Final

A Field Survey of Fish and Aquatic Macroinvertebrates at the Proposed Bell Bend Nuclear Power Plant Site, Luzerne County, Pennsylvania

Submitted to:
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TABLE OF CONTENTS

Page

INTRODUCTION 1

PERSONNEL 1

METHODS 1

FISH COLLECTIONS 1

STREAM MACROINVERTEBRATES 3

POND/ CANAL MACROINVERTEBRATES 3

HABITAT ASSESSMENTS 5

WATER QUALITY 6

RESULTS AND DISCUSSION 6

FISH 6

2007 Pond Surveys 6

2008 Pond Surveys 7

Walker Run Fall 2007 8

Walker Run Spring 2008 8

Walker Run Summer 2008 9

MACROINVERTEBRATES 10

Ponds/Canal 2008 10

Walker Run Fall 2007 10

Walker Run Spring 2008 11

Walker Run Summer 2008 12

LITERATURE CITED 16

LIST OF TABLES

Table 1. Habitat assessment summary for six stations located on Walker Run.

Table 2. Water quality data collected from Walker Run during Fall 2007 and Spring and Summer 2008.

Table 3. Water quality data collected from on-site ponds during Fall 2007 and Summer 2008.

Table 4. Number and percent composition of fish collected from three ponds located within the proposed BBNPP site on November 8, 2007.

Table 5. Length range of fish collected from ponds within the BBNPP site during November 2007.

Table 6. Number and percent composition of fish collected from three ponds located within the proposed BBNPP site, July 2008.

Table 7. Length range of fish collected from ponds within the BBNPP site during July 2008.

Table 8. Number and percent composition of fish collected from three stations on Walker Run located within the proposed BBNPP site on November 8, 2007.

Table 9. Length range of fish collected in Walker Run during Fall 2007.

Table 10. Number and percent composition of fish collected from five stations on Walker Run located within and downstream of the proposed BBNPP site on April 7 and 8, 2008.

Table 11. Length range of fish collected in Walker Run during July 2008.

Table 12. Number and percent composition of fish collected from five stations on Walker Run located within and downstream of the proposed BBNPP site, July 2008.

Table 13. Length range of fish collected in Walker Run during July 2008.

Table 14. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 1 in Walker Run on November 8, 2007.

Table 15. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 2 in Walker Run on November 8, 2007.

Table 16. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 1 in Walker Run on April 7, 2008.

Table 17. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 2 in Walker Run on April 7, 2008.

Table 18. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 4 in Walker Run on April 8, 2008.

Table 19. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 5 in Walker Run on April 8, 2008.

Table 20. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 1 in Walker Run on July 14, 2008.

Table 21. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 2 in Walker Run on July 14, 2008.

Table 22. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 4 in Walker Run on July 14, 2008.

Table 23. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 5 in Walker Run on July 14, 2008.

Table 24. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 6 in Walker Run on July 15, 2008.

Table 25. Number and percent composition of benthic macroinvertebrates collected with a kick net at in Unnamed Tributary 2 on July 16, 2008.

Table 26. Number and percent composition of benthic macroinvertebrates collected with a kick net at in Unnamed Tributary 3 on July 16, 2008.

LIST OF FIGURES

Figure 1. Location of the proposed BBNPP site.

Figure 2. Location of the pond and North Branch Canal biota collection stations.

Figure 3. Location of biota sample stations on Walker Run and the unnamed tributaries.

INTRODUCTION

Bell Bend Nuclear Power Plant (BBNPP) is proposed to be sited adjacent to the Susquehanna Steam Electric Station in Salem Township, Luzerne County, Pennsylvania (Figure 1). Normandeau Associates, Inc. was contracted by AREVA NP, Inc. to assess the aquatic communities of water bodies on and adjacent to the proposed BBNPP owner controlled area (OCA). Herein the OCA is referred to as the site.

Sampling was performed to determine the community composition of benthic macroinvertebrates and fish inhabiting several ponds and small streams, as well as North Branch Canal, potentially to be affected by construction of the plant.

Personnel

This fishery and macroinvertebrate report for the BBNPP site is the product of efforts from many well-trained personnel. Field work was accomplished by field biologists Jayme Schaeffer, Charles Dix, and Matthew Williams under the direction of aquatic scientist Bryan Lees, who also coordinated the laboratory processing of macroinvertebrate samples at Normandeau's Stowe laboratory. Identification of the macroinvertebrate samples was completed by Bryan Lees, Stacy Lathrop, and George Christian. Melonie Ettinger, Brenda Strouse, and Connie Booz provided secretarial and computer support for tables and text. Bryan Lees prepared the report, and Project Manager, Paul Harmon, coordinated the efforts.

METHODS

Fish Collections

Six ponds were surveyed for fish within the BBNPP site (Figure 2). Johnson's Pond, Beaver Pond, Unnamed Pond 1, Farm Pond, and West Building Pond were surveyed for fish during November 2007 and July 2008. Unnamed Pond 2 was surveyed for fish

during July 2008. The fish community was assessed using several gear types including a 4-ft x 8-ft flat seine, 12-ft jon boat outfitted with a single anode probe and an electrofishing pram with a single anode probe. At each location the appropriate gear type was selected based on access and pond depth. The small and shallow West Building Pond was sampled with the seine. The large and shallow Farm Pond was sampled with the seine in 2007 and with the towed electrofishing pram during 2008. The larger Beaver Pond and Johnson's Pond were sampled with the 12-ft jon boat. The shallow Unnamed Pond 1 was sampled with the electrofishing pram. Unnamed Pond 2 was too shallow to seine (only a few inches of water present) so visual inspections were made to determine if fish were present. Both electrofishing gears were powered by a Georator unit producing 230 volt DC current with output ranging from 2 to 5 amperes. For all gear types an effort was made to sample the entire pond perimeter and cover all habitat types including several transects across Johnson's Pond.

An attempt was made to sample the fish community in North Branch Canal with the 12-ft jon boat. Excessive duckweed on the water surface as well as thick beds of submerged aquatic vegetation made it impossible to effectively survey the fish community. As a result of these conditions it was determined that sampling should be completed at a later date. Nonetheless, the composition of the fish assemblage in the Canal is assumed to be similar to the fish assemblage in Lake Took-a-While which consists mainly of sunfish, bass, cyprinids (minnows), and catfish (Ecology III 2000). The Lake is hydrologically connected to the Canal. The fish community in the Lake is typical of other warmwater lentic waterbodies in Pennsylvania. No threatened, endangered, or species of special concern are believed to inhabit the Canal nor are any known to inhabit the Lake.

Six stations were surveyed for fish in Walker Run both within and downstream of the BBNPP site boundaries (Figure 3). Stations 1, 2, and 3 were surveyed during November 2007 and April and July 2008. Stations 4 and 5 were surveyed during April and July 2008. Station 6 was surveyed during July 2008. Walker Run fish surveys were completed using the towed electrofishing pram outfitted with a single or double

anode probe, depending on the width of the stream reach being surveyed. At each station a single electrofishing pass was completed. Station length varied from 100 feet at Station 6 to 280 feet for Station 4. All captured fish were identified to species and enumerated; a subsample of each species was measured for total length and then all fish were released.

Three unnamed tributaries were assessed during July 2008 (Figure 3). Unnamed Tributary 1 was dry and no fish were present. Unnamed Tributary 2 and 3 were too small and overgrown with vegetation to effectively survey for fish. However, visual inspections were made of both streams and no fish were observed.

