Conewago Creek Initiative

Fish Survey Report for the Conewago Creek

A compilation of historic fish survey data from 1972, 1973, 2007, 2012 for three locations along the Conewago Creek

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I. Background

This report highlights and compares fish survey data gathered from historic fish surveys of the Conewago Creek that were completed in 1972, 1973 and June of 2007, as well as surveys conducted in June and October of 2012. The data collected in the 1970's was completed by York College of Pennsylvania. The 2007 survey was performed by the Tri-County Conewago Creek Association. The 2012 surveys were coordinated by the Conewago Creek Initiative.

The Conewago Creek flows through Dauphin, Lebanon and Lancaster Counties of Pennsylvania before joining with the Susquehanna River. The 2012 sampling occurred in three stretches of creek: in State Game Lands 145, at the Hershey Meadows Site, and near the mouth. 2012 was the first year that a location was sampled closer to the headwaters of the Conewago and a section of stream within State Game Lands 145, across from Fieldcrest Drive, was chosen as the spot to sample. The Hershey Meadows site is located between Route 283 and Route 743 and has been sampled all four years. 2012 was the first year this site has been sampled since a project to restore nearly a mile of eroded stream banks was completed at this location. The 1970's surveys that were done near the mouth of the creek were conducted on the section of stream that parallels Hillsdale Rd. The 2007 and 2012 surveys were conducted further downstream where Covered Bridge Rd crosses the Conewago.

Routine fish sampling is an essential component of ongoing monitoring to gauge effectiveness of restoration projects and overall water quality in the Conewago Creek Watershed. The provided data compares the number of species present in each of the four survey years at the locations that were surveyed, the number of species per fish family, the tolerability of the species identified, and the trophic level of each fish species. The method of fishing included electrofishing and seine netting for the 1972 and 1973 surveys, and electrofishing for the 2007 and 2012 surveys. Two additional sites were sampled prior to 2012, however with the formation of the Conewago Creek Initiative in 2009 a monitoring plan was developed that eliminated those locations (near Koser rd and near Hertzler Rd) and added the headwater site to create a more comprehensive monitoring plan for the entire watershed. The data from these additional surveys will not be included in this report.

The tolerability and trophic levels used in this report were compiled by RETTEW Associates prior to the 2007 survey using the EPA Rapid Bioassessment Protocol for use in Wadeable Streams (EPA 841-B-99-002) Appendix C: Tolerance and Trophic Guilds of Selected Fish Species. Tolerability designations that identify the level to which a species can adjust to physical and chemical changes in the environment were determined by the EPA using 7 selected literature sources. These same sources were also used by the EPA to establish the trophic designations of the recorded fish species.

II. Data

Headwaters

This survey, conducted on October 21, 2012, found 16 species of fish, out of the 187 fish collected. There was 1 Darter species, 2 Sunfish species, 7 Minnow species, 2 Catfish species, 2 Sucker species, and 1 trout species. There were 4 intolerant species, 7 intermediate species and 5 tolerant species recorded.

Chart 1: Results of Fish Surveys in State Game lands 145			
	Count - Percentage	**Tolerance Designation**	**Trophic Designation**
Cyprinidae (Carps and Minnows)			
Campostoma anomalum (Central stoneroller)	3 - 2%	Intermediate	Herbivore
Exoglossum maxillingua (Cutlips minnow)	6 - 3%	Intolerant	Insectivore
Notropis procne (Swallowtail shiner)	3 - 2%	Intolerant	Insectivore
Rhinichthys atratulus (Blacknose dace)	20 - 11%	Tolerant	Generalist
Rhinichthys cataractae (Longnose dace)	1 - 1%	Intermediate	Insectivore
Semotilus atromaculus (Creek chub)	3 - 2%	Tolerant	Generalist
Semotilus corporalis (Fallfish)	14 - 7%	Intermediate	Generalist
Catostomidae (Suckers)			
Catostomus commersoni (White sucker)	12 - 6%	Tolerant	Generalist
Hypentelium nigricans (Northern hog sucker)	4 - 2%	Intermediate	Generalist
Ictaluridae (Bullhead catfishes)			
Ameiurus nebulosus (Brown bullhead)	1 - 1%	Tolerant	Generalist
Noturus insignis (Margined madtom)	1 - 1%	Intermediate	Insectivore
Salmonidae (Trouts)			
Salmo Trutta (Brown trout)	1 - 1%	Intolerant	Piscivore
Centachidae (Sunfishes)			
Lepomis gibbosus (Pumpkinseed)	104 - 56%	Intermediate	Generalist
Lepomis macrochirus (Bluegill)	3 - 2%	Tolerant	Generalist
Percidae (Perches)			
Etheostoma zonale (Banded darter)	3 - 2%	Intolerant	Insectivore
Other			
Hybrid Sunfish Lepomis gibbosus X L. Macrochirus	8 - 4%	*Intermediate	Generalist

Chart 1: The number of fish per species identified and the percentage of that count compared to the total number of fish identified is shown for the 2012 survey at State Game lands 145. The tolerance and trophic designations of each fish species is also shown.
**The Hybrid Sunfish species was given a tolerability level of intermediate to not skew the tolerability average.*

Hershey Meadows

The 1972 survey found 18 species of fish, out of the 164 fish collected. There was 1 Darter species, 5 Sunfish species, 7 Minnow species, 1 Catfish species, 2 Sucker species, 1 Pike species and 1 Killifish species. There were 2 intolerant species, 9 intermediate species and 7 tolerant species recorded.

The 1973 survey found 18 species of fish, out of the 299 fish collected. There was 1 Darter species, 5 Sunfish species, 8 Minnow species, 1 Catfish species, 1 Sucker species, 1 Pike species and 1 Killifish species. There were 2 intolerant species, 9 intermediate species, and 7 tolerant species recorded.

The 2007 survey found 12 species of fish, out of the 123 fish collected. There was 1 Darter species, 3 Sunfish species, 4 Minnow species, 1 Catfish species, 2 Sucker species, and 1 Killifish Species. There were no intolerant species, 7 intermediate species and 5 tolerant species recorded.

The survey conducted on June 28, 2012 found 24 species of fish, out of the 882 fish collected. There were 2 Darter species, 11 Minnow species, 6 Sunfish species, 2 Catfish species, 2 Sucker Species and 1 Killifish Species. There were 3 intolerant species, 14 intermediate species and 6 tolerant species recorded.

