37	231.33	32.33	127.67		5.67
Min	6.42	170.00	8.56	1.90	-104.00	32.00	2.30	6.80	155.00	25.00	86.00	<	5.00
Max	7.50	350.00	14.44	17.60	-12.00	124.00	7.70	8.00	335.00	42.00	173.00		7.00

Date Sampled	Methane		Total Hardn	Aluminum	Bar	ium	Calcium	Iron	Magnesium	Manganese
	mg/L		gpg	mg/L	m	g/L	mg/L	mg/L	mg/L	mg/L
1/6/2012	<	0.30	4.0	0.25		0.05	17.5	0.28	6.16	0.11
3/6/2012	<	0.30	2.7	0.14	<	0.05	12.0	0.14	4.14	0.06
7/3/2012	<	0.30	5.0	0.24		0.07	23.8	0.40	6.45	0.07
Average	<	0.30	3.90	0.21		0.06	17.77	0.27	5.58	0.08
Min	<	0.30	2.70	0.14	<	0.05	12.00	0.14	4.14	0.06
Max	<	0.30	5.00	0.25		0.07	23.80	0.40	6.45	0.11

APPENDIX C MACROINVERTEBRATE SAMPLING

Macroinvert	ebrate Samp	ling in Snyd	er Run
	Snyder A	Snyder B	Snyder C
Ephemeroptera	1	7	4
Plecoptera		4	1
Tricoptera			60
Diptera	1	2	2
Odonata	2	2	1
Megaloptera			8
Crayfish		2	
Total Indiv.	4	17	76
Number of EPT	11	65	

Macroinvert	tebrate Samp	oling in Sprin	g Run
	Spring 1	Spring 2	Spring 4
Ephemeroptera	5	6	3
Plecoptera	22	12	4
Tricoptera	5	3	110
Diptera	12	15	
Odonata	1		3
Megaloptera			1
Crayfish			1
Total	65	36	122
Number of EPT	32	21	117

APPENDIX D HABITAT ASSESSMENTS



COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY NETWORK HABITAT ASSESSMENT

WATERBODY NAME Snyder Run

STATION NUMBER Snyder A LOCATION Mouth of northern trib to Snyder south of Five Pts Rd

DATE 11/6/12 TIME 11:50AM

AQUATIC ECOREGION _____ COUNTY Clearfield

INVESTIGATORS Kelly Williams, Carl Undercofler

FORM COMPLETED BY Kelly Williams

RIFFLE/RUN PREVALENCE

STR CODE/RMI

Habitat		Categ	jory					
Parameter	Optimal	Suboptimal	Marginal	Poor				
1. Instream Cover (Fish)	Greater than 50% mix of boulder, cobble, sub- merged logs, undercut banks, or other stable habitat.	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	10-30% mix of boulder, cobble, or other stable habitat; habitat avail- ability less than desirable.	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.				
SCORE <u>18</u>	20 19 <mark>18</mark> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
2. Epifaunal Substrate	Well developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lack- ing; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bed- rock prevalent; some cobble present.	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.				
SCORE <u>8</u>	20 19 18 17 16	15 14 13 12 11	10 9 <mark>8</mark> 7 6	5 4 3 2 1				
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.				
SCORE <u>9</u>	20 19 18 17 16	15 14 13 12 11	10 <mark>9</mark> 8 7 6	5 4 3 2 1				
4. Velocity/Depth Regimes	All four velocity/depth regimes present (slow- deep, slow-shallow, fast- deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score lower than if missing other regimes).	Dominated by 1 velocity/depth regime (usually slow- deep).				
SCORE <u>7</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 <mark>7</mark> 6	5 4 3 2 1				
5. Channel Alteration	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.				
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <mark>6</mark>	5 4 3 2 1				
Total Side 1 <u>39</u>								

Habitat				Catego Suboptimal										Poor				
Parameter	<u> </u>	Optim	al			Subo	ptimal			Μ	largir	nal			F	oor		
6. Sediment Deposition	Little or of island and less bottom a sedimen	of islands or point bars and less than 5% of the bottom affected by sediment deposition.2019181716Occurrence of riffles					increase on, most e gravel; e botton ght n pools.	e in ly n 11	Mod new on o 50% affec depo cons mod pool	erate gravuld an o of th cted; osits a striction lerate s pre	e depo el, co d nev e bot sedin at obs on, ar e depo valen	osition barse sa w bars; ttom nent struction nd ben osition nt. 7	of and 30- on, ds; of 6	Hea mat bar mor bott freq alm sub dep	avy de erial, i develue than om ch uently ost ab stantia osition	posits increa opmer 50% nangin y; pool osent c al sedi n. 3	of fin sed nt; of th g s due to men 2	ne ie o t
	20 13			10		14					0	-	0	Ger		J	2	
Riffles	distance divided t the streat variety c	relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat. 20 19 18 17 16					distance les divic of the als 7 to	led 15.	bend prov dista divid the s 15 to	asion d; bot ide s ance l led by strear o 25.	tom come l ome l betwe y the m is b	habitat een riffl width c	rs ; les of n	or s hab betv by t stre ratio	hallov itat; d veen he wid am is o >25.	v riffles istance riffles dth of betwe	t wai s; po e divid the en	er or ed
SCORE 10	20 19	18	17 [·]	16	15	14 1	13 12	11	<mark>10</mark>	9	8	7	6	5	4	3	2	1
8. Channel Flow Status	Water re both low minimal channel exposec	Wate availa <25% subst	r fills > able ch 6 of cha trate is	75% of annel; c annel expose	the or d.	Wate avail riffle mos	er fills lable subs tly ex	s 25-7 chan strates pose	75% of nel and s are d.	the d/or	Ver cha pres poo	y little nnel a sent a ls.	water and mo s stan	in ostly ding				
SCORE <u>15</u>	20 19	<mark>15</mark>	14 1	13 12	11	10	9	8	7	6	5	4	3	2	1			
9. Condition of Banks	Banks st evidence bank fail	table; n e of ero lure.	o sion or		Mode infrec of erc over.	erately quent, s osion n	stable; small ar nostly he	eas ealed	Mod to 60 have	erate 0% of e area	ly un f bank as of	stable; ks in re erosior	up ach n.	Uns eroc area stra ben 60-7	table; ded ar as frec ight so ds; or 100% sional	many reas; " quent ections of bar scars	raw" along s and slope nk ha]] es, is
3CORE 10	20 19	18	17	0	15	14	13 12	11	10	9	8	1	0	Э	4	3	2	1
10. Bank Vegetative Protection	More tha streamb covered	an 90% ank sui by veg	of the face etation.		70-90 bank vege	0% of t surfac tation.	he strea	im- ed by	50-7 bank by v	′0% c < surf egeta	of the aces ation.	stream	h- ed	Les stre cov veg	s than amba ered b etation	i 50% nk sur by n.	of th face	e
SCORE <u>19</u>	20 19	18	17	<mark>16</mark>	15	14 1	13 12	11	10	9	8	7	6	5	4	3	2	1
11. Grazing or Other Disruptive Pressure	Vegetati through mowing, evident; allowed	ts ly.	Disru not a grow great one-h plant rema	ption e ffecting th pote extent nalf of t stubbl ining.	evident to g full pla ential to a t; more to the pote e height	out nt any han ntial	Disru patc close vege less pote heig	uption hes c ely cr etatio than than ht rer	n obv of bar oppe n con one-l plant maini	ious; e soil c d nmon; half of stubble ng.	or the e	Disr veg high bee 2 in ave heig	uptior etation ; vego n rem ches o rage s ght.	n of etatior oved t or less stubble	ery has to tin e	i		
SCORE <u>13</u>	20 19	18	17	16	15	14 1	<mark>13</mark> 12	11	10	9	8	7	6	5	4	3	2	1
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.				Width 12-18 activi zone	n of rip 3 mete ties ha only m	arian zo rs; huma ive impa ninimally	ne an icted 7.	Widt 6-12 activ zone	th of i 2 mete /ities e a gr	riparia ers; h have reat d	an zon iuman impac eal.	e ted	Wid <6 r ripa due activ	th of r neters rian v to hu vities.	iparia s; little egetat man	n zor or n ion	1e 0
SCORE <u>6</u>	20 19 18 17 16				15	14 1	13 12	11	10	9	8	7	<mark>6</mark>	5	4	3	2	1
Total Side 2 <u>91</u>		20 19 18 17 16																
Total Score 130																		



COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY NETWORK HABITAT ASSESSMENT

WATERBODY NAME Snyder Run

STATION NUMBER Snyder B LOCATION Mouth of southern trib to Snyder south of Five Pts Rd

DATE 11/6/12 TIME 12PM

AQUATIC ECOREGION _____ COUNTY Clearfield

INVESTIGATORS Kelly Williams, Carl Undercofler

FORM COMPLETED BY Kelly Williams

RIFFLE/RUN PREVALENCE

STR CODE/RMI

Habitat		Categ	ory					
Parameter	Optimal	Suboptimal	Marginal	Poor				
1. Instream Cover (Fish)	Greater than 50% mix of boulder, cobble, sub- merged logs, undercut banks, or other stable habitat.	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	10-30% mix of boulder, cobble, or other stable habitat; habitat avail- ability less than desirable.	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.				
SCORE <u>19</u>	20 <mark>19</mark> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
2. Epifaunal Substrate	Well developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lack- ing; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bed- rock prevalent; some cobble present.	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.				
SCORE <u>19</u>	20 <mark>19</mark> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.				
SCORE <u>17</u>	20 19 18 <mark>17</mark> 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
4. Velocity/Depth Regimes	All four velocity/depth regimes present (slow- deep, slow-shallow, fast- deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score lower than if missing other regimes).	Dominated by 1 velocity/depth regime (usually slow- deep).				
SCORE <u>16</u>	20 19 18 17 <mark>16</mark>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
5. Channel Alteration	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.				
SCORE <u>15</u>	20 19 18 17 16	<mark>15</mark> 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
Total Side 1 86								

Habitat							Categ	ory					Poor				
Parameter		Optimal			Subo	ptimal			M	argin	al			F	oor		
6. Sediment Deposition	Little or r of islands and less bottom a sediment	no enlarg s or poin than 5% ffected b t deposit	gement it bars 5 of the by tion.	Som bar f from 5-30 affec depc	e new i ormatio coarse % of the ted; slig osition in	ncrease gravel; e bottor ght n pools.	e in tly m	Mode new on o 50% affec cons mod pools	erate grave Id and of the cted; s osits a strictic erate s prev	depo el, coa d new e bott sedim at obs on, an depo valent	sition arse sa bars; com ent truction d bene sition	of and 30- m, ds; of	Hea mat bar mor bott freq alm subs dep	erial, i develue e thar om ch uently ost ab stantia ositior	posits increa opmer 1 50% iangin v; pool osent c al sedi n.	of fin sed nt; of the g s due to ment	9
3CORE 10	20 19	18	17 <mark>16</mark>	15	14 1	3 12	11	10	9	ð	1	6	5	4	3	2	1
7. Frequency of Riffles	Occurrer relatively distance divided b the strea variety o	relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat. 20 19 18 17 16				of riffle distance les divid of the als 7 to	s ded 15.	Occa benc prov dista divid the s 15 to	asiona d; bott ide so ance b led by strean o 25.	al riffle tom c ome h oetwe / the v n is be	e or ontour nabitat en riffl width c etween	rs ; es of n	Ger or s hab betv by th stre ratio	herally hallow itat; di veen i he wic am is o >25.	all fla v riffles istance riffles dth of betwe	t wate s; poo e divide the een	∍r ∍r ∘d
SCORE <u>19</u>	20 <mark>19</mark>	18	17 16	15	14 1	3 12	11	10	9	8	7	6	5	4	3	2	1
8. Channel Flow Status	Water re both lowe minimal a channel exposed	aches ba er banks amount substrate	ase of and of e is	Wate avail <25% subs	er fills > able ch % of cha strate is	75% of annel; c annel expose	f the or ed.	Wate avail riffle most	er fills lable subs tly exp	25-7 chanr trates posec	5% of nel and are d.	the d/or	Very chai pres poo	y little nnel a sent a ls.	water Ind mo s stan	in ostly ding	
SCORE <u>19</u>	20 <mark>19</mark> 18 17 16				15 14 13 12 11				9	8	7	6	5	4	3	2	1
9. Condition of Banks	Banks st evidence bank faile	able; no e of eros ure.	ion or	Mode infre of er over	erately quent, s osion m	stable; small ar nostly h	eas ealed	Mod to 60 have	eratel 0% of e area	ly uns bank as of e	stable; s in re erosior	up ach 1.	Uns eroc area stra ben 60-1	table; ded ar as frec ight so ds; or 100% sional	many eas; " quent a ection side of bar scars	, along s and slopes nk has	S,
SCORE 16	20 19	18	17 <mark>16</mark>	15	14 1	3 12	11	10	9	8	1	6	5	4	3	2	1
10. Bank Vegetative Protection	More tha streamba covered	in 90% c ank surfa by vege	of the ace tation.	70-9 bank vege	0% of the surfaction.	he strea e cover	am- ed by	50-7 bank by ve	0% o c surfa egeta	f the s aces o tion.	stream covere	n- ed	Less stre cove vege	s than amba ered b etatioi	i 50% nk sur by n.	of the face	!
SCORE <u>19</u>	20 <mark>19</mark>	18	17 16	15	14 1	3 12	11	10	9	8	7	6	5	4	3	2	1
11. Grazing or Other Disruptive Pressure	Vegetativ through g mowing, evident; allowed t	Disru not a grow grea one- plant rema	uption e affecting /th pote t extent half of t half of t aining.	vident k g full pla ntial to ; more f he pote e heigh	but ant any than ential t	Disru patcl close vege less pote heig	uption hes o ely cro etation than htial p ht ren	n obvi oppeo n com one-h olant s nainir	ous; e soil c d mon; nalf of stubble	or the e	Disr vege high bee 2 ine aver heig	uptior etation ; vege n rem ches o rage s jht.	n of etatior oved t or less stubble	ery has to s in e			
SCORE <u>16</u>	20 19	18	17 <mark>16</mark>	15	14 1	3 12	11	10	9	8	7	6	5	4	3	2	1
12. Riparian Vegetative Zone Width	Width of >18 mete activities lots, road cuts, law have not	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.				Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Wid <6 r ripa due activ	th of r neters rian ve to hu vities.	iparia s; little egetat man	n zone or no ion	Ð		
SCORE <u>13</u>	20 19	15	14 <mark>1</mark>	<mark>3</mark> 12	11	10	9	8	7	6	5	4	3	2	1		
Total Side 2 <u>118</u>		20 19 18 17 16															
10tal Score 204																	



COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY NETWORK HABITAT ASSESSMENT

WATERBODY NAME Snyder Run

STATION NUMBER Snyder C LOCATION Snyder u/s of Five Points Road bridge near Hugill San.