Stream Macroinvertebrates

Benthic macroinvertebrates were collected from Stations 1 and 2 in Walker Run during November 2007 and April and July 2008 and from Stations 4 and 5 during April and July 2008. Benthic macroinvertebrates were also collected from Station 6 in Walker Run during July 2008. Three unnamed tributaries (Unnamed Tributary 1, 2, and 3) to the Susquehanna River were also surveyed during July 2008. Unnamed Tributary 1 was completely dry thus a benthic sample was not collected. A 500-micron mesh D-frame kick net was utilized for the collections. A total of 1 minute of kicking at two or three locations was completed for each station. Samples were collected from riffle areas with cobble substrate, although limited cobble was present at Station 1. The contents of each kick were composited into one sample. Each sample was labeled, preserved in 70% isopropanol, and transported to Normandeau's laboratory for sorting and identification. Each sample was completely sorted and abundant taxa (>200 specimens) were subsampled. All insects, except Chironomidae, were identified to genus level. Non-insects were identified to genus or order level depending on the particular group.

Pond/ Canal Macroinvertebrates

Benthic macroinvertebrates were collected from North Branch Canal, Johnson's Pond, Beaver Pond, and Unnamed Pond 1 during July 2008. A 500-micron mesh D-frame kick net was utilized for the collections. A sample consisted of making several net sweeps along the shoreline of each waterbody. Each sweep was composited into a single sample at each location and preserved in 70% isopropanol, and transported to Normandeau's laboratory for sorting and identification. A qualitative sort of each sample was completed and most organisms were identified to order or family.

Site Description

Walker Run is a second order cool water stream that flows through a section of the proposed BBNPP site. The main stem of Walker Run flows south through the western portion of the site and a secondary branch (east fork) flows west until it's confluence with the main stem. Station 1 was the most downstream station within the site, spatially located below the confluence with the east fork tributary, on the main stem of Walker Run. This section of the stream flowed through forested land with average stream width of 11 ft and maximum depth of 1 ft. Bottom substrate was a mix of silt and sand with some woody debris. Station 2 was located on the main stem of Walker Run, upstream of Station 1 and the east fork tributary. This section of the stream flowed through actively farmed fields and was overgrown with scrubby vegetation and small trees. Average water depth was less than 1 ft, although several deep pools were present, and stream width averaged 9 ft. Bottom substrate was composed mainly of sand and large cobble. Station 3 was located on the east fork tributary to the main stem of Walker Run. At this location the stream flowed through forested land, averaged 5 ft in width, and had limited flow with water depths less than 1 ft. Stream substrate was comprised of a mixture of silt and clay. Station 4 was located downstream of Station 1, approximately 0.5 miles from the site boundary. This section of the stream flowed through an active dairy farm with animal access to the entire sample reach. Few trees were present along the stream bank with grasses being the dominant cover type within the riparian corridor. Stream width averaged 16 feet and depths varied from less than a foot to nearly 3 feet deep in one deep trough-like pool. Substrate was composed mainly

of large cobble with fine sediments in the depositional areas. Station 5 was roughly 0.25 miles downstream of Station 4 and flowed through a narrow strip of forested land. The stream was widest here averaging 21 feet across and also had the steepest gradient. Bottom substrate was composed of large cobble and no pools were present within the reach. Station 6 was the most upstream station on the main stem of Walker Run and it flowed along a maintained grassy area. The stream bank was bordered by a narrow strip of shrubs and trees and stream width varied from 4 ft to 15 ft.

Unnamed Tributary 1 was located at the eastern corner of the site just downstream of the boundary. It is a small intermittent stream that flowed through a forested patch of land at the assessment location and was completely dry at the time of sampling. Stream channel width ranged to 5 ft. Unnamed Tributary 2 was a small stream that flowed in an easterly direction through the eastern portion of the site before it eventually entered Lake Took-a-While. It flowed through a mix of shrubs and grasses with stream channel width ranging up to 4 ft. Unnamed Tributary 3 was located downstream of the site, approximately 1/3 of a mile from the site boundary. The stream had limited discharge during sampling and flowed through a narrow forested patch of land with stream width ranging to 5 ft. It was mostly fed by a small impoundment along Confers Lane and upstream of this point the stream channel was dry.

Habitat Assessments

Habitat assessments were performed using the EPA Rapid Bioassessment Protocols (RBP) for high gradient streams (Barbour et al. 1999). Assessments were completed on Walker Run during April 2008 at Stations 1-5 and during July 2008 at Station 6. The RBP evaluates and scores a total of ten parameters on a 0 to 20 scale, with 200 being the highest total score possible. Each parameter is important in determining the quality of the in-stream and riparian habitat that influences the structure and function of the aquatic community in the stream. Degraded habitat conditions are considered one of the major stressors to aquatic communities and can lead to alterations in natural aquatic assemblages.

Total habitat scores were similar for Stations 1, 2, 3, 5, and 6 (Table 1), ranging from 144 to 166. For the most part each of these stations scored similarly for most of the habitat parameters. The total score for Station 4 was 123. This station scored significantly lower than the other stations for three parameters: bank stability, vegetative protection, and riparian vegetative zone width. The low scores for these parameters are a direct result of the use of the land area around the stream as pasture for dairy cows.

Water Quality

Temperature, pH, dissolved oxygen, and conductivity were measured during collections at each of the six Walker Run stations and in several of the ponds. A Horiba U-10 multimeter was used to collect the in-situ water quality data. Most water quality parameters were similar among each of the stream stations (Table 2). The only exception was conductivity in the east fork tributary (Station 3), which was approximately twice as high as any of the other stations. Similarly, water quality among the ponds was comparable although conductivity was much lower for Johnson's Pond than the other four ponds (Table 3).

RESULTS AND DISCUSSION

Fish

2007 Pond Surveys

No fish were collected in the West Building Pond or Unnamed Pond 1. Fish were present within Johnson's, Beaver, and Farm ponds from which a total of 254 fish representing seven species and one hybrid was collected (Table 4). Beaver Pond yielded a total of 164 fish representing five species and one hybrid. Brown bullhead was the dominant species within Beaver Pond, comprising 61% of the catch. A total of 89 fish representing three species was collected from Johnson's Pond with bluegill

being numerically dominant, comprising 96% of the catch. A single creek chub was collected from Farm Pond. Length ranges of fish collected in the ponds are given in Table 5.

2008 Pond Surveys

No fish were collected from West Building Pond, Unnamed Pond 1, or Unnamed Pond 2. For the other three ponds (Beaver, Johnson's, Farm) a total of 356 fish representing nine species and one hybrid was collected (Table 6). A total of 64 fish representing four species and one hybrid was collected from Beaver Pond. The predominate species in Beaver Pond was brown bullhead, comprising 39.1% of the catch. Johnson's Pond yielded a total of 240 fish representing three species and one hybrid with bluegill being numerically dominant, comprising 85.8% of the catch. Fifty-two fish representing four species were collected from Farm Pond with creek chub the predominant species, comprising 82.7% of the catch. Length ranges of fish collected in the ponds are given in Table 7.