Chart 2: Results of Fish Surveys at Hershey Meadows

Species	1972	1973	2007	2012	Tolerance	Trophic
Cyprinidae (Carps and Minnows)						
Campostoma anomalum (Central stoneroller)				9 - 1%	Intermediate	Herbivore
Cyprinella analostana (Satinfin shiner)	4 - 2%	1 - 0%			Intolerant	Insectivore
Cyprinella spiloptera (Spotfin shiner)	44 - 27%	16 - 5%		39 - 4%	Intermediate	Insectivore
Exoglossum maxillingua (Cutlips minnow)				9 - 1%	Intolerant	Insectivore
Luxilus cornutus (Common Shiner)			C	18 - 2%	Intermediate	Insectivore
Nocomis micropogen (River chub)				8 - 1%	Intermediate	Insectivore
Notemigonus crysoleucas (Golden shiner)	1 - 1%	1 - 0%			Tolerant	Omnivore
Notropis amoenus (Comely shiner)	5 - 3%	1 - 0%			Tolerant	Insectivore
Notropis hudsonius (Spottail shiner)	5 - 3%	14 - 5%	C	26 - 3%	Intermediate	Insectivore
Notropis rubellus (Rosyface shiner				135 - 15%	Intermediate	Insectivore
Notropis procne (Swallowtail shiner)	25 - 15%	157 - 53%		104 - 12%	Intolerant	Insectivore
Pimephales notatus (Bluntnose minnow)				3 - 0%	Tolerant	Generalist
Pimephales promelas (Fathead minnow)			P		Tolerant	Generalist
Rhinichthys atratulus (Blacknose dace)		8 - 3%	A		Tolerant	Generalist
Rhinichthys cataractae (Longnose dace)		5 - 2%			Intermediate	Insectivore
Semotilus atromaculus (Creek chub)	2 - 1%			16 - 2%	Tolerant	Generalist
Semotilus corporalis (Fallfish)				6 - 1%	Intermediate	Generalist
Catostomidae (Suckers)						
Catostomus commersoni (White sucker)	11 - 7%	8 - 3%	A	188 - 21%	Tolerant	Generalist
Hypentelium nigricans (Northern hog sucker)	1 - 1%		P	8 - 1%	Intermediate	Generalist
Ictaluridae (Bullhead catfishes)						
Ameiurus natalis (Yellow bullhead)	2 - 1%		P	1 - 0%	Tolerant	Generalist

Noturus insignis (Margined madtom)		1 - 0%		1 - 0%	Intermediate	Insectivore
Esocidae (Pikes)						
Esox niger (Chain pickerel)	2 - 1%	2 -1%			Intermediate	Piscivore
Cyprinodontidae (Killifishes)						
Fundulus diaphanus (Banded killifish)	4 - 2%	16 - 5%	C	12 - 1%	Tolerant	Insectivore
Centachidae (Sunfishes)						
Ambloplites rupestris (Rock bass)	4 - 2%	3 - 1%	P	70 - 8%	Intermediate	Piscivore
Lepomis auritus (Redbreast sunfish)	29 - 18%	40 - 13%	C	35 - 4%	Intermediate	Generalist
Lepomis gibbosus (Pumpkinseed)		12 - 4%		142 - 16%	Intermediate	Generalist
Lepomis macrochirus (Bluegill)	3 - 2%	8 - 3%		23 - 3%	Tolerant	Generalist
Micropterus dolomieu (Smallmouth bass)	5 - 3%	1 - 0%	P	17 - 2%	Intermediate	Piscivore
Micropterus salmoides (Largemouth bass)				2 - 0%	Intermediate	Piscivore
Percidae (Perches)						
Etheostoma olmstedi (Tessellated darter)	15 - 9%	5 - 2%	P	8 - 1%	Intermediate	Insectivore
Etheostoma zonale (Banded darter)				2 - 0%	Intolerant	Insectivore
Other						
crappie sp	2 - 1%				Intermediate*	Piscivore

Chart 2: The number of fish per species identified and the percentage of that count compared to the total number of fish identified is shown for all 4 survey years at Hershey Meadows. The tolerance and trophic designations of each fish species is also shown. Note: The 2007 fish data for Hershey Meadows was recorded as a range, rather than specific count. The data was recorded as: Present: (1-4) Common: (5-24) Abundant: (25+).
**The unknown crappie species was given a tolerability level of intermediate to not skew the tolerability average.*

Near the Mouth

The 1972 survey found 12 species of fish, out of the 50 fish collected. There were 2 Darter species, 2 Sunfish species, 7 Minnow species, and 1 Sucker species. There was 1 intolerant species, 8 intermediate species and 2 tolerant species recorded.

The 1973 survey found 18 species of fish, out of the 640 fish collected. There were 2 Darter species, 1 Sunfish species, 12 Minnow species, 2 Catfish species, and 1 Sucker species. There were 2 intolerant species, 12 intermediate species, and 3 tolerant species recorded.

The 2007 survey found 20 species of fish, out of the 402+ fish collected. There were 4 Darter species, 4 Sunfish species, 10 Minnow species, and 2 Sucker species. There were 2 intolerant species, 14 intermediate species and 2 tolerant species recorded.

The survey conducted on October 21, 2012 found 22 species of fish, out of the 287 fish collected. There were 4 Darter species, 9 Minnow species, 6 Sunfish species, 1 Catfish species, 1 Sucker Species and 1 Killifish Species. There were 2 intolerant species, 12 intermediate species and 7 tolerant species recorded.