DATE 11/6/12 TIME 1PM

AQUATIC ECOREGION _____ COUNTY Clearfield

STR CODE/RMI

INVESTIGATORS Kelly Williams, Carl Undercofler

FORM COMPLETED BY Kelly Williams

Habitat		Categ	ory					
Parameter	Optimal	Suboptimal	Marginal	Poor				
1. Instream Cover (Fish)	Greater than 50% mix of boulder, cobble, sub- merged logs, undercut banks, or other stable habitat.	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	10-30% mix of boulder, cobble, or other stable habitat; habitat avail- ability less than desirable.	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.				
SCORE <u>16</u>	20 19 18 17 <mark>16</mark>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
2. Epifaunal Substrate	Well developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lack- ing; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bed- rock prevalent; some cobble present.	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.				
SCORE <u>19</u>	20 <mark>19</mark> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.				
SCORE <u>18</u>	20 19 <mark>18</mark> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
4. Velocity/Depth Regimes	All four velocity/depth regimes present (slow- deep, slow-shallow, fast- deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score lower than if missing other regimes).	Dominated by 1 velocity/depth regime (usually slow- deep).				
SCORE <u>18</u>	20 19 <mark>18</mark> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1				
5. Channel Alteration	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.				
SCORE <u>12</u>	20 19 18 17 16	15 14 13 <mark>12</mark> 11	10 9 8 7 6	5 4 3 2 1				
Total Side 1 83								

Habitat					Catego Suboptimal														
Parameter		Opt	timal			S	Subop	timal			N	largiı	nal			F	oor		
6. Sediment Deposition	Little o of islar and les bottom sedime	r no e nds or ss tha a affec ent de	enlarge point in 5% cted by epositie	ement bars of the y on.	Sor bar fror 5-3 affe dep	me r forr n co 0% ected bosit	new in mation parse (of the d; slig ion in 4 13	crease a, most gravel; bottom ht pools.	e in ly n 11	Mod new on c 50% affed dep cons moc pool	lerate grav old an o of th cted; osits stricti derate ls pre 9	e depe el, co id nev ne bot sedir at ob on, at e depe evaler 8	osition barse si w bars; ttom nent struction nd ben osition nt. 7	of and 30- on, ds; of 6	Hea mat bar mor bott freq almosub sub sub	vy de erial, i devele e thar om ch uently ost ab stantia osition 4	posits increa opmer 1 50% nangin 7; pool sent c al sedi 1. 3	of fin sed nt; of th g s due to men	ne ne o it
7 Frequency of	Occur	ence	of riffl	<u> </u>	000	- CUIT		of rifflog		000	asion	al riff			Ger	orally	all fla	t wa	tor
Riffles	relative distance divideo the stro variety	relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat. 20 19 18 17 16				eque wee the v eam	ent; di n riffle width equal	stance s divid of the s 7 to 7	led 15.	bend prov dista divid the 15 to	d; bot vide s ance ded b streat o 25.	ttom o come betwe y the m is t	contour habitat een riff width o petwee	rs ; les of n	or s hab betw by th stre ratio	hallow itat; di veen r he wic am is o >25.	v riffles istance riffles dth of betwe	s; po e divid the en	or ed
SCORE <u>20</u>	<mark>20</mark> 1	19 1	18 1	17 16	15	14	4 13	3 12	11	10	9	8	7	6	5	4	3	2	1
8. Channel Flow Status	Water both lo minima channe expose	Wa ava <25 sub	iter f ailab 5% c ostra	ills > 7 le cha of chai ite is e	75% of innel; c nnel expose	the or d.	Wat avai riffle mos	er fill: ilable subs stly ex	s 25-7 chan strate (pose	75% of inel and s are ed.	the d/or	Very chai pres poo	/ little nnel a sent a ls.	water Ind mo s stan	in ostly ding				
SCORE <u>16</u>	20 19 18 17 <mark>16</mark>					15 14 13 12 11					9	8	7	6	5	4	3	2	1
9. Condition of Banks	Banks eviden bank fa	stable ce of ailure.	e; no erosic	on or	Mod infro of e ove	dera eque erosi er.	ately s ent, sr ion mo	table; nall are ostly he	eas ealed	Mod to 60 have	lerate 0% o e area	ely un f banl as of	stable; ks in re erosior	up ⊧ach ı.	Uns eroc area stra ben 60-7	table; led ar as frec ight se ds; or 100% sional	many reas; " quent ections side of bar scars	, along s and slope nk ha	g d es, as
SCORE <u>18</u>	20 1	19 <mark>1</mark>	<mark>18</mark> 1	1/ 16	15	14	4 13	<u> </u>	11	10	9	8	1	6	5	4	3	2	1
10. Bank Vegetative Protection	More the stream covere	han 9 Ibank Id by V	0% of surfac vegeta	the ce ation.	70- ban veg	90% nk su jetat	6 of the urface tion.	e strea covere	m- ed by	50-7 banl by v	70% c k surl regeta	of the faces ation.	stream covere	ı- ≩d	Less stre cove vege	s than amba ered b etatioi	i 50% nk sur by n.	of th face	e
SCORE <u>17</u>	20 1	19 1	18 <mark>1</mark>	17 16	15	14	4 13	3 12	11	10	9	8	7	6	5	4	3	2	1
11. Grazing or Other Disruptive Pressure	Vegeta through mowin eviden allowe	Dis not gro gre one plar rem	rupt affe wth at e: e-hal nt st naini	ion ev ecting poten xtent; If of th ubble ing.	ident b full pla tial to a more t e pote height	out nt any han ntial	Disr pato clos vege less pote heig	uptio ches d ely ci etatio than ential jht rei	n obv of bar roppe on cor one- plant maini	rious; re soil c ed nmon; half of stubble ng.	or the e	Disr vege high bee 2 ine ave heic	uptior etatior ; vege n rem ches c rage s ght.	n of etatior oved t or less stubble	ery h has to s in e	>			
SCORE <u>16</u>	20 1	l 9 1	18 1	17 <mark>16</mark>	15	14	4 13	3 12	11	10	9	8	7	6	5	4	3	2	1
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.				Wic 12- acti zon	dth c 18 n ivitie ne or	of ripa neters es hav nly mi	rian zo ; huma e impa nimally	ne an cted '.	Wid 6-12 activ zone	th of 2 met vities e a gi	riparia ers; h have reat d	an zon iuman impac leal.	∍ ted	Wid <6 r ripa due activ	th of r neters rian ve to hu vities.	iparia s; little egetat man	n zor or n ion	าe 0
SCORE <u>11</u>	20 19 18 17 16				່ 15 14 13 12 <mark>11</mark> 10 9 8 7 6						6	5	4	3	2	1			
Total Side 2 <u>114</u>		20 19 18 17 16																	
Total Score <u>197</u>																			



COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WATER STANDARDS AND FACILITY REGULATION DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY NETWORK HABITAT ASSESSMENT

WATERBODY NAME <u>Snyder Run</u>	STR CODE/RMI							
STATION NUMBER Snyder D	LOCATION Mouth of Snyder Run near Hugill Sanitation							
DATE <u>11/6/12</u>	TIME <u>1:30PM</u>							
AQUATIC ECOREGION	COUNTY Clearfield							

INVESTIGATORS Kelly Williams, Carl Undercofler

FORM COMPLETED BY Kelly Williams

Habitat	Category											
Parameter	Optimal	Suboptimal	Marginal	Poor								
1. Instream Cover (Fish)	Greater than 50% mix of boulder, cobble, sub- merged logs, undercut banks, or other stable habitat.	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	10-30% mix of boulder, cobble, or other stable habitat; habitat avail- ability less than desirable.	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.								
SCORE <u>8</u>	20 19 18 17 16	15 14 13 12 11	10 9 <mark>8</mark> 7 6	5 4 3 2 1								
2. Epifaunal Substrate	Well developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lack- ing; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bed- rock prevalent; some cobble present.	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.								
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <mark>6</mark>	5 4 3 2 1								
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.								
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <mark>6</mark>	5 4 3 2 1								
4. Velocity/Depth Regimes	All four velocity/depth regimes present (slow- deep, slow-shallow, fast- deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score lower than if missing other regimes).	Dominated by 1 velocity/depth regime (usually slow- deep).								
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <mark>6</mark>	5 4 3 2 1								
5. Channel Alteration	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.								
SCORE <u>17</u>	20 19 18 <mark>17</mark> 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1								
Total Side 1 43												

Habitat	Category																		
Parameter		Opt	imal			Su	bopt	imal			N	largiı	nal						
6. Sediment Deposition	Little of of islan and les bottom sedime	ttle or no enlargement islands or point bars nd less than 5% of the ottom affected by adiment deposition.					Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.					e depe el, co id nev ne bot sedir at ob on, at e depe evaler 8	osition parse si w bars; ttom nent struction nd ben osition nt. 7	Hea mat bar mor bott freq alm sub dep	of fin sed nt; of th g s due to men	ne ie o t			
7 Frequency of			of rifflor		000	urron		f rifflos		000		ol riff	le or	Generally all flat wa					
Riffles	relative distance divided the stre variety	ely free ce betv l by th eam e of hal	nce of riffles y frequent; between riffles by the width of am equals 5 to 7; of habitat.					stance s divid of the s 7 to 1	led 15.	ben prov dista divid the 15 t	d; bot vide s ance ded b streat o 25.	ttom o ome betwe y the m is t	contour habitat een riff width coetwee	rs ; les of n	or shallow riffles; poo habitat; distance between riffles divide by the width of the stream is between ratio >25.				
SCORE <u>5</u>	20 1	9 1	8 17	16	15	14	13	12	11	10	9	8	7	6	<mark>5</mark>	4	3	2	1
8. Channel Flow Status	Water i both lo minima channe expose	reach wer ba al amo el subs ed.	es base anks ar ount of strate is	e of nd S	Wata avai <25º subs	Water fills > 75% of the available channel; or <25% of channel substrate is exposed. Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.						Very chai pres poo	y little nnel a sent a ls.	water Ind mo s stan	in ostly ding				
SCORE <u>17</u>	20 1	9 1	8 <mark>17</mark>	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
9. Condition of Banks	Banks evidend bank fa	stable ce of e ailure.	e; no erosion	or	Moderately stable; infrequent, small areas of erosion mostly healed over.					Moc to 6 have	lerate 0% of e area	ely un f banl as of	stable; ks in re erosior	up each n.	Uns eroc area stra ben 60-1	table; ded ar as frec ight so ds; or 100% sional	many reas; " quent a ections of side of bar scars.	raw" along s and slope nk ha]] es, IS
SCORE 11	20 1	9 1	8 17	16	15	14	13	12	<mark>11</mark>	10	9	8	1	6	5	4	3	2	1
10. Bank Vegetative Protection	More th stream covere	han 90 bank d by v	0% of th surface /egetati	ne on.	70-9 banl vege	90% c k surf etatio	of the face n.	e strea covere	m- ed by	50-7 ban by v	70% c k surf egeta	of the faces ation.	stream covere	n- ed	Less stre cove vege	s than amba ered b etatioi	nk sur nk sur by n.	of th face	e
SCORE <u>18</u>	20 1	9 <mark>1</mark>	<mark>8</mark> 17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
11. Grazing or Other Disruptive Pressure	Vegeta through mowing evident allowed	ative d h graz g, min t; almo d to gr	lisruptio cing or nimal or ost all p row nati	n, not plants urally.	Disr not a grow grea one- plan rema	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height romaining							Disr vege high bee 2 ine ave heig	uptior etation ; vege n rem ches o rage s jht.	n of n is ve etatior oved t or less stubble	ery has to in e	i		
SCORE <u>18</u>	20 1	9 <mark>1</mark>	<mark>8</mark> 17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
12. Riparian Vegetative Zone Width	Width of >18 me activitie lots, ro cuts, la have n	of ripa eters; es (i.e adbec awns, ot imp	rian zo human ., parkir ds, clea or crop pacted z	ne ng r- s) zone.	Width of riparian zoneWidt12-18 meters; human6-12activities have impactedactivitieszone only minimally.zone					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.				
SCORE <u>16</u>	20 1	9 1	8 17	<mark>16</mark>	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Total Side 2 74																			



DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WATER QUALITY NETWORK HABITAT ASSESSMENT

WATERBODY NAME Spring Run	STR CODE/RMI
STATION NUMBER Spring 1	LOCATION U/S of Harmony Mine on south side of road
DATE <u>11/6/12</u>	TIME <u>10:10AM</u>
AQUATIC ECOREGION	COUNTY Clearfield