The fish assemblages observed within Beaver Pond and Johnson's Pond were characteristic of a typical warm-water pond in Pennsylvania (Cooper 1983). Most of the species including largemouth bass, bluegill, and brown bullhead are commonly recommended by extension agencies for stocking in small ponds in Pennsylvania (PSU 2000). In both ponds the predominant fish species were from the families Centrarchidae (sunfishes) and Ictaluridae (catfishes). Several species within these two families are common inhabitants of ponds throughout Pennsylvania. Beaver Pond had the most balanced and diverse fish assemblage with both brown bullhead and green sunfish being abundant. Three centrarchids were present in Johnson's Pond with bluegill being abundant. Community composition was similar within both ponds during Fall 2007 and Summer 2008. The Farm Pond fish assemblage was not representative of a typical fish community for ponds in Pennsylvania. A majority of the species collected in Farm Pond including creek chub, white sucker, and blacknose dace normally inhabit streams and rivers and are not found in ponds (Cooper 1983). It is

probable that these fish were washed into Farm Pond during flood events that caused Walker Run to overflow it's banks.

No rare, threatened, endangered, or species of special concern were collected.

Walker Run Fall 2007

Seven species of fish and one hybrid totaling 299 individuals were collected from three stations on Walker Run during the fall of 2007 (Table 8). Station 1 yielded 151 individual fish of five species with blacknose dace and creek chub being the numerically dominant species. A total of 56 fish representing five species was collected from Station 2. Species composition and relative abundance was similar for Stations 1 and 2 with blacknose dace and creek chub being co-dominant. For Station 3, 92 fish representing five species and one hybrid were collected with creek chub being numerically dominant, comprising 70% of the catch. Length ranges of fish collected in Walker Run during the fall of 2007 are given in Table 9.

Walker Run Spring 2008

Ten species of fish totaling 857 individuals were collected from five stations on Walker Run during the spring of 2008 (Table 10). A total of 112 individuals representing six species was collected from Station 1; Station 2 yielded 101 individuals and four species of fish. Blacknose dace was numerically dominant at Stations 1 and 2 comprising 43.8% and 45.5% of the total, respectively. For station 3 a total of four species and 50 individual fish was collected with creek chub being dominant, comprising 32.0% of the total. Station 4 yielded 371 individuals and nine species and at Station 5 a total of six species and 223 individuals was collected. The dominant species at Station 4 was white sucker, comprising 40.7% of the total and for Station 5 blacknose dace was numerically dominant, comprising 83.4% of the collection. Length ranges of fish collected in Walker Run during the spring of 2008 are given in Table 11.

Walker Run Summer 2008

Ten species and one hybrid fish totaling 921individuals were collected from six stations in Walker Run during July 2008 (Table 12). Station 4 yielded the greatest number of individuals (430) and the most species (9). The fewest number of fish (51) and species (4) were collected from Station 3. Blacknose dace, creek chub, and white sucker were among the predominate species at most of the stations. Length ranges of fish collected in Walker Run during the summer of 2008 are given in Table 13.

The fish assemblage observed in Walker Run was characteristic of similar-sized coolwater streams throughout eastern Pennsylvania (Fairchild 1998, Horwitz 2008). A mixture of both coldwater and warmwater species was collected throughout the watershed. Walker Run is currently designated as a cold water fishery (PA 1980). This designation indicates that in Walker Run the maintenance or propagation, or both, of fish species including the family Salmonidae occurs. This designation was confirmed with the collection of brown trout which are in the family Salmonidae.

In Walker Run a general trend of increasing species diversity and abundance was observed at stations that were farther downstream, which is a common characteristic of smaller headwater streams. Similar species composition and abundance was observed during the fall, spring, and summer sampling events. Although brown trout was present during the spring and summer but not the fall sampling effort. Seasonal movement of brown trout within the stream most likely explains their presence during spring and summer and not during the fall. The brown trout appeared to be naturally reproduced, wild fish. Trout are not currently stocked in Walker Run by the PFBC.

Four species that were relatively abundant throughout the surveyed locations in Walker Run were blacknose dace, creek chub, white sucker, and tessellated darter. The

abundance of blacknose dace and creek chub in Walker Run offers an important forage base for brown trout and other predatory fish. Blacknose dace distribution is widespread in Pennsylvania and nearly every stream in Pennsylvania contains blacknose dace (Cooper 1983). Additionally, white sucker, creek chub, and tessellated darter are also widely distributed throughout Pennsylvania.

Qualitative collections of crayfish were completed while electrofishing in the lower reaches of Walker Run during summer 2008 (Stations 4 and 5) Crayfish were extremely abundant and only one species was collected, *Orconectes obscurus*. Another species, *Cambarus bartonii bartonii*, however, was collected in Walker Run benthic macroinvertebrate samples.

No rare, threatened, endangered, or species of special concern were collected nor would any be expected to occur in Walker Run.

Macroinvertebrates

Ponds/Canal 2008

The macroinvertebrate communities within the ponds and Canal were similar. In all four water bodies Chironomidae (midges) was the most abundant group. Other common taxa within the ponds and Canal include Odonata, Hemiptera, Oligochaeta, and Gastropoda. In two of the ponds, Johnson's and Beaver, the mayfly *Caenis* was present. This species commonly inhabits lentic habitats. No other Ephemeroptera, Trichoptera, or Plecoptera (EPT) were identified. In addition, no mussels were observed in any of the water bodies.

Walker Run Fall 2007

A combined total of 2,510 macroinvertebrates representing 66 taxa was collected from Walker Run during the fall of 2007 (Tables 14 and 15). Diptera was the dominant group

both numerically (48.1%) and by the number of taxa (n=15). The EPT group made up a large proportion of the total taxa and was represented by 30 genera.

A total of 1,349 macroinvertebrates representing 46 taxa was collected from Station 1 (Table 14). Diptera was the dominant group at Station 1 comprising 73.0% of the macroinvertebrates; most of the dipterans were in the family Chironomidae. Diptera was also the most diverse group with 13 taxa being collected. The EPT grouping comprised 12.3% of the macroinvertebrates with a total of 12 taxa present from this group. The caddisfly *Cheumatopsyche* was the most abundant EPT taxon representing 4.3% of the macroinvertebrates.

At Station 2 a total of 1,161 macroinvertebrates from 52 taxa was collected (Table 15). Of these, two groups were essentially co-dominant, Ephemeroptera and Coleoptera comprising 33.6% and 31.4% of the total, respectively. Diptera were also fairly numerous accounting for 19.2% of the macroinvertebrates. The combined contribution of the EPT group accounted for 45.9% of the macroinvertebrates and over half of the total taxa (n= 26 taxa). The mayfly *Stenonema* was the most abundant EPT taxon comprising 22.8% of the macroinvertebrates.

Walker Run Spring 2008

A total of 15,228 organisms and 69 taxa was collected from Walker Run during Spring 2008 (Tables 16-19). Similar to fall 2007, Diptera was the dominant group both numerically (81.1%) and by number of taxa (15). The EPT group comprised a large number of the total taxa with 27 genera identified.

For Station1 a total of 1,510 organisms and 44 taxa was collected (Table 16). Diptera was most abundant comprising 65.2% of organisms with most of the dipterans being in the family Chironomidae. The EPT group was also common, comprising 25.7% of macroinvertebrates. The mayfly *Eurylophella* was the dominant EPT taxon, comprising 18.1% of the macroinvertebrates.