Chart 3: Results of Surveys Near the Mouth of the Conewago Creek						
Species	**1972**	**1973**	**2007**	**2012**	**Tolerance**	**Trophic**
Cyprinidae (Carps and Minnows)						
Campostoma anomalum (Central stoneroller)		1 - 0%		2 - 1%	Intermediate	Herbivore
Cyprinella analostana (Satinfin shiner)	1 - 2 %				Intolerant	Insectivore
Cyprinella spiloptera (Spotfin shiner)	29 - 58%	562 - 88%	18 - 4%	98 - 34%	Intermediate	Insectivore
Exoglossum maxillingua (Cutlips minnow)		1 - 0%			Intolerant	Insectivore
Luxilus cornutus (Common Shiner)			5 - 1%		Intermediate	Insectivore
Nocomis micropogen (River chub)	6 - 12%	18 - 3%	12 - 3%	4 - 1%	Intermediate	Insectivore
Notropis amoenus (Comely shiner)		1 - 0%			Tolerant	Insectivore
Notropis hudsonius (Spottail shiner)	3 - 6%	1 - 0%	8 - 2%		Intermediate	Insectivore
Notropis rubellus (Rosyface shiner	2 - 4%	5 - 1%	13 - 3%	5 - 2%	Intermediate	Insectivore
Notropis procne (Swallowtail shiner)		2 - 0%	25 - 6%		Intolerant	Insectivore
Notropis volucellus (Mimic shiner)				83 - 29%	Intermediate	Generalist
Pimephales notatus (Bluntnose minnow)		10 - 2%		19 - 7%	Tolerant	Generalist
Rhinichthys atratulus (Blacknose dace)	1 - 2%	1 - 0%	1 - 0%		Tolerant	Generalist
Rhinichthys cataractae (Longnose dace)		9 - 1%	15 - 4%	7 - 2%	Intermediate	Insectivore
Semotilus atromaculus (Creek chub)				4 - 1%	Tolerant	Generalist
Semotilus corporalis (Fallfish)	1 - 2%	2 - 0%	18 - 4%	6 - 2%	Intermediate	Generalist
Catostomidae (Suckers)						
Catostomus commersoni (White sucker)	2 - 4%		6 - 1%	5 - 2%	Tolerant	Generalist
Hypentelium nigricans (Northern hog sucker)		2 - 0%	10 - 2%		Intermediate	Generalist
Ictaluridae (Bullhead catfishes)						
Ameiurus natalis (Yellow bullhead)				7 - 2%	Tolerant	Generalist
Ictalurus punctatus (Channel catfish)		1 - 0%			Intermediate	Piscivore
Noturus insignis (Margined madtom)		4 - 1%			Intermediate	Insectivore
Cyprinodontidae (Killifishes)						
Fundulus diaphanus (Banded killifish)				1 - 0%	Tolerant	Insectivore
Centachidae (Sunfishes)						
Ambloplites rupestris (Rock bass)			12 - 3%	9 - 3%	Intermediate	Piscivore
Lepomis auritus (Redbreast sunfish)	1 - 2%	7 - 1%	3 - 1%	7 - 2%	Intermediate	Generalist
Lepomis cyanellus (Green sunfish)				14 - 5%	Tolerant	Generalist
Lepomis gibbosus (Pumpkinseed)			14 - 3%	5 - 2%	Intermediate	Generalist
Lepomis macrochirus (Bluegill)				1 - 0%	Tolerant	Generalist
Micropterus dolomieu (Smallmouth bass)	1 - 2%		7 - 2%	3 - 1%	Intermediate	Piscivore
Percidae (Perches)						
Etheostoma blennioides (Greenside darter)				1 - 0%	Intolerant	Insectivore
Etheostoma olmstedi (Tessellated darter)	2 - 4%	11 - 2%	25 - 6%	2 - 1%	Intermediate	Insectivore
Etheostoma zonale (Banded darter)			6 - 1%	2 - 1%	Intolerant	Insectivore
Stizostedion vitreum (Walleye)			2 - 0%		Intermediate	Piscivore
Other						
shield darter	1 - 2%	2 - 0%	2 - 0%	2 - 1%	intolerant	Insectivore
Cyprinella species			200- 50%		Intermediate*	Insectivore

Chart 3: The number of fish per species identified and the percentage of that count compared to the total number of fish identified is shown for all 4 survey years near the mouth of the Conewago Creek. The tolerance land trophic designations of each fish species are also shown.

**The unknown Cyprinella species was given a tolerability level of intermediate to not skew the tolerability average.*

III. Discussion

The data collected this year from the Hershey Meadows Site and the sites near the mouth can be compared to previous years to show changes in species diversity and tolerance. Since this is the first year that sampling was conducted closer to the headwaters, there is no data to compare to the State Game Lands 145 survey from previous years.

Hershey Meadows

The section of the Conewago Creek referred to as Hershey Meadows underwent a stream restoration project that began in 2009 on Hershey Trust Property. This project was designed to repair nearly a mile of eroded stream banks and 15 acres of wetlands. The restoration was led by the U.S. Fish and Wildlife Service and the Tri-County Conewago Creek Association. On this site, steep banks were leveled out and log and rock structures were installed to increase fish habitat and stabilize the banks. Wetlands were restored in the floodplain to increase the site's infiltration capacity and reduce pollutants entering the stream. Twenty acres of native trees and shrubs were planted alongside the stream to create a forest buffer. The 2012 fish survey is the first survey to be conducted at this site following the completed restoration.