INVESTIGATORS Kelly Williams, Carl Undercofler

FORM COMPLETED BY Kelly Williams

Habitat	Category																					
Parameter		Optima	al			Sub	poptir	mal			Ma	argin	al			F	oor					
1. Instream Cover (Fish)	Greater f boulder, merged l banks, o habitat.	than 50 cobble logs, ur r other	9% mix , sub- ndercu stable	k of ut	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.				10-3 cobb habit abilit desir	0% m le, or tat; ha y less rable.	nix of other abitat s than	bould r stab avail-	er, le	Less than 10% mix boulder, cobble, or other stable habitat; lack of habitat is obvious.								
SCORE <u>16</u>	20 19	18	17	<mark>16</mark>	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1			
2. Epifaunal Substrate	Well dev run, riffle stream a extends width of abundan	eloped is as v ind leng two tim stream ice of c	riffle a vide a gth es the ; obble.	and s	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.					ing; riffle not as wide as istream but length is less than two times width; abundance of cobble; boulders and gravel common.							Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.					
SCORE <u>19</u>	20 <mark>19</mark>	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1			
3. Embeddedness	Gravel, c boulder j 0-25% si fine sedi	cobble, particle urrounc ment.	and s are ded by	,	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.				Grav bould 50-7 fine s	vel, co der pa 5% si sedim	obble, article urrour nent.	and es are nded l	by	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.								
SCORE <u>12</u>	20 19	18	17	16	15	14	13	<mark>12</mark>	11	10	9	8	7	6	5	4	3	2	1			
4. Velocity/Depth Regimes	All four v regimes deep, slo deep, fas	velocity/ presen ow-shal st-shall	/depth t (slov llow, fa ow).	v- ast-	Only pres is m than regii	/ 3 of ent (ii issing if mis nes).	the 4 f fast- j, scoi ssing	regim shallo re low other	ies w er	Only regin shall are r than regin	2 of t nes p ow or nissir if mis nes).	the 4 resen r slow ng, sca ssing	habita nt (if fa shall ore lo other	at ast- ow wer	Dom 1 ve regir deep	ninate locity/ me (u o).	d by /depth sually	ו slow	1-			
SCORE <u>19</u>	20 <mark>19</mark>	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1			
5. Channel Alteration	No chan dredging	nelizati preser	on or nt.		Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.				New prese and reach disru	emba ent or 40-80 h cha pted.	ankm n both 9% of nneliz	ents bank streai zed ar	ks; m nd	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.								
SCORE <u>19</u>	20 <mark>19</mark>	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1			
Total Side 1 <u>85</u>																						

Habitat	Category																			
Parameter		Op	otimal				Subo	ptimal			N	largi	nal		Poor					
6. Sediment Deposition	Little of isla and le bottor sedim	le or no enlargement slands or point bars d less than 5% of the tom affected by liment deposition.					Some new increase in oar formation, mostly rom coarse gravel; 5-30% of the bottom affected; slight deposition in pools.					e dep vel, co nd nev ne bo sedir at ob on, a e dep evaler 8	osition barse si w bars; ttom ment struction nd ben osition nt. 7	Hea mat bar mor bott freq alm sub dep	of fin sed nt; of th g s due to men	ne ne o t				
7 Frequency of		rronce	of rif	floc			ronco	of riffle	 			ool riff	le or	Generally all flat way						
Riffles	relativ distar divide the st variet	vely fr nce be ed by ream y of h	equen etweer the wid equal abitat.	nt; n riffles dth of s 5 to 7	 Occurrence of riffles infrequent; distance between riffles divided by the width of the 7; stream equals 7 to 15. 				ben prov dist divid the 15 t	d; bo vide s ance ded b strea	ttom of some betwo betwo y the m is b	contour habitat een riff width o betwee	or shallow riffles; po habitat; distance between riffles divid by the width of the stream is between ratio >25.							
SCORE <u>18</u>	20	19	<mark>18</mark>	17 10	6 1	5 ⁻	14 1	3 12	2 11	10	9	8	7	6	5	4	3	2	1	
8. Channel Flow Status	Water both I minim chann expos	r reac ower nal am nel su sed.	hes banks banks hount o bstrate	ase of and of e is	V a s	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.Water fills 25-75 available channel riffle substrates mostly exposed						75% of inel and is are ed.	the d/or	Very cha pres poo	y little nnel a sent a ls.	water Ind mo s stan	in ostly ding			
SCORE <u>18</u>	20	19	<mark>18</mark>	17 1	6 1	5 ⁻	14 1	3 12	2 11	10	9	8	7	6	5	4	3	2	1	
9. Condition of Banks	Banks evide bank	s stab nce o failure	e; no f erosi e.	ion or	N ir o	Moderately stable; infrequent, small areas of erosion mostly healed over.					derate 0% o e are	ely un f ban as of	stable; ks in re erosior	up each n.	Uns eroc area stra ben 60-7	table; ded ar as frec ight so ds; or 100% sional	many reas; " quent ection side of bar scars	raw" along s and slope nk ha	ว ป อร, เร	
SCORE <u>14</u>	20	19	18	1/ 1	6 1	5	<mark>14</mark> 1	3 12	. 11	10	9	8	1	6	5	4	3	2	1	
10. Bank Vegetative Protection	More strear cover	than nbanl ed by	90% o k surfa v veget	of the ace tation.	7 b v	0-90 ank s egeta	% of tl surface ation.	he strea e covei	am- red by	50-7 ban by v	70% d k sur vegeta	of the faces ation.	stream covere	n- ed	Les stre cove veg	s than amba ered b etation	i 50% nk sur by n.	of th face	e	
SCORE <u>19</u>	20	<mark>19</mark>	18	17 10	6 1	5 ⁻	14 1	3 12	. 11	10	9	8	7	6	5	4	3	2	1	
11. Grazing or Other Disruptive Pressure	Veget throug mowin evide allowe	tative gh gra ng, m nt; alr ed to	disrup azing o inimal nost a grow r	otion, or or not Il plants naturally	2 n g g y. o r	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height romaining						Disr veg high bee 2 in ave heig	uptior etation ; vege n rem ches e rage s ght.	n of etatior oved t or less stubble	ery has to in e	;				
SCORE <u>20</u>	<mark>20</mark>	19	18	17 1	6 1	5	14 1	3 12	2 11	10	9	8	7	6	5	4	3	2	1	
12. Riparian Vegetative Zone Width	Width >18 n activit lots, r cuts, have	of rip neters ties (i. oadbo lawns not in	barian s; hum e., pa eds, cl s, or cr npacte	zone an rking ear- ops) d zone.	V 1 a z	Width of riparian zoneV12-18 meters; human6activities have impactedazone only minimally.z					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.				
SCORE 11	20	19	18	17 1	б 1	5	14 1	3 12	: <mark>11</mark>	10	9	8	7	6	5	4	3	2	1	
Total Side 2 <u>116</u>																				



COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION **pennsylvania** BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WATER QUALITY NETWORK HABITAT ASSESSMENT

WATERBODY NAME Spring Run	STR CODE/RMI
STATION NUMBER Spring 2	LOCATION Few miles D/S of Harmony Mine north of road
DATE <u>11/6/12</u>	TIME <u>10:45AM</u>