At Station 2 a total of 43 taxa and 3,765 organisms was collected. Diptera was the dominant group accounting for 60.0% of organisms (Table 17). The blackfly *Prosimulium* was the most numerous taxon comprising 53.8% of all organisms. The EPT group accounted for 22.4% of organisms and 21 taxa. Several mayflies were numerous with *Ephemerella* being the dominant EPT taxon, accounting for 6.2% of all organisms.

A total of 2,481 organisms and 35 taxa was collected from Station 4 (Table 18). Diptera was the predominate group comprising 72.7% of all organisms. Of these, Chironomidae was the dominant organism accounting for 49.5% of the total. The EPT group accounted for 22.3% of organisms and 13 taxa with the mayfly *Ephemerella* being most numerous at 11.0%.

At the most downstream location, Station 5, a total of 7,472 organisms and 24 taxa was collected (Table 19). The blackfly, *Prosimulium*, was the predominate organism accounting for 83.9% of the total. The EPT group comprised 4.9% of the total with nine taxa from the group being identified.

Walker Run Summer 2008

A total of 7,247 organisms and 59 taxa was collected from Walker Run during the summer of 2008 (Tables 20-24). Similar to both fall 2007 and spring 2008, Diptera was the most abundant group both numerically (30.9%) and by number of taxa (13). The EPT group comprised a large number of the total taxa with 22 being identified.

At Station 1 a total 1,233 organisms and 36 taxa was collected (Table 20). Diptera was the most abundant group comprising 44.3% of all organisms, with Chironomidae accounting for a large proportion of the group at 41.8%. The EPT group accounted for 28.5% of all organism and 12 taxa with the caddisfly *Cheumatopsyche* being most numerous at 13.4%.

For Station 2 a total of 689 organisms and 31 taxa was collected (Table 21). Diptera was the most abundant group comprising 41.9% of organisms with most of the dipterans being in the family Chironomidae. The EPT group was also common, comprising 33.1% of the macroinvertebrates and 13 taxa. The mayfly *Baetis* was the dominant EPT taxon comprising 12.5% of all organisms.

Station 4 yielded a total of 1,796 organisms and 36 taxa (Table 22). Trichoptera was the most abundant group, comprising 47.1% of all organisms. A majority of the trichopterans were *Cheumatopsyche* (29.7%) and *Hydropsyche* (11.1%). Overall, the EPT group comprised 54.0% of all organisms with the afformentioned *Cheumatopsyche* being the most abundant taxon within the group. A total of 12 EPT taxa was collected.

At Station 5 a total of 774 organisms and 33 taxa was collected (Table 23). Trichoptera was the most abundant group, comprising 44.1% of all organisms with *Chimarra* being the most numerous organism in the group (24.9%). A total of 14 EPT taxa was collected and this group comprised 63.8% of all organisms.

Station 6, the most upstream station, yielded 2,755 organisms and 34 taxa (Table 24). Ephemeroptera was the dominant group accounting for 33.7% of all organisms with *Baetis* being the most numerous organism in the group (23.8%). A total of 13 EPT taxa was collected which comprised 60.9% of all organisms.

The macroinvertebrate community present in Walker Run was diverse and representative of a small coolwater stream in eastern Pennsylvania. A total of 88 taxa was collected. Almost half (43) of these taxa were within the EPT group. Taxa within this group are generally considered intolerant to most types of water pollution and habitat degradation. The benthic macroinvertebrates present in Walker Run was indicative of a healthy, clean-water stream community.

For the most part, species abundance and composition was similar among stations and between seasons. Most of the differences were related to the heterogeneous or "patchy" distribution of macroinvertebrates. However, some more specific differences were evident. Some of the seasonal differences were related to the life history characteristics of benthic macroinvertebrates. For example, as a part of the life history of many mayfly species there is an egg diapause. This results in many species being in egg stage during summer and not hatching until fall; therefore, these species would not be collected in benthos samples. Additionally, seasonal differences in abundance can be related to "blooms" of organisms. This phenomenon occurred at Stations 2, 4, and 5 during the spring when large numbers of the blackfly *Prosimulium* were collected. Most species within this genus mature in the spring and can be highly abundant if habitat conditions are especially favorable (Adler 1986). These habitat conditions include swift currents for feeding and stable, size-specific substrate for attachment. Both of these parameters were present at Stations 2, 4, and 5 and appear to explain the large abundance of blackfly in each of the areas.

No rare, threatened, endangered, or species of special concern were collected or are thought to occur within the Walker Run watershed.

Unnamed Tributary 2

A total of 8,161 organisms and 16 taxa was collected from Unnamed Tributary 2 (Table 25). The macroinvertebrate community was dominated by the amphipod *Gammarus* which comprised 95.9% of all organisms. A single EPT taxon, the mayfly *Baetis*, was collected which comprised 0.3% of the collection.

Unnamed Tributary 3

A total of 444 organisms and 17 taxa was collected from Unnamed Tributary 3 (Table 26). Diptera was the dominant group comprising 73.4% of all organisms with

Chironomidae accounting for 52.3% of the dipterans. The EPT group comprised 18.9% of all organisms and a total of 6 taxa was collected.

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Table 1. Habitat assessment[1] summary for six stations located on Walker Run.

Habitat Parameter		Station 1	2	3	4	5	6
Epifaunal Substrate/ Available Cover		15	17	14	17	18	15
Embeddedness		15	18	14	15	16	15
Velocity/Depth regime		12	15	9	15	13	15
Sediment Deposition		12	16	14	12	17	16
Channel Flow Status		19	19	19	19	19	16
Channel Alteration		19	16	19	17	19	15
Frequency of Riffles		16	16	14	16	18	16
Bank Stability							
	Left Bank	7	7	8	2	8	7
	Right Bank	7	6	8	2	9	6
Vegetative Protection							
	Left Bank	5	6	8	2	9	6
	Right Bank	5	6	8	2	9	6
Riparian Vegetative Zone Width							
	Left Bank	9	4	8	2	4	6
	Right Bank	9	4	8	2	7	5
Total Score		150	150	151	123	166	144

[1] U.S. EPA. 1999. Rapid Biooassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. EPA 841-B-99-002. (http://www.epa.gov/OWOW/monitoring/techmon.html)

Table 2. Water quality data collected from Walker Run during Fall 2007 and Spring and Summer 2008.

Season	Parameter	Station 1	2	3	4	5	6
Fall 2007							
	Temperature (°C)	5.2	6.2	6			
	pH	6.6	6.8	6.7			
	Dissolved Oxygen (mg/l)	11.5	11.2	11.1			
	Conductivity (µS/cm)	127	95	334			
Spring 2008							
	Temperature (°C)	8.8	9.3	11.2	8.3	10.6	
	pH	6.5	7.5	7.8	7.6	7.6	
	Dissolved Oxygen (mg/l)	11.8	11.7	11.2	12	12.7	
	Conductivity (µS/cm)	80	63	158	81	81	
Summer 2008							
	Temperature (°C)	20.5	21.3	22.4	22.7	24.7	24.1
	pH	6.3	6.4	7.1	7.5	7.3	7.3
	Dissolved Oxygen (mg/l)	7			8.2	7	8.4
	Conductivity (µS/cm)	86	80	195	85	81	70

Table 3. Water quality data collected from the ponds during Fall 2007 and Summer 2008.