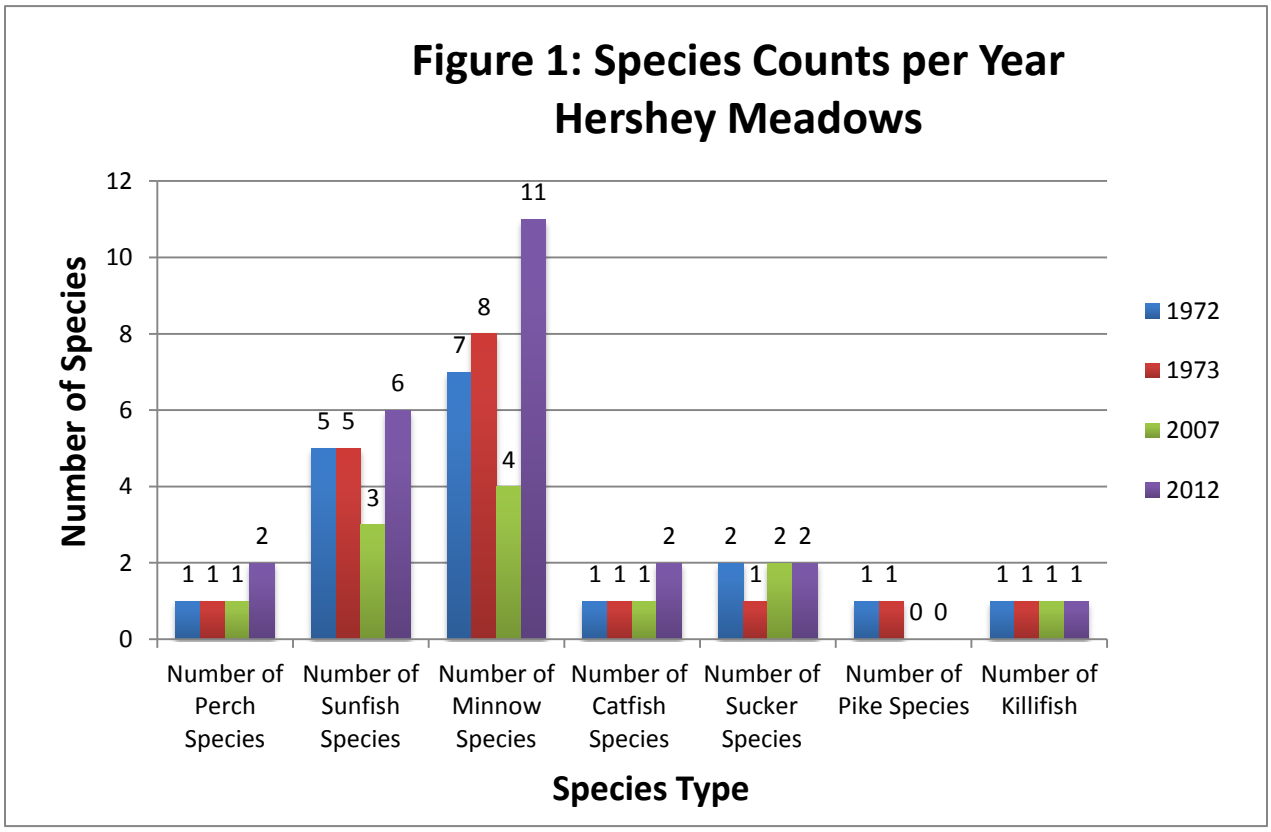

Figure 1: This graph compares the number of species within each family for the 4 years that sampling occurred at Hershey Meadows.

It appears from these results that the restoration project has been effective at increasing the diversity, abundance, and tolerance of fish in this section of stream. The total number of species caught at this site doubled from 2007 to 2012 suggesting an increase in diversity of fish species. Figure 1 demonstrates that diversity has increased since the 2012 survey recording an equal or

greater number of species for each family compared to previous years. The only family to decrease in number of species was the pike family which was not accounted for in any of the 2007 or 2012 surveys. The fish population has become less tolerant compared to previous years with the percentage of tolerant species dropping from above 40% in 2007 to 25% in this most recent survey as seen in figure 2. The number of intolerant species has increased from 2 in the 1970's and 0 in 2007 to 3 in the most recent survey. This could be tied to an improvement in stream health due to the restoration project. Length of stream and time spent sampling is unknown for the previous sample years which makes it difficult to compare results, but the extreme increase in number of fish collected (less than 300 in previous years to almost 900 in 2012) suggests that the abundance of fish at this site has also increased since the fish habitat structures were installed.

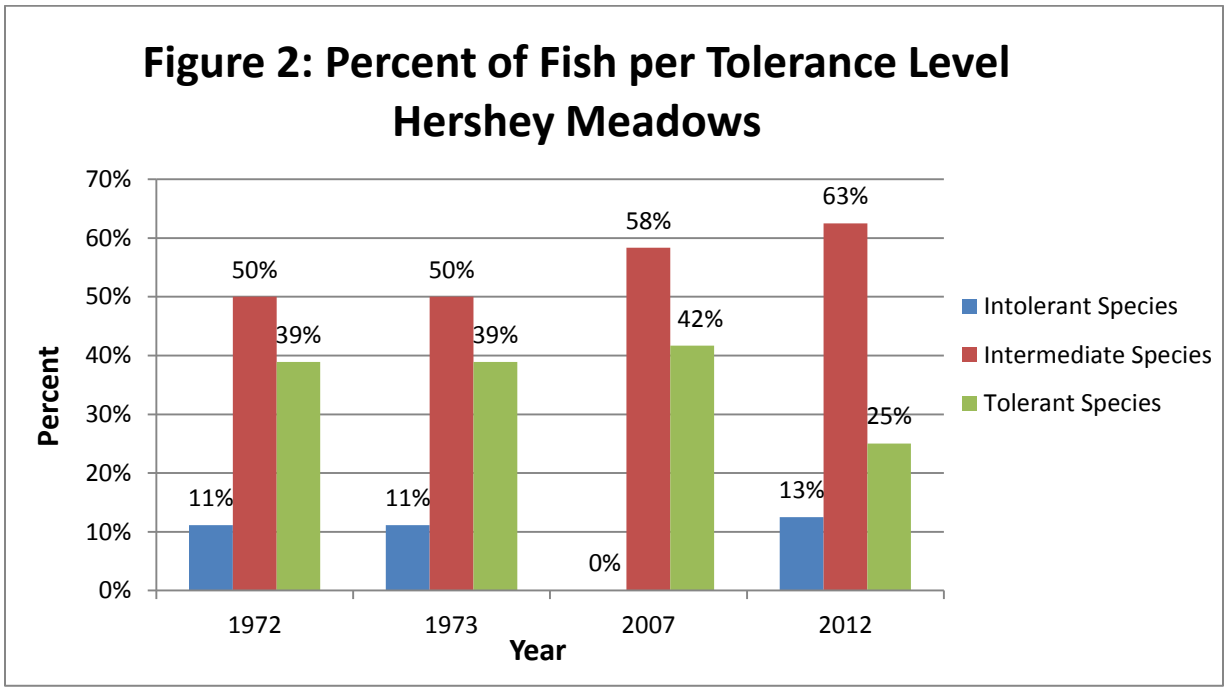

Figure 2: This graph shows the percent of fish from Hershey Meadows identified as either tolerant, intermediate, or intolerant during the 4 sample years.