AQUATIC ECOREGION COUNTY Clearfield

INVESTIGATORS Kelly Williams, Carl Undercofler

FORM COMPLETED BY Kelly Williams

Habitat Category Parameter Optimal Suboptimal Marginal Poor 1. Instream Cover Greater than 50% mix of 30-50% mix of boulder, 10-30% mix of boulder, Less than 10% mix of boulder, cobble, subcobble, or other stable cobble, or other stable (Fish) boulder, cobble, or merged logs, undercut habitat; adequate habitat; habitat availother stable habitat; banks, or other stable habitat. ability less than lack of habitat is desirable. habitat. obvious. SCORE 18 20 19 **18** 17 16 15 14 13 10 9 4 12 11 8 7 6 5 3 2 1 2. Epifaunal Well developed riffle and Riffle is as wide as Run area may be lack-Riffles or run virtually Substrate run, riffle is as wide as stream but length is less ing; riffle not as wide as nonexistent; large than two times width; boulders and bedrock stream and length stream and its length is extends two times the abundance of cobble; less than two times the prevalent; cobble width of stream; boulders and gravel stream width; gravel or lacking. abundance of cobble. common. large boulders and bedrock prevalent; some cobble present. SCORE 18 10 9 6 20 19 <mark>18</mark> 17 16 15 14 13 12 11 8 7 5 4 3 2 1 Gravel, cobble, and Gravel, cobble, and Gravel, cobble, and Gravel, cobble, and 3. Embeddedness boulder particles are boulder particles are boulder particles are boulder particles are 0-25% surrounded by 25-50% surrounded by 50-75% surrounded by more than 75% fine sediment. fine sediment. fine sediment. surrounded by fine sediment. SCORE 12 15 14 13 <mark>12</mark> 11 4 20 19 18 17 16 10 9 8 7 5 3 2 1 6 All four velocity/depth Only 3 of the 4 regimes Only 2 of the 4 habitat 4. Velocity/Depth Dominated by regimes present (slowpresent (if fast-shallow regimes present (if fast-1 velocity/depth Regimes deep, slow-shallow, fastis missing, score lower shallow or slow-shallow regime (usually slowthan if missing other deep, fast-shallow). are missing, score lower deep). than if missing other regimes). regimes). SCORE 16 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 5. Channel Alteration No channelization or Some channelization New embankments Banks shored gabion present, usually in areas dredging present. present on both banks: or cement: over 80% of bridge abutments; and 40-80% of stream of the stream reach evidence of past reach channelized and channelized and channelization, i.e., disrupted. disrupted. dredging, (greater than past 20 yr) may be present, but recent channelization is not present. SCORE 20 20 5 19 18 17 16 15 14 13 12 11 10 9 8 7 6 4 3 2 1