Season	Parameter	Pond				
		West Building	Beaver	Johnson's	Farm	Unnamed 1
Fall 2007						
	Temperature (°C)	5.2	7.1	8.5	9.0	5.4
	pH	7.2	7.5	7.2	6.2	6.1
	Dissolved Oxygen (mg/l)	10.6	14.2	11.1	10.5	10.9
	Conductivity (µS/cm)	261	426	35	110	93
Spring 2008						
	Temperature (°C)		25.0	25.7	26.0	23.9
	pH		7.1	6.0	6.0	6.3
	Dissolved Oxygen (mg/l)		6.8	7.2	-	7.1
	Conductivity (µS/cm)		245	35	83	109

Table 4. Number and percent composition of fish collected from three ponds located within the proposed BBNPP site, November 8, 2007.

Common name	Scientific name	Beaver Pond		Johnson's Pond		Farm Pond	
		Number	Percent	Number	Percent	Number	Percent
Bluegill	*Lepomis macrochirus*	5	3	85	96		
Brown bullhead	*Ameiurus nebulosus*	100	61				
Creek chub	*Semotilus atromaculatus*	1	1			1	100
Golden shiner	*Notemigonus crysoleucas*	1	1				
Green sunfish	*Lepomis cyanellus*	48	29				
Largemouth bass	*Micropterus salmoides*			3	3		
Sunfish hybrid	*Lepomis sp.*	9	5				
White crappie	*Pomoxis annularis*			1	1		
Total number of organisms		164		89		1	
Total number of species[1]		5		3		1	

Note that no fish were collected from either the West Building Pond or Unnamed Pond

[1]excludes sunfish hybrid

Table 5. Length range of fish collected from ponds within the BBNPP site during November 2007.

Taxon	Total Length (mm)					
	Beaver Pond		Johnson's Pond		Farm Pond	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
White crappie			89			
Bluegill	78	98	42	116		
Golden shiner	101					
Creek chub					55	
Green sunfish	36	120				
Largemouth bass			89	341		
Brown bullhead	64	250				
Sunfish hybrid	75	91				

Table 6. Number and percent composition of fish collected from three ponds located within the proposed BBNPP site, July 2008.

Common name	Scientific name	Beaver Pond		Johnson's Pond		Farm Pond	
		Number	Percent	Number	Percent	Number	Percent
Blacknose dace	*Rhinichthys atratulus*					4	7.7
Bluegill	*Lepomis macrochirus*	1	1.6	206	85.8		
Brown bullhead	*Ameiurus nebulosus*	25	39.1				
Creek chub	*Semotilus atromaculatus*					43	82.7
Golden shiner	*Notemigonus crysoleucas*	17	26.6			3	5.8
Green sunfish	*Lepomis cyanellus*	20	31.3				
Largemouth bass	*Micropterus salmoides*			23	9.6		
Sunfish hybrid	*Lepomis sp.*	1	1.6	4	1.7		
White crappie	*Pomoxis annularis*			7	2.9		
White sucker	*Catostomus commersoni*					2	3.8
Total number of organisms		64		240		52	
Total number of species[1]		4		3		4	

Note that no fish were collected from either the West Building Pond, Unnamed Pond, or Unnamed Pond 2

[1]excludes sunfish hybrid

Table 7. Length range of fish collected from ponds within the BBNPP site during July 2008.

Taxon	Total Length (mm)					
	Beaver Pond		Johnson's Pond		Farm Pond	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
White crappie			120	190		
Bluegill	75		30	160		
Golden shiner	32	125			27	
Creek chub					21	112
Blacknose dace					22	40
Green sunfish	54	145				
Largemouth bass			40	355		
Brown bullhead	80	225				
Sunfish hybrid	95		140	230		
White sucker					87	134

Table 8. Number and percent composition of fish collected from three stations on Walker Run located within the proposed BBNPP site, November 8, 2007.

Common name	Scientific name	Station 1		Station 2		Station 3	
		Number	Percent	Number	Percent	Number	Percent
Blacknose dace	*Rhinichthys atratulus*	59	39	17	30	3	3
Bluegill	*Lepomis macrochirus*					7	8
Creek chub	*Semotilus atromaculatus*	46	30	18	32	64	70
Fallfish	*Semotilus corporalis*	22	15	1	2		
Green sunfish	*Lepomis cyanellus*			2	4	10	11
Sunfish hybrid	*Lepomis sp.*					4	4
Tessellated darter	*Etheostoma olmstedi*	4	3				
White sucker	*Catostomus commersoni*	20	13	18	32	4	4
Total number of organisms		151		56		92	
Total number of species[1]		5		5		6	

[1]excludes sunfish hybrid

Table 9. Length range of fish collected in Walker Run during November 2007.

Taxon	Total Length (mm)	
	Minimum	Maximum
Blacknose dace	38	81
Bluegill	62	79
Creek chub	36	143
Fallfish	47	133
Green sunfish	39	83
Tessellated darter	61	71
White sucker	36	151

Table 10. Number and percent composition of fish collected from five stations on Walker Run located within and downstream of the proposed BBNPP site, April 7 and 8, 2008.

Common name	Scientific name	Station 1		Station 2		Station 3		Station 4		Station 5	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Blacknose dace	*Rhinichthys atratulus*	49	43.8	46	45.5	11	22.0	39	10.5	186	83.4
Bluegill	*Lepomis macrochirus*							1	0.3		
Brown trout	*Salmo trutta*	1	0.9	3	3.0			4	1.1	2	0.9
Creek chub	*Semotilus atromaculatus*	43	38.4	32	31.7	16	32.0	99	26.7	16	7.2
Fallfish	*Semotilus corporalis*							23	6.2		
Green sunfish	*Lepomis cyanellus*	1	0.9			9	18.0	1	0.3		
Longnose dace	*Rhinichthys cataractae*									15	6.7
Pumpkinseed	*Lepomis gibbosus*							1	0.3		
Tessellated darter	*Etheostoma olmstedi*	5	4.5					52	14.0	2	0.9
White sucker	*Catostomus commersoni*	13	11.6	20	19.8	14	28.0	151	40.7	2	0.9
Total number of organisms		112		101		50		371		223	
Total number of species		6		4		4		9		6	

Table 11. Length range of fish collected in Walker Run during April 2008.

Taxon	Length (mm)	
	Minimum	Maximum
Blacknose dace	30	80
Bluegill	66	
Brown trout	102	295
Creek chub	37	136
Fallfish	52	168
Green sunfish	46	47
Longnose dace	46	105
Pumpkinseed	52	
Tessellated darter	31	65
White sucker	43	271

Table 12. Number and percent composition of fish collected from five stations on Walker Run located within and downstream of the proposed BBNPP site, July 2008.

Common name	Scientific name	Station 1		[1]Station 2		Station 3		Station 4		Station 5		Station 6	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Blacknose dace	*Rhinichthys atratulus*	52	41.6	8	10.0	30	58.8	27	6.3	112	68.3	34	47.9
Bluegill	*Lepomis macrochirus*	1	0.8					1	0.2	1	0.6		
Brown trout	*Salmo trutta*			1	1.3			3	0.7	1	0.6	9	12.7
Creek chub	*Semotilus atromaculatus*	62	49.6	21	26.3	17	33.3	81	18.8	22	13.4	7	9.9
Fallfish	*Semotilus corporalis*	1	0.8	3	3.8			13	3.0			2	2.8
Green sunfish	*Lepomis cyanellus*	1	0.8	3	3.8	1	2.0	36	8.4	4	2.4		
Largemouth bass	*Micropterus salmoides*							1	0.2				
Sunfish hybrid	*Lepomis sp.*									1	0.6		
Longnose dace	*Rhinichthys cataractae*									15	9.1		
Tessellated darter	*Etheostoma olmstedi*	4	3.2					87	20.2				
White sucker	*Catostomus commersoni*	4	3.2	44	55.0	3	5.9	181	42.1	8	4.9	19	26.8
Total number of organisms		125		80		51		430		164		71	
Total number of species		7		6		4		9		7		5	

[1]sample location downstream of original sample boundary

Table 13. Length range of fish collected in Walker Run during July 2008.