Fish can also act as indicators of stream health based on the diets of the species present. Omnivores and generalist feeders can survive on many different food sources while insectivores need to have specific types and amounts of aquatic bugs to eat. Macroinvertebrates are very good indicators of stream health and their presence is determined by the water quality and habitat provided by the stream. It suggests then that if a greater abundance and variety of insect eating fish are present in the stream that there is a healthier macroinvertebrate population and a higher quality stream environment. Figure 3 shows that there has been shift from a population dominated by generalists in 2007 to a population dominated by insectivores in 2012. This switch in dominate trophic level could be demonstrating an improvement in macroinvertebrate habitat and water quality.

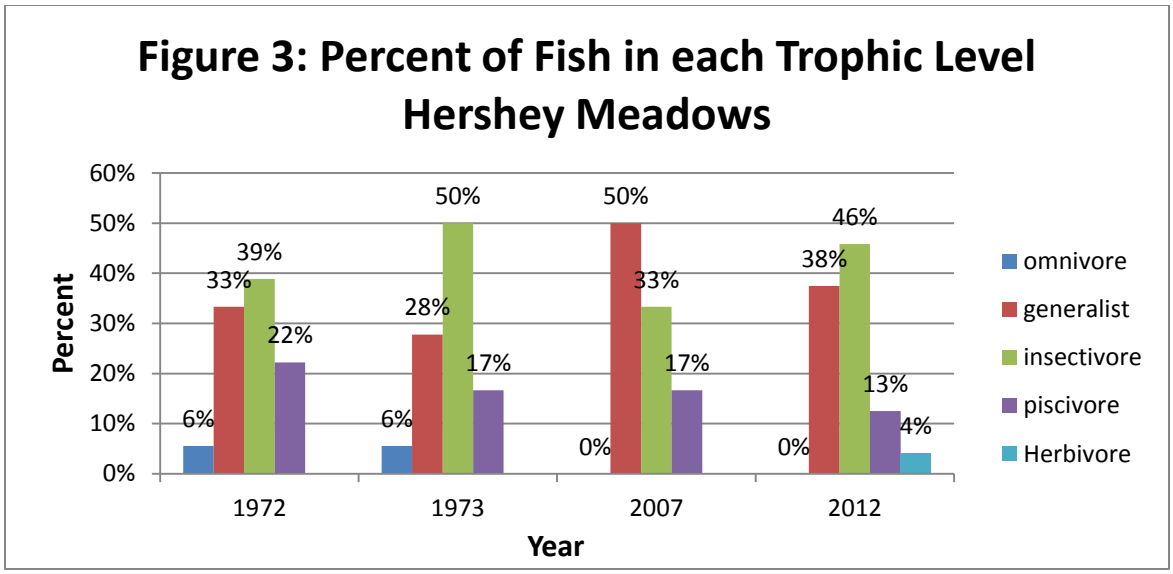

Figure 3: This graph shows the percentage of fish species identified at Hershey Meadows during the 4 sample years within each trophic level.

Near the Mouth

The number of species that are tolerant of poor water quality has increased more than 20% near the mouth of the Conewago Creek as can be seen in Figure 4. The percentage of intolerant species has slightly decreased. However, in the darter family, Percidae, the trend is toward more intolerant species at this location. In 2012, 3 out of 4 darters are intolerant; a 25% increase since 2007.

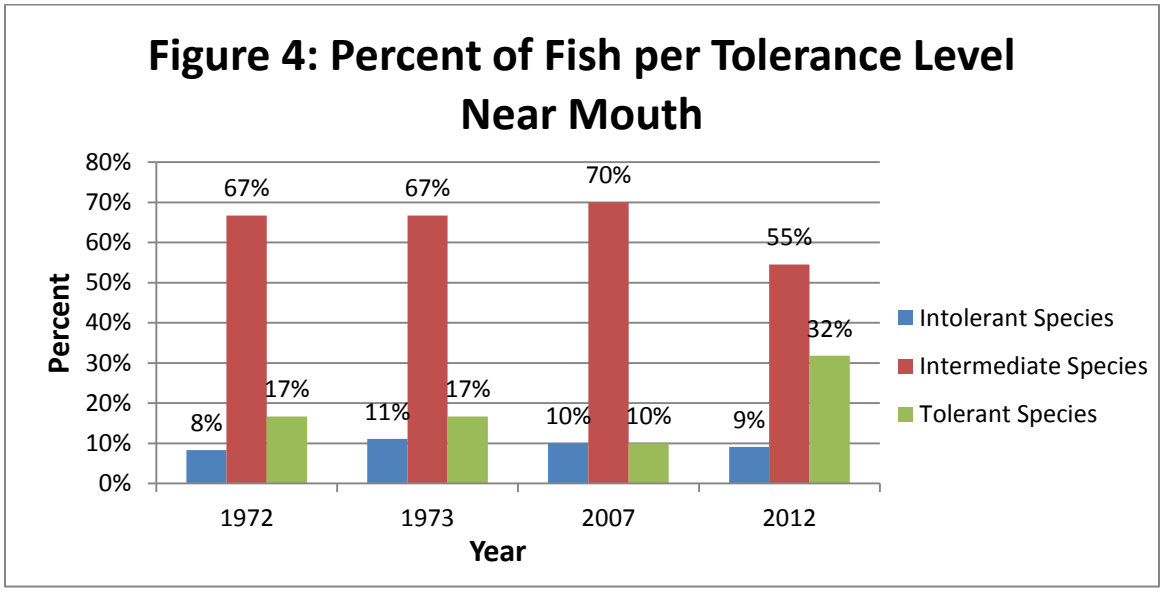

Figure 4: This graph shows the percent of fish from the sites near the mouth of the Conewago Creek identified as tolerant, intermediate, or intolerant during the 4 sample years.

Diversity of species is definitely higher today than it was in 1972 (22 species versus 12 species). For example, the number of Sunfish species has been increasing since 1973. The Centachidae family is generally tolerant of poor water quality conditions and prefers warmer water. Although the number of species in the Catfish and Minnow families have decreased since the 1973 survey, across the board there are more species per family today then there were in 1972 (Figure 5).