Total Side 1 84

Perameter Optimal Suboptimal Marginal Poor 6. Sediment Deposition Little or no enlargement and less han 5% of the bottom affected by sediment deposition in pools. Some new prevel, coarse sand on old and new barel, coarse sand affected; sight deposition in pools. Heavy deposition of new gravel, coarse sand on old and new barel, coarse sand on old and new barel, coarse sand one drate deposition of moderate deposition of status Centerally all flat vatter status Centerally all flat vatter moderate deposition of moderate deposition of status Centerally all flat vatter status SCORE 13 20 19 18 17 <	Habitat	Category																			
6. Soden new increase in bar densation, mostly from coarse gravel; bat dama have bar development; bat dama have daw dama have dama	Parameter	<u> </u>	Optima	al			Subo	otimal			Μ	largir	nal			Poor					
20 10 <td< td=""><td>6. Sediment Deposition</td><td>Little or r of island and less bottom a sedimen</td><td>no enla ls or poi than 5 affected at depos</td><td>rgement int bars % of the by sition.</td><td>6 C</td><td colspan="4">Some new increase in par formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.</td><td>Mod new on o 50% affec depo cons mod pool</td><td>lerate grav old an o of th cted; osits striction lerate ls pre</td><td>e depo el, co id nev ne bot sedin at obs on, ar e depo valen</td><td>osition barse sa w bars; ttom nent struction nd ben osition nt. 7</td><td>Hea mate bar mor botte freq alme sub: dep</td><td>of fin sed nt; of th g s due to imen</td><td>ne ne o t</td></td<>	6. Sediment Deposition	Little or r of island and less bottom a sedimen	no enla ls or poi than 5 affected at depos	rgement int bars % of the by sition.	6 C	Some new increase in par formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.				Mod new on o 50% affec depo cons mod pool	lerate grav old an o of th cted; osits striction lerate ls pre	e depo el, co id nev ne bot sedin at obs on, ar e depo valen	osition barse sa w bars; ttom nent struction nd ben osition nt. 7	Hea mate bar mor botte freq alme sub: dep	of fin sed nt; of th g s due to imen	ne ne o t					
7. Frequency of Riffles Occurrence of miles and index y frequent; distance between riffles divided by the width of the stream equals 7 to 15. Occurrence of miles provide some habita; divided by the width of the stream is between riffles; divided by the width of the stream is between ratio >25. 8. Channel Flow Status Water reaches base of both lower banks and mineal and/out of channel substrate is exposed. Water fills > 75% of the available channel, or exposed. Water fills > 57% of the available channel, or exposed. Very little water in channel and mostly present as standing pools. 9. Condition of Banks Banks stable; no bank failure. Moderately stable; nover. Moderately stable; nover. Moderately unstable; up toread as standing pools. Unstable; many eroded areas; Taw' areas frequent along bank surface covered by vegetation. SCORE 13 20 19 18 17 16 15 14 13 12 10 9 7 6 5 4 2 1 10. Bank Vegetative Protection 20 19		20 19	10		0	0	14 1	J 12		10		0	-	0	3	-4	3	2	_		
SCORE 18 20 19 16 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 8. Channel Flow Status Water reaches base of both lower banks and minimal amount of channel substrate is exposed. Water fills > 75% of th available channel, or substrate is exposed. Water fills > 75% of th available channel or substrate is exposed. Water fills > 75% of th available channel or substrate is exposed. Water fills > 75% of th available channel and mostly exposed. Very little water in variable channel and mostly exposed. 9. Condition of Banks Banks stable: no evidence of erosion or bank failure. Moderately unstable: no evidence of erosion mostly healed of erosion mostly healed or ever Moderately unstable: no evident failure. Moderately unstable: no evident failure. It 10 9 8 7 6 5 4 3 2 1 10. Bank Vegetative Protection 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 10. Bank Vegetative Protection Wore than 90% of the streambank surface covered by vegetation.	Riffles	distance divided b the streat variety o	y freque betwee by the v am equa	nnes ent; en riffles vidth of als 5 to 7 at.	Occurrence of riffles infrequent; distance between riffles divided by the width of the o 7; stream equals 7 to 15.				bend prov dista divid the s 15 to	asion d; bot vide s ance ded b strear o 25.	ttom c ome betwe y the m is b	habitat een riffl width c	rs ; les of n	or shallow riffles; por habitat; distance between riffles divide by the width of the stream is between ratio >25.							
8. Channel Flow Status Water reaches base of both lover banks and minimal amount of channel substrate is exposed. Water fills > 75% of the available channel; or 25% of channel; or substrate is exposed. Water fills 25-75% of the available channel; or 25% of channel; or 25% of channel; or substrate is exposed. Water fills 25-75% of the available channel; or mostly exposed. Very little water in available channel; or mostly exposed. Very little water in available channel; or mostly exposed. Very little water in available channe; or mostly exposed. Very little water in available channel; or mostly exposed. 9. Condition of Banks Banks stable; no evidence of erosion or bank failure. Banks stable; no evidence of erosion or bank failure. Moderately stable; infrequent, small areas of erosion mostly healed over. Moderately unstable; up to 60% of banks in reach have areas of erosion. Unstable; many eroded areas; reav' areas frequent along over. SCORE 13 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 10. Bank Vegetative Protection More than 90% of the streambank surface covered by vegetation. 70-90% of the stream- bank surface covered by vegetation. Sor 6 5 4 3 2 1 11. Grazing or Other Disruptive Pressure 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 12. Riparian Vegetative 20 roe water do; vegetation Width of riparian zone 12-18 meters; human activities (i.e., parking lok, roadbed, clear- cut, lawns, or crops) have not impacted zone. 15 14 13 12 11<	SCORE <u>18</u>	20 19) <mark>18</mark>	17 1	6 ⁻	15 <i>*</i>	14 1	3 12	11	10	9	8	7	6	5	4	3	2	1		
SCORE 1620191817161514131211109876543219.Condition of BanksBanks stable; no evidence of erosion or bank failure.Moderately stable; infrequent, small areas over.Moderately stable; infrequent, small areas over.Moderately stable; have areas of erosion.Unstable; many erosion.Unstable; many areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars.SCORE 13201918171615141312111098765432110. Bank Vegetative ProtectionMore than 90% of the streambank surface covered by vegetation.70-90% of the stream- bank surface covered by vegetation.50-70% of the stream- bank surface covered by vegetation.Less than 50% of the streambank surface covered by vegetation.Less than 50% of the streambank surface covered by vegetation.SCORE 19201918171615141312111098765432111. Grazing or Other Disruptive Pressure Zone WidthVegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.Disruption evident but not affecting full plant grath of the potential plant stubble height remaining.1098765	8. Channel Flow Status	Water re both low minimal channel exposed	eaches l ver bank amount substra	base of ks and t of ate is		Water fills > 75% of the available channel; or <25% of channel substrate is exposed.Water fills 25-75° available channe riffle substrates a mostly exposed.						75% of inel and s are d.	the d/or	Very chai pres poo	/ little nnel a sent a ls.	water and mo s stan	in ostly ding				
9. Condition of Banks Banks stable; no evidence of erosion or bank failure. Moderately stable; infrequent, small areas of erosion mostly healed over. Moderately unstable; up to 60% of banks in reach have areas of erosion. Unstable; many eroded areas; 'raw' areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars. SCORE 13 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 10. Bank Vegetative Protection More than 90% of the streambank surface covered by vegetation. 70-90% of the streambank surface covered by vegetation. 50-70% of the streambank surface covered by vegetation. Less than 50% of the streambank surface covered by vegetation. SCORE 19 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 11. Grazing or Other Disruptior Pressure Vegetative disruption, through grazing or mowing, minimal or not evident: all plants allowed to grow naturally. Disruption evident: and of the potential to any great extent; more than allowed to grow naturally. Disruption of the streambank surface covered to 2 icosely cropped vegetation is stubble height remaining.	SCORE <u>16</u>	20 19	18	17 <mark>1</mark>	<mark>6</mark> '	15 <i>*</i>	14 1	3 12	11	10	9	8	7	6	5	4	3	2	1		
SCORE 13201918171615141312111098765432110. Bank Vegetative ProtectionMore than 90% of the streambank surface covered by vegetation.70-90% of the stream- bank surface covered by vegetation.50-70% of the stream- bank surfaces covered by vegetation.50-70% of the stream- bank surfaces covered by vegetation.Less than 50% of the streambank surface covered by vegetation.SCORE 19201918171615141312111098765432111. Grazing or Other Disruptive PressureVegetative disruption, trough grazing or mowing, minimal or not allowed to grow naturally.Disruption evident but not affecting full plant great extent; more than one-half of the potential plant stubble height remaining.Disruption obvious; patches of bare soil or closely cropped vegetation common; less than none-half of the potential plant stubble height remaining.Disruption of vegetation common; less than none-half of the potential plant stubble height remaining.5432112. Riparian Vegetative Zone WidthWidth of riparian zone >stordseds, clear- cuts, lawns, or crops) have not impacted zone.Width of riparian zone total score 204Width of riparian zone cuts, lawns, or crops) have not impacted zone.15141312111098765432<	9. Condition of Banks	Banks st evidence bank fail	table; n e of ero lure.	o sion or		Moderately stable; infrequent, small areas of erosion mostly healed over.					lerate 0% of e area	ely un f bank as of	stable; ks in re erosior	up each n.	Uns eroc area strai ben 60-1	table; led ar as frec ight so ds; or 100% sional	many reas; " quent ection side of bar scars	/ raw" along s and slope nk ha	ว ป อร, เร		
10. Bank Vegetative Protection More than 90% of the streambank surface covered by vegetation. 70-90% of the stream- bank surface covered by vegetation. 50-70% of the stream- bank surfaces covered by vegetation. Less than 50% of the streambank surface covered by vegetation. SCORE 19 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 11. Grazing or Other Disruptive Pressure Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally. Disruption evident but not affecting full plant grat extent; more than one-half of the potential plant stubble height remaining. Disruption of vegetation common; less than one-half of the potential plant stubble height remaining. Disruption of vegetation has been removed to 2 inches or less in average stubble height. 12. Riparian Vegetative Zone Width Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone. Width of riparian zone studies have impacted zone only minimally. Width of riparian zone allowed to 2 19 5 4 3 2 1 12. SCORE 15 20 19 18 17 16 15 14 13 12 11 10 9	SCORE <u>13</u>	20 19	18	17 1	6 '	15 ⁻	14 <mark>1</mark>	<mark>3</mark> 12	11	10	9	8	7	6	5	4	3	2	1		
SCORE 19201918171615141312111098765432111. Grazing or Disruptive PressureVegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.Disruption evident but not affecting full plant great extent; more than allowed to grow naturally.Disruption evident but not affecting full plant great extent; more than one-half of the potential plant stubble height remaining.Disruption of vegetation is very high; vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height remaining.SCORE 20201918171615141312111098765432112. Riparian Vegetative Zone WidthWidth of riparian zone stivities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.Width of riparian zone.Width of riparian zone.Width of riparian zone.Width of riparian vegetation due to human activities have impacted zone and times.Use to human activities.SCORE 15201918171615141312111098765432112. Riparian Sone cuts, lawns, or crops) have not impacted zone.201918171615141312111098765432113. Los core 20420191	10. Bank Vegetative Protection	More that streambat covered	an 90% ank sur by veg	of the face etation.	k	70-90 bank s vegeta	% of th surface ation.	ne strea e covere	m- ed by	50-7 banl by v	70% c k surf egeta	of the faces ation.	stream covere	n- ed	Less strea cove veg	s than amba ered b etatio	n 50% nk sur by n.	of th face	e		
11. Grazing or Other Disruptive Pressure Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally. Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. Disruption obvious; patches of bare soil or closely cropped Disruption of vegetation is very high; vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height. SCORE 20 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 12. Riparian Vegetative Zone Width Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone. Width of riparian zone inversed zone. Vidth of riparian zone inversed zone. 5 4 3 2 1 5 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 10<	SCORE <u>19</u>	20 <mark>19</mark>	18	17 1	6 ′	15 <i>*</i>	14 1	3 12	11	10	9	8	7	6	5	4	3	2	1		
SCORE 20201918171615141312111098765432112. Riparian Vegetative Zone WidthWidth of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.Width of riparian zone 6-12 meters; human activities.Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.Width of riparian vegetation due to human activities.SCORE 152019181716151413121110987654321Total Side 2 120Total Score 204	11. Grazing or Other Disruptive Pressure	Vegetati through mowing, evident; allowed	ve disru grazing , minima almost to grow	uption, j or al or not all plants naturally	r 9 9. 0 1 1 1	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble						Disr vege high bee 2 in ave heiç	uptior etation ; vege n rem ches e rage s ght.	n of etatior oved to or less stubble	ery n has to s in e	;					
12. Riparian Vegetative Zone Width Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone. Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. Width of riparian zone (-12 meters; human activities have impacted zone a great deal. Width of riparian zone (-12 meters; human activities have impacted zone a great deal. Width of riparian zone (-12 meters; human activities have impacted zone a great deal. Width of riparian zone (-12 meters; human activities have impacted zone a great deal. Width of riparian zone (-12 meters; human activities have impacted zone a great deal. Width of riparian zone (-5 meters; little or no riparian vegetation due to human activities. SCORE 15 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Total Side 2 120 Total Score 204 120	SCORE <u>20</u>	<mark>20</mark> 19	18	17 1	6 ′	15 <i>*</i>	14 1	3 12	11	10	9	8	7	6	5	4	3	2	1		
SCORE 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Total Side 2 120 10 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Total Score 204	12. Riparian Vegetative Zone Width	Width of >18 met activities lots, road cuts, law have not	ripariai ers; hui s (i.e., p dbeds, vns, or o t impac	n zone man arking clear- crops) ted zone		Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.Width of riparian z 6-12 meters; human activities have imp zone a great deal.						an zon iuman impac leal.	e ted	Wid <6 r ripa due activ	th of r neters rian ve to hu vities.	riparia s; little egetat man	n zor or n tion	1e 0			
Total Side 2 <u>120</u> Total Score 204	300KE <u>13</u>	20 19	18	1/ 1	0	15 '	14 1	3 12	11	10	9	8	1	0	5	4	3	2	1		
	Total Side 2 <u>120</u>																				



COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY NETWORK HABITAT ASSESSMENT

WATERBODY NAME Spring Run	STR CODE/RMI
STATION NUMBER Spring 4	LOCATION Near the mouth of Spring Run
DATE <u>11/6/12</u>	TIME <u>11:20AM</u>
AQUATIC ECOREGION	COUNTY Clearfield

INVESTIGATORS Kelly Williams, Carl Undercofler

FORM COMPLETED BY Kelly Williams

Habitat	Category																	
Parameter	0	otimal			Subopt	imal			Mar	ginal			Poor					
1. Instream Cover (Fish)	Greater tha boulder, co merged log banks, or c habitat.	an 50% m obble, sub gs, underc other stabl	ix of - cut le	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.				10-30 cobble habita ability desira	ulder able ail-	,	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.							
SCORE <u>11</u>	20 19	18 17	16	15 1	14 13	12	<mark>11</mark>	10	9	87	7	6	5	4	3	2 1		
2. Epifaunal Substrate	Well develour run, riffle is stream and extends tw width of str abundance	oped riffle as wide a d length o times th eam; of cobble	and as ne e.	Riffle i strean than ty abund boulde comm	Run a ing; rii strear less th strear large rock p cobble	ffle not m and nan tw m widtl boulde prevale e prese	ay be t as wi its len o time o time h; grav ers and ent; so ent; so	S S P r d-	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.									
SCORE <u>19</u>	20 <mark>19</mark>	18 17	16	15 1	14 13	12	11	10	9	87	7	6	5	4	3	21		
3. Embeddedness	Gravel, col boulder pa 0-25% surr fine sedime	oble, and rticles are rounded b ent.	d Gravel, cobble, and boulder particles are by 25-50% surrounded by fine sediment.					Grave bould 50-75 fine se	nd are ed by	,	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.							
SCORE <u>10</u>	20 19	18 17	16	15 1	14 13	12	11	<mark>10</mark>	9	87	7	6	5	4	3	2 1		
4. Velocity/Depth Regimes	All four velo regimes pro deep, slow deep, fast-	ocity/dept esent (slo -shallow, shallow).	h w- fast-	Only 3 preser is miss than if regime	8 of the 4 nt (if fas sing, sco missing es).	4 regim t-shallo pre low g other	nes ow ver	Only 2 regim shallo are m than it regim	2 of the es pre w or s issing, f missi es).	e 4 ha sent (i low-sh , score ng oth	bitat f fas nallov e low ier	t- w er	Dom 1 vel regin deep	inate locity/ ne (us o).	d by ′depth sually	slow-		
SCORE <u>15</u>	20 19	18 17	16	<mark>15</mark> 1	14 13	12	11	10	9	87	7	6	5	4	3	2 1		
5. Channel Alteration	No channe dredging p	lization or resent.	ſ	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.				New e prese and 4 reach disrup	- ,	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.								
SCORE <u>13</u>	20 19	18 17	16	15 í	14 <mark>13</mark>	12	11	10	9	8 7	7	6	5	4	3	2 1		
Total Side 1 <u>68</u>																		

Habitat	Category										
Parameter	Optimal	Suboptimal	Marginal	Poor							
6. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, coarse sand on old and new bars; 30- 50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.							
SCORE IU	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1							
7. Frequency of Riffles	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.							
SCORE <u>16</u>	20 19 18 17 <mark>16</mark>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1							
8. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.							
SCORE <u>16</u>	20 19 18 17 <mark>16</mark>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1							
9. Condition of Banks	Banks stable; no evidence of erosion or bank failure.	Moderately stable; infrequent, small areas of erosion mostly healed over.	Moderately unstable; up to 60% of banks in reach have areas of erosion.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars.							
SCORE 15	20 19 18 17 16	<mark>15</mark> 14 13 12 11	10 9 8 7 6	5 4 3 2 1							
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the stream- bank surface covered by vegetation.	50-70% of the stream- bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.							
SCORE <u>20</u>	<mark>20</mark> 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1							
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.								
SCORE <u>11</u>	20 19 18 17 16	15 14 13 12 <mark>11</mark>	10 9 8 7 6	5 4 3 2 1							
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.							
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 <mark>7</mark> 6	5 4 3 2 1							
Total Side 2 <u>95</u>											
Total Score 163											

APPENDIX E PICTURES



Snyder A: N 40.791772°, W -78.699858°



Snyder B: N 40.791094°, W -78.700351°



Snyder C: N 40.794764°, W -78.680705°



Snyder D: N 40.795608°, W -78.676560°



Spring 1: N 40.777749°, W -78.710914°



Spring 2: N 40.779725°, W -78.699918°



Spring 3: N 40.780046°, W -78.699861°



Spring 4: N 40.786189°, W -78.680294°