Taxon	Total Length (mm)	
	Minimum	Maximum
Blacknose dace	25	66
Bluegill	54	67
Brown trout	60	297
Creek chub	45	176
Fallfish	65	225
Green sunfish	53	85
Largemouth bass	50	
Longnose dace	54	106
Tessellated darter	45	64
White sucker	33	270

Table 14. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 1 in Walker Run on November 8, 2007.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		5	5	0.4	0.4
CRUSTACEA		2		0.1	
	Amphipoda		1		0.1
	Cambarus		1		0.1
PLECOPTERA		5		0.4	
	Allocapnia		4		0.3
	Taeniopteryx		1		0.1
EPHEMEROPTERA		86		6.4	
	Acerpenna		12		0.9
	Eurylophella		14		1.0
	Paraleptophlebia		6		0.4
	Stenonema		54		4.0
TRICHOPTERA		74		5.5	
	Cheumatopsyche		58		4.3
	Chimarra		1		0.1
	Hydatophylax		8		0.6
	Hydropsyche		4		0.3
	Neophylax		2		0.1
	Nyctiophylax		1		0.1
COLEOPTERA		136		10.1	
	Anchytarsus		1		0.1
	Dubiraphia		111		8.2
	Ectopria		1		0.1
	Helichus		1		0.1
	Optioservus		6		0.4
	Oulimnius		5		0.4
	Promoresia		5		0.4
	Stenelmis		6		0.4
DIPTERA		985		73.0	
	Alluaudomyia		7		0.5
	Antocha		7		0.5
	Bezzia		7		0.5
	Chelifera		2		0.1
	Chironomidae		847		62.8

Table 14. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
DIPTERA (continued)					
	Chrysops		11		0.8
	Culicoides		7		0.5
	Dicranota		2		0.1
	Hemerodromia		2		0.1
	Hexatoma		5		0.4
	Probezzia		8		0.6
	Prosimulium		7		0.5
	Sphaeromias		73		5.4
MOLLUSCA		21		1.6	
	Ferrissia		7		0.5
	Physa		1		0.1
	Musculium		13		1.0
OTHER		35		2.6	
	Acariformes		16		1.2
	Nematoda		2		0.1
	Aeshnidae		2		0.1
	Calopterygidae		2		0.1
	Gomphidae		7		0.5
	Nigronia		4		0.3
	Sialis		2		0.1
TOTAL		1,349	1,349	100	100

Table 15. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 2 in Walker Run on November 8, 2007.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
CRUSTACEA					
	Cambarus	4	4	0.3	0.3
PLECOPTERA		30		2.6	
	Acroneuria		6		0.5
	Agnetina		1		0.1
	Leuctra		1		0.1
	Paracapnia		1		0.1
	Pteronarcys		1		0.1
	Sweltsa		12		1.0
	Taeniopteryx		8		0.7
EPHEMEROPTERA		390		33.6	
	Acentrella		1		0.1
	Baetis		1		0.1
	Acerpenna		6		0.5
	Ephemera		1		0.1
	Ephemerella		14		1.2
	Eurylophella		46		4.0
	Leptophlebia		1		0.1
	Paraleptophlebia		49		4.2
	Serratella		5		0.4
	Stenacron		1		0.1
	Stenonema		265		22.8
TRICHOPTERA		113		9.7	
	Cheumatopsyche		68		5.9
	Chimarra		25		2.2
	Dolophilodes		1		0.1
	Hydropsyche		2		0.2
	Lype		2		0.2
	Micrasema		4		0.3
	Neophylax		8		0.7
	Polycentropus		3		0.3
COLEOPTERA		364		31.4	
	Anchytarsus		16		1.4
	Dubiraphia		2		0.2
	Optioservus		67		5.8
	Oulimnius		239		20.6

Table 15. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
COLEOPTERA (continued)					
	Promoresia		34		2.9
	Stenelmis		6		0.5
DIPTERA		223		19.2	
	Antocha		8		0.7
	Chironomidae		172		14.8
	Dicranota		15		1.3
	Hemerodromia		2		0.2
	Palpomyia group		8		0.7
	Pericoma		1		0.1
	Pilaria		1		0.1
	Probezzia		1		0.1
	Prosimulium		14		1.2
	Tipula		1		0.1
MOLLUSCA		16		1.4	
	Ferrissia		2		0.2
	Physa		4		0.3
	Pisidium		10		0.9
OTHER					
	Prostoma	21	1	1.8	0.1
	Tricladida		1		0.1
	Aeshnidae		1		0.1
	Gomphidae		12		1.0
	Nigronia		5		0.4
	Sialis		1		0.1
TOTAL		1,161	1,161	100	100

Table 16. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 1 in Walker Run on April 7, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		38	38	2.5	2.5
CRUSTACEA		2		0.1	
	Cambarus		2		0.1
PLECOPTERA		6		0.4	
	Amphinemura		2		0.1
	Isoperla		1		0.1
	Leuctra		2		0.1
	Prostoia		1		0.1
EPHEMEROPTERA		329		21.8	
	Cingymula		8		0.5
	Epeorus		16		1.1
	Eurylophella		273		18.1
	Stenonema		32		2.1
TRICHOPTERA		53		3.5	
	Brachycentrus		1		0.1
	Cheumatopsyche		30		2.0
	Chimarra		1		0.1
	Hydropsyche		3		0.2
	Lepidostoma		1		0.1
	Neophylax		8		0.5
	Oecetis		1		0.1
	Pycnopsyche		7		0.5
	Rhyacophila		1		0.1
COLEOPTERA		44		2.9	
	Dubiraphia		28		1.9
	Helichus		1		0.1
	Optioservus		9		0.6
	Oulimnius		5		0.3
	Promoresia		1		0.1
DIPTERA		984		65.2	
	Antocha		2		0.1
	Bezzia		1		0.1
	Chironomidae		752		49.8
	Chrysops		1		0.1
	Dicranota		3		0.2

Table 16. Continued

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
DIPTERA (continued)					
	Pilaria		1		0.1
	Probezzia		4		0.3
	Prosimulium		162		10.7
	Sphaeromias		7		0.5
	Stegopterna		48		3.2
	Tipula		3		0.2
MOLLUSCA		31		2.1	
	Ferrissia		1		0.1
	Physa		3		0.2
	Musculium		15		1.0
	Pisidium		12		0.8
OTHER		23		1.5	
	Acariformes		5		0.3
	Nematoda		8		0.5
	Aeshnidae		1		0.1
	Gomphidae		6		0.4
	Nigronia		3		0.2
TOTAL		1,510	1,510	100	100