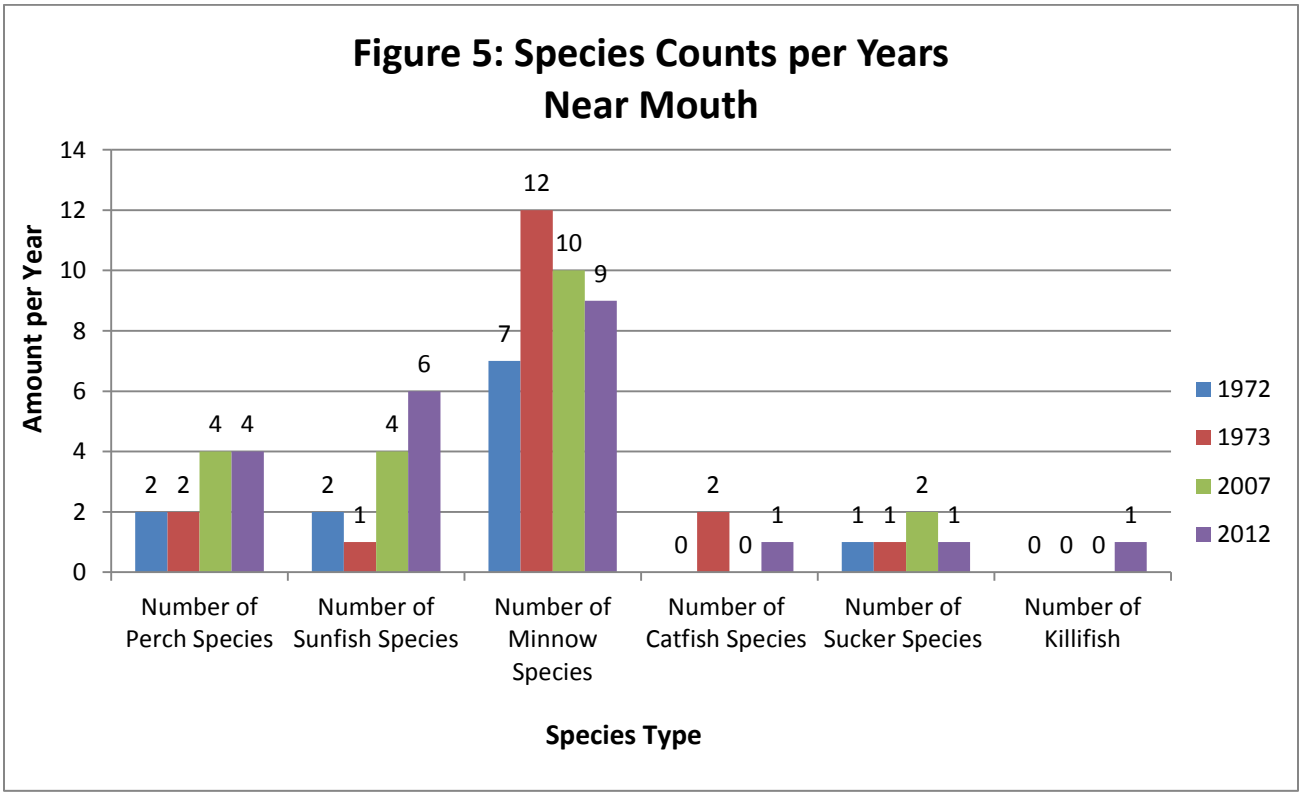

Figure 5: This graph compares the number of species within each family for the 4 years that sampling occurred near the mouth of the Conewago Creek.

Besides the increase in fish diversity, the results of the 2012 survey seem to suggest a decrease in water quality based on the increased percentage of tolerant fish species and the shifts in types of fish to more tolerant warm water fishes. This is also supported by that data shown in Figure 6. There has been a significant decrease in the percentage of insect eating fish since the 1970's. 2012 is the first year that generalist feeders are more abundant than insectivores suggesting a decrease in the area's water quality, macroinvertebrate and fish habitat.

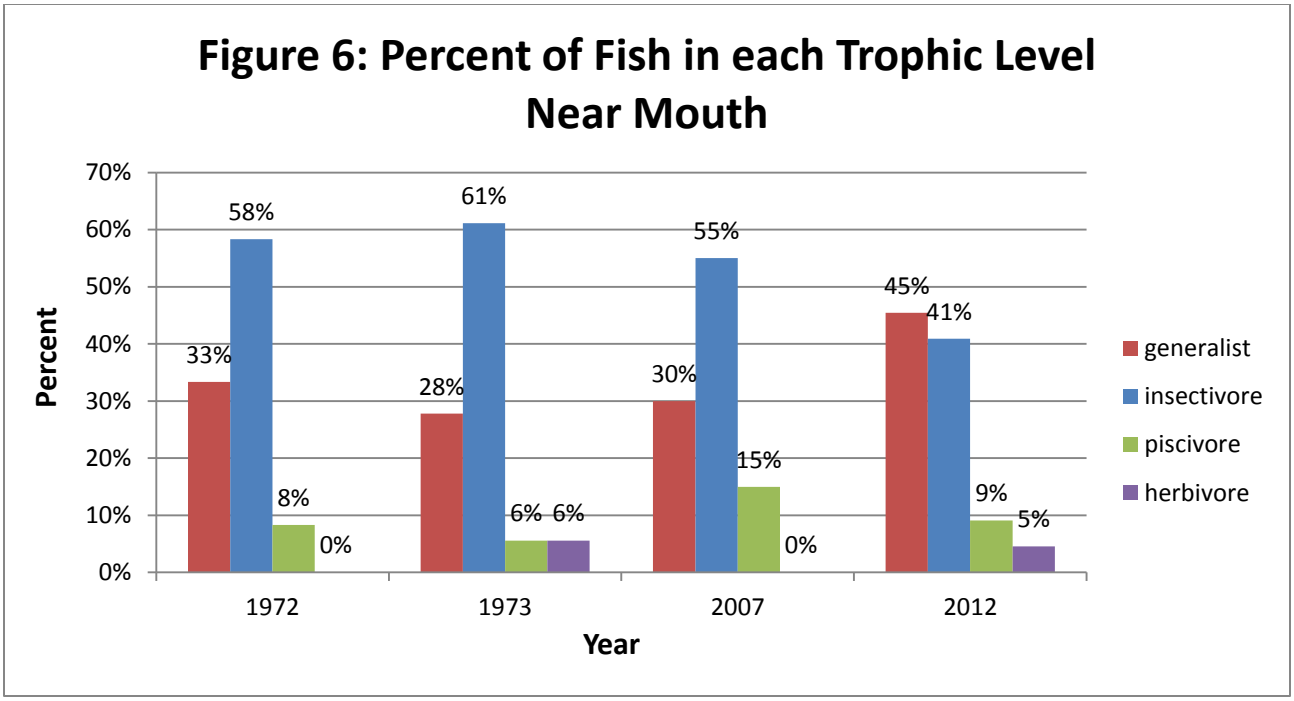

Figure 6: This graph shows the percentage of fish species identified at sites near the mouth of the Conewago Creek during the 4 sample years within each trophic level.