Table 17. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 2 in Walker Run on April 7, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		15	15	0.4	0.4
CRUSTACEA		2		0.1	
	Amphipoda		1		<0.1
	Cambarus		1		<0.1
PLECOPTERA		38		1.0	
	Acroneuria		11		0.3
	Amphinemura		8		0.2
	Leuctra		8		0.2
	Isoperla		10		0.3
	Pteronarcys		1		<0.1
EPHEMEROPTERA		766		20.3	
	Baetis		117		3.1
	Cinygmula		136		3.6
	Ephemerella		234		6.2
	Epeorus		198		5.3
	Isonychia		9		0.2
	Stenonema		27		0.7
	Serratella		45		1.2
TRICHOPTERA		42		1.1	
	Cheumatopsyche		6		0.2
	Chimarra		15		0.4
	Diplectrona		2		0.1
	Hydropsyche		7		0.2
	Leucotrichia		1		<0.1
	Lype		1		<0.1
	Neophylax		4		0.1
	Polycentropus		1		<0.1
	Rhyacophila		5		0.1
COLEOPTERA		594		15.8	
	Anchytarsus		3		0.1
	Curculionidae		1		<0.1
	Optioservus		84		2.2
	Oulimnius		434		11.5
	Promoresia		72		1.9

Table 17. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
DIPTERA		2,259		60.0	
	Antocha		1		<0.1
	Chironomidae		228		6.1
	Clinocera		2		0.1
	Dicranota		2		0.1
	Pilaria		1		<0.1
	Prosimulium		2,024		53.8
	Tipula		1		<0.1
MOLLUSCA		12		0.3	
	Pisidium		8		0.2
	Sphaerium		4		0.1
OTHER		37		1.0	
	Acariformes		1		<0.1
	Nematoda		1		<0.1
	Cordulegastridae		8		0.2
	Gomphidae		24		0.6
	Nigronia		3		0.1
TOTAL		3,765	3,765	100	100.0

Table 18. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 4 in Walker Run on April 8, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		71	71	2.9	2.9
CRUSTACEA		23		0.9	
	Amphipoda		23		0.9
PLECOPTERA		8		0.3	
	Amphinemura		8		0.3
EPHEMEROPTERA		368		14.8	
	Cinygmula		8		0.3
	Ephemerella		272		11.0
	Epeorus		24		1.0
	Eurylophella		8		0.3
	Stenonema		56		2.3
TRICHOPTERA		132		5.3	
	Cheumatopsyche		88		3.5
	Chimarra		8		0.3
	Diplectrona		1		<0.1
	Hydropsyche		23		0.9
	Micrasema		2		0.1
	Neophylax		1		<0.1
	Psychomyia		9		0.4
COLEOPTERA		55		2.2	
	Anchytarsus		5		0.2
	Hydrobius		1		<0.1
	Optioservus		3		0.1
	Oulimnius		15		0.6
	Promoresia		8		0.3
	Stenelmis		23		0.9
DIPTERA		1,804		72.7	
	Antocha		20		0.8
	Chelifera		6		0.2
	Chironomidae		1,228		49.5
	Clinocera		7		0.3
	Dasyhelea		2		0.1
	Prosimulium		530		21.4
	Sphaeromias		3		0.1
	Stegopterna		8		0.3
MOLLUSCA		5		0.2	
	Pisidium		5		0.2

Table 18. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OTHER		15		0.6	
	Acariformes		4		0.2
	Nematoda		4		0.2
	Aeshnidae		1		<0.1
	Gomphidae		3		0.1
	Sialis		3		0.1
TOTAL		2,481	2,481	100	100

Table 19. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 5 in Walker Run on April 8, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
CRUSTACEA		1		<0.1	
	Cambarus		1		<0.1
PLECOPTERA		2		<0.1	
	Amphinemura		2		<0.1
EPHEMEROPTERA		288		3.9	
	Ephemerella		288		3.9
TRICHOPTERA		76		1.0	
	Cheumatopsyche		14		0.2
	Chimarra		23		0.3
	Hydropsyche		14		0.2
	Micrasema		3		<0.1
	Neophylax		19		0.3
	Polycentropus		1		<0.1
	Rhyacophila		2		<0.1
COLEOPTERA		17		0.2	
	Ectopria		1		
	Optioservus		6		0.1
	Oulimnius		5		0.1
	Promoresia		3		<0.1
	Stenelmis		2		<0.1
DIPTERA		6,634		88.8	
	Antocha		2		<0.1
	Chironomidae		356		4.8
	Clinocera		2		<0.1
	Dicranota		1		<0.1
	Hemerodromia		1		<0.1
	Prosimulium		6,272		83.9
MOLLUSCA		4		0.1	
	Pisidium		4		0.1
OTHER		450		6.0	
	Nematoda		449		6.0
	Nigronia		1		<0.1
TOTAL		7,472	7,472	100	100

Table 20. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 1 in Walker Run on July 14, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		4	4	0.3	0.3
CRUSTACEA		2		0.2	
	Cambarus		1		0.1
	Stygobromis		1		0.1
PLECOPTERA		38		3.1	
	Acroneuria		5		0.4
	Leuctra		30		2.4
	Sweltsa		3		0.2
EPHEMEROPTERA		30		2.4	
	Leptophlebiidae		1		0.1
	Eurylophella		6		0.5
	Serratella		1		0.1
	Stenonema		22		1.8
TRICHOPTERA		284		23.0	
	Brachycentrus		12		1.0
	Cheumatopsyche		165		13.4
	Chimarra		13		1.1
	Hydropsyche		56		4.5
	Hydroptila		38		3.1
COLEOPTERA		210		17.0	
	Anchytarsus		1		0.1
	Ectopria		4		0.3
	Optioservus		66		5.4
	Oulimnius		9		0.7
	Promoresia		71		5.8
	Stenelmis		59		4.8
DIPTERA		546		44.3	
	Antocha		4		0.3
	Bezzia		1		0.1
	Chironomidae		516		41.8
	Dicranota		21		1.7
	Tipula		4		0.3
MOLLUSCA		8		0.6	
	Ferrissia		4		0.3
	Pisidium		4		0.3

Table 20. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OTHER		111		9.0	
	Acariformes		27		2.2
	Argia		26		2.1
	Boyeria		1		0.1
	Nigronia		18		1.5
	Prostoma		4		0.3
	Sialis		2		0.2
	Stylogomphus		4		0.3
	Veliidae		29		2.4
TOTAL		1,233	1,233	100	100

Table 21. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 2 in Walker Run on July 15, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		19	19	2.8	2.8
CRUSTACEA		3		0.4	
	Cambarus		3		0.4
PLECOPTERA		50		7.3	
	Acroneuria		5		0.7
	Leuctra		42		6.1
	Nemouridae		1		0.1
	Sweltsa		2		0.3
EPHEMEROPTERA		137		19.9	
	Baetis		86		12.5
	Leptophlebiidae		4		0.6
	Eurylophella		15		2.2
	Serratella		3		0.4
	Stenacron		1		0.1
	Stenonema		28		4.1
TRICHOPTERA		41		6.0	
	Cheumatopsyche		27		3.9
	Chimarra		4		0.6
	Hydropsyche		10		1.5
COLEOPTERA		93		13.5	
	Optioservus		57		8.3
	Oulimnius		24		3.5
	Promoresia		6		0.9
	Stenelmis		6		0.9
DIPTERA		289		41.9	
	Antocha		1		0.1
	Chironomidae		272		39.5
	Dicranota		4		0.6
	Hemerodromia		4		0.6
	Probezzia		1		0.1
	Simulium		7		1.0
MOLLUSCA		23		3.3	
	Ferrissia		2		0.3
	Pisidium		21		3.0