Over the 4 sample years, the length and number of fish sampled has varied from 50 fish identified in 1972 to 640 fish in 1973, high water in 2012 prevented the team from sampling both sides of the stream, and the length of stream sampled in previous years is unknown. These variations in sampling methods make it difficult to draw any definite conclusions from this data. The shift in sample locations from Hillsdale Rd to Covered Bridge Rd could also affect any noticeable trends. Future sampling will help solidify these results.

Comparison of 3 Surveys Completed in 2012

Comparison of the fish survey data collected in 2012 at the 3 separate sample points shows results that are generally predicted for this type of stream system. The headwaters, which have narrow and shallow stream beds, had a fewer number of overall species. This is expected due to the more limited habitat space provided by a headwater system. The headwaters also presented more intolerant fish species and had an almost equal percentage of species within each tolerability class (Figure 7). Farther downstream, more intermediate fish species were present, as were more warm water fishes since the number of sunfish doubled (Figure 8). The cooler water of the headwaters is also demonstrated by the presence of a brown trout. This trout was most likely stocked earlier in the year, but its survival to this point is a sign of cooler waters. Tolerance levels generally need to increase closer to the mouth of streams due to the accumulation of pollutants from upstream and warmer temperatures due to thermal pollution and a more open landuse.

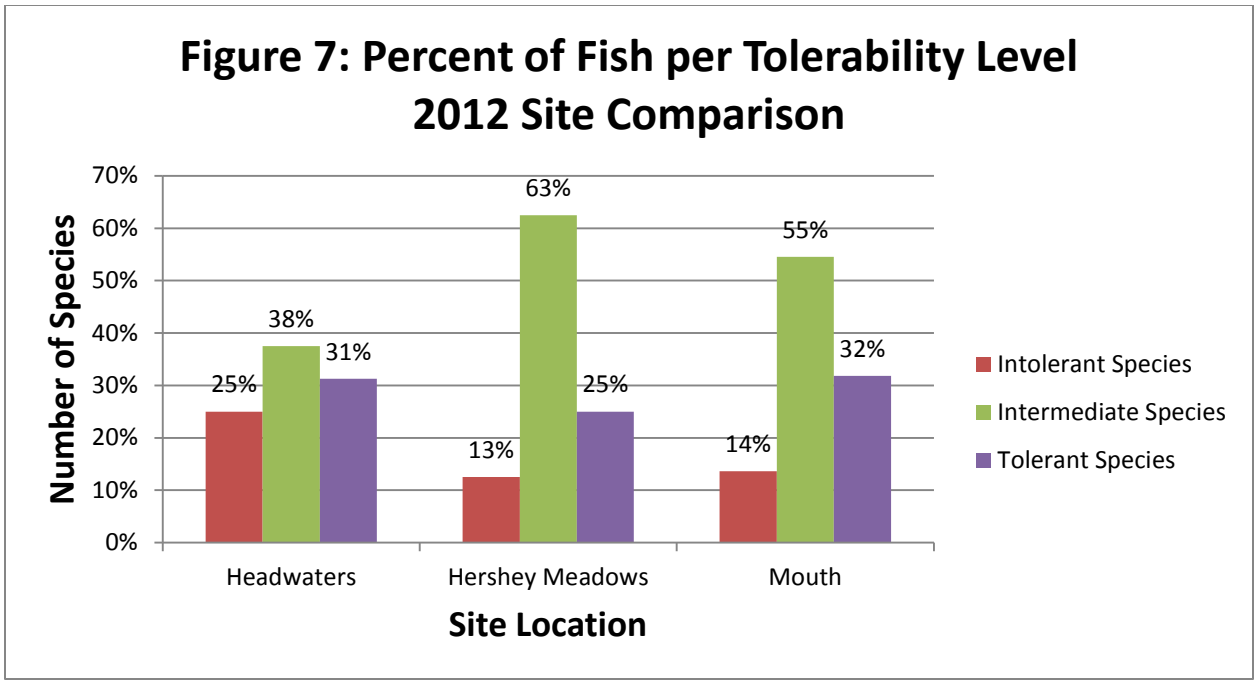

Figure 7: This graph shows the percentage of fish species broken down into tolerant, intermediate, and intolerant levels for the 3 sites surveyed in 2012.

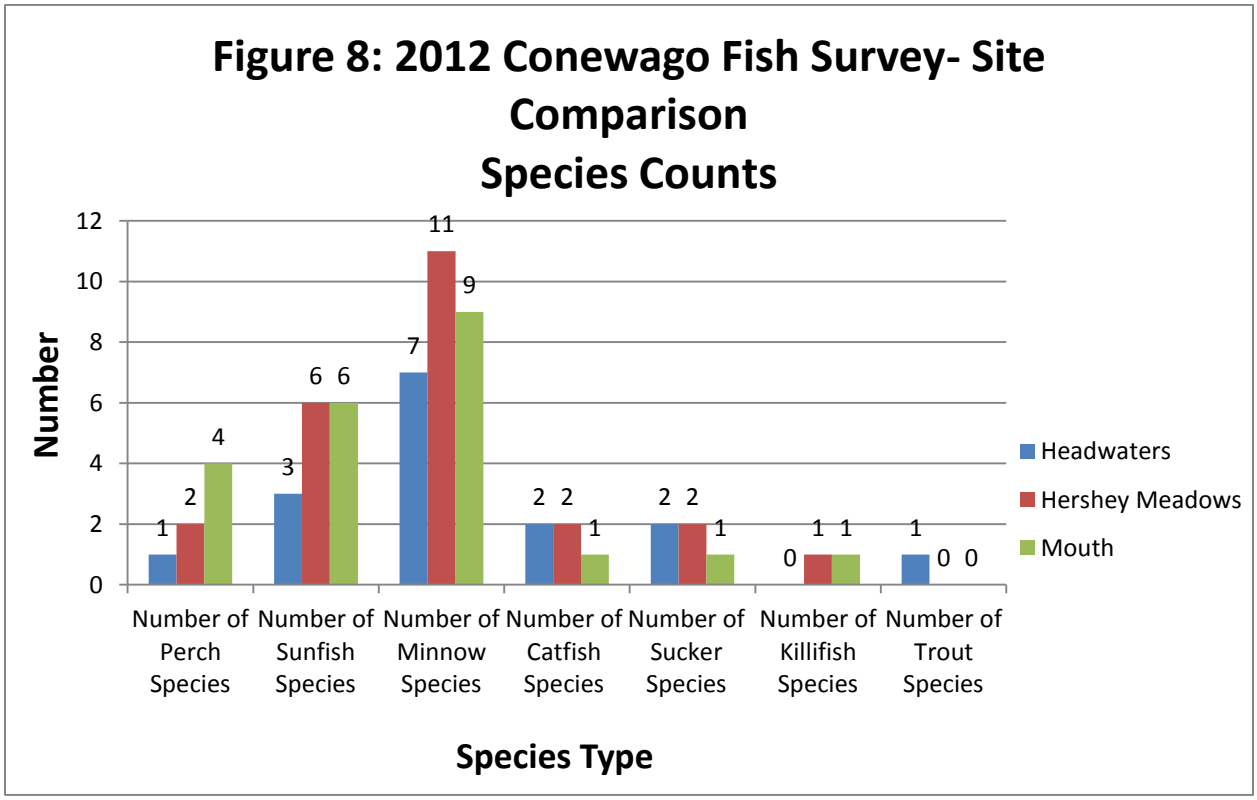

Figure 8: This graph compares the number of species within each family for the 3 sites that were surveyed in 2012.

Chart 4: Comparison of 2012 Fish Survey Results					
Species	**Mouth**	**Hershey Meadows**	**Headwaters**	**Tolerability**	**Trophic Level**
Cyprinidae (Carps and Minnows)					
Campostoma anomalum (Central stoneroller)	2 - 1%	9 - 1%	3 - 2%	Intermediate	Herbivore
Cyprinella spiloptera (Spotfin shiner)	98 - 34%	39 - 4%		Intermediate	Insectivore
Exoglossum maxillingua (Cutlips minnow)		9 - 1%	6 - 3%	Intolerant	Insectivore
Luxilus cornutus (Common Shiner)		18 - 2%		Intermediate	Insectivore
Nocomis micropogen (River chub)	4 - 1%	8 - 1%		Intermediate	Insectivore
Notropis hudsonius (Spottail shiner)		26 - 3%		Intermediate	Insectivore
Notropis rubellus (Rosyface shiner	5 - 2%	135 - 15%		Intermediate	Insectivore
Notropis procne (Swallowtail shiner)		104 - 12%	3 - 2%	Intolerant	Insectivore
Notropis volucellus (Mimic shiner)	83 - 29%			Intermediate	Generalist
Pimephales notatus (Bluntnose minnow)	19 - 7%	3 - 0%		Tolerant	Generalist
Rhinichthys atratulus (Blacknose dace)			20 - 11%	Tolerant	Generalist
Rhinichthys cataractae (Longnose dace)	7 - 2%		1 - 1%	Intermediate	Insectivore
Semotilus atromaculus (Creek chub)	4 - 1%	16 - 2%	3 - 2%	Tolerant	Generalist
Semotilus corporalis (Fallfish)	6 - 2%	6 - 1%	14 - 7%	Intermediate	Generalist
Catostomidae (Suckers)					
Catostomus commersoni (White sucker)	5 - 2%	188 - 21%	12 - 6%	Tolerant	Generalist
Hypentelium nigricans (Northern hog sucker)		8 - 1%	4 - 2%	Intermediate	Generalist
Ictaluridae (Bullhead catfishes)					
Ameiurus natalis (Yellow bullhead)	7 - 2%	1 - 0%		Tolerant	Generalist
Ameiurus nebulosus (Brown bullhead)			1 - 1%	Tolerant	Generalist
Noturus insignis (Margined madtom)		1 - 0%	1 - 1%	Intermediate	Insectivore
Salmonidae (Trouts)					
Salmo Trutta (Brown trout)			1 - 1%	Intolerant	Piscivore
Cyprinodontidae (Killifishes)					
Fundulus diaphanus (Banded killifish)	1 - 0%	12 - 1%		Tolerant	Insectivore
Centachidae (Sunfishes)					
Ambloplites rupestris (Rock bass)	9 - 3%	70 - 8%		Intermediate	Piscivore
Lepomis auritus (Redbreast sunfish)	7 - 2%	35 - 4%		Intermediate	Generalist
Lepomis cyanellus (Green sunfish)	14 - 5%			Tolerant	Generalist
Lepomis gibbosus (Pumpkinseed)	5 - 2%	142 - 16%	104 - 56%	Intermediate	Generalist
Lepomis macrochirus (Bluegill)	1 - 0%	23 - 3%	3 - 2%	Tolerant	Generalist
Micropterus dolomieu (Smallmouth bass)	3 - 1%	17 - 2%		Intermediate	Piscivore
Micropterus salmoides (Largemouth bass)		2 - 0%		Intermediate	Piscivore
Percidae (Perches)					
Etheostoma blennioides (Greenside darter)	1 - 0%			Intolerant	Insectivore
Etheostoma olmstedi (Tessellated darter)	2 - 1%	8 - 1%		Intermediate	Insectivore
Etheostoma zonale (Banded darter)	2 - 1%	2 - 0%	3 - 2%	Intolerant	Insectivore
Other					
shield darter	2 - 1%			Intolerant	Insectivore
Hybrid Sunfish Lepomis gibbosus X L. Macrochirus			8 - 4%	*Intermediate	Generalist

Chart 4: This chart compresses Charts 1-3 to include only the 2012 data. Like charts 1-3, number of fish per species identified and the percentage of that count compared to the total number of fish identified is shown. The tolerance and trophic designations of each fish species is also shown.

**The Hybrid Sunfish species was given a tolerability level of intermediate to not skew the tolerability average.*