Table 21. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OTHER		34		4.9	
	Acariformes		9		1.3
	Nematoda		4		0.6
	Nigronia		4		0.6
	Stylogomphus		17		2.5
TOTAL		689	689	100	100

Table 22. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 4 in Walker Run on July 14, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		36	36	2.0	2.0
CRUSTACEA		57		3.2	
	Cambarus		1		0.1
	Gammarus		56		3.1
PLECOPTERA		6		0.3	
	Acroneuria		1		0.1
	Leuctra		5		0.3
EPHEMEROPTERA		118		6.6	
	Leptophlebiidae		1		0.1
	Baetis		55		3.1
	Eurylophella		1		0.1
	Stenacron		3		0.2
	Stenonema		58		3.2
TRICHOPTERA		846		47.1	
	Cheumatopsyche		533		29.7
	Chimarra		81		4.5
	Hydropsyche		200		11.1
	Hydroptila		16		0.9
	Psychomyia		16		0.9
COLEOPTERA		292		16.3	
	Ectopria		19		1.1
	Macronychus		4		0.2
	Optioservus		71		4.0
	Oulimnius		9		0.5
	Promoresia		46		2.6
	Stenelmis		143		8.0
DIPTERA		408		22.7	
	Antocha		15		0.8
	Chironomidae		348		19.4
	Dicranota		10		0.6
	Hemerodromia		2		0.1
	Hexatoma		1		0.1
	Limonia		3		0.2
	Simulium		26		1.4
	Tipula		3		0.2

Table 22. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
MOLLUSCA		10		0.6	
	Ferrissia		5		0.3
	Pisidium		5		0.3
OTHER		23		1.3	
	Acariformes		8		0.4
	Nigronia		2		0.1
	Nematoda		1		0.1
	Sialis		1		0.1
	Veliidae		11		0.6
TOTAL		1,796	1,796	100	100

Table 23. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 5 in Walker Run on July 14, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		2	2	0.3	0.3
CRUSTACEA		3		0.4	
	Cambarus		2		0.3
	Gammarus		1		0.1
PLECOPTERA		22		2.8	
	Acroneuria		18		2.3
	Leuctra		4		0.5
EPHEMEROPTERA		131		16.9	
	Baetis		32		4.1
	Isonychia		30		3.9
	Leptophlebiidae		1		0.1
	Leucrocuta		1		0.1
	Stenonema		49		6.3
	Stenacron		18		2.3
TRICHOPTERA		341		44.1	
	Cheumatopsyche		118		15.2
	Chimarra		193		24.9
	Dolophilodes		8		1.0
	Hydropsyche		13		1.7
	Psychomyia		8		1.0
	Rhyacophila		1		0.1
COLEOPTERA		74		9.6	
	Ectopria		8		1.0
	Macronychus		1		0.1
	Optioservus		18		2.3
	Promoresia		2		
	Psephenus		21		2.7
	Stenelmis		24		3.1
DIPTERA		191		24.7	
	Antocha		8		1.0
	Atrichopogon		1		0.1
	Chironomidae		178		23.0
	Dicranota		1		0.1

Table 23. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
DIPTERA (continued)					
	Molophilus		1		0.1
	Tipula		2		0.3
MOLLUSCA		3		0.4	
	Ferrissia		3		0.4
OTHER		7		0.9	
	Argia		1		0.1
	Sialis		1		0.1
	Veliidae		5		0.6
TOTAL		774	774	100	100

Table 24. Number and percent composition of benthic macroinvertebrates collected with a kick net at Station 6 in Walker Run on July 15, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		10	10	0.4	0.4
CRUSTACEA		15		0.5	
	Cambarus				0.0
	Gammarus		15		0.5
PLECOPTERA		192		7.0	
	Acroneuria		24		0.9
	Leuctra		144		5.2
	Sweltsa		24		0.9
EPHEMEROPTERA		928		33.7	
	Leptophlebiidae		16		0.6
	Acentrella		32		1.2
	Baetis		656		23.8
	Eurylophella		16		0.6
	Serratella		112		4.1
	Stenonema		96		3.5
TRICHOPTERA		556		20.2	
	Cheumatopsyche		280		10.2
	Dolophilodes		11		0.4
	Hydropsyche		264		9.6
	Neophylax		1		0.0
COLEOPTERA		232		8.4	
	Helichus		24		0.9
	Optioservus		114		4.1
	Oulimnius		63		2.3
	Psephenus		6		0.2
	Promoresia		3		0.1
	Stenelmis		22		0.8
DIPTERA		808		29.3	
	Antocha		17		0.6
	Chironomidae		656		23.8
	Chelifera		8		0.3
	Dicranota		82		3.0
	Hemerodromia		17		0.6
	Hexatoma		13		0.5
	Probezzia		8		0.3

Table 24. Continued.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
DIPTERA (continued)					
	Simulium		5		0.2
	Tipula		2		0.1
OTHER		14		0.5	
	Acariformes		2		0.1
	Boyeria		1		0.0
	Nigronia		2		0.1
	Stylogomphus		9		0.3
TOTAL		2,755	2,755	100	100

Table 25. Number and percent composition of benthic macroinvertebrates collected with a kick net in Unnamed Tributary 2 on July 16, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		19	19	0.2	0.2
CRUSTACEA		7,824		95.9	
	Cambarus		4		0.0
	Gammarus		7,820		95.8
EPHEMEROPTERA		27		0.3	
	Baetis		27		0.3
COLEOPTERA		83		1.0	
	Optioservus		47		0.6
	Oulimnius		34		0.4
	Tropisternus		2		0.0
DIPTERA		206		2.5	
	Chironomidae		170		2.1
	Chrysops		1		0.0
	Dicranota		2		0.0
	Dixa		10		0.1
	Ephydridae		5		0.1
	Limonia		9		0.1
	Simulium		9		0.1
OTHER		2		0.0	
	Dugesia		1		0.0
	Nematoda		1		0.0
TOTAL		8,161	8,161	100	100

Table 26. Number and percent composition of benthic macroinvertebrates collected with a kick net in Unnamed Tributary 3 on July 16, 2008.

Group	Taxon	Total Number		Percent of Total	
		Group	Taxon	Group	Taxon
OLIGOCHAETA		5	5	1.1	1.1
CRUSTACEA		7		1.6	
	Crangonyx		7		1.6
PLECOPTERA		1		0.2	
	Leuctra		1		0.2
EPHEMEROPTERA		20		4.5	
	Baetis		2		0.5
	Leptophlebiidae		13		2.9
	Stenonema		5		1.1
TRICHOPTERA		63		14.2	
	Cheumatopsyche		1		0.2
	Diplectrona		62		14.0
DIPTERA		326		73.4	
	Chironomidae		232		52.3
	Dicranota		88		19.8
	Pseudolimnophila		1		0.2
	Tipula		5		1.1
MOLLUSCA		15		3.4	
	Corbicula		1		0.2
	Pisidium		8		1.8
	Physella		6		1.4
OTHER		7		1.6	
	Gerridae		4		0.9
	Sialis		3		0.7
TOTAL		444	444	100	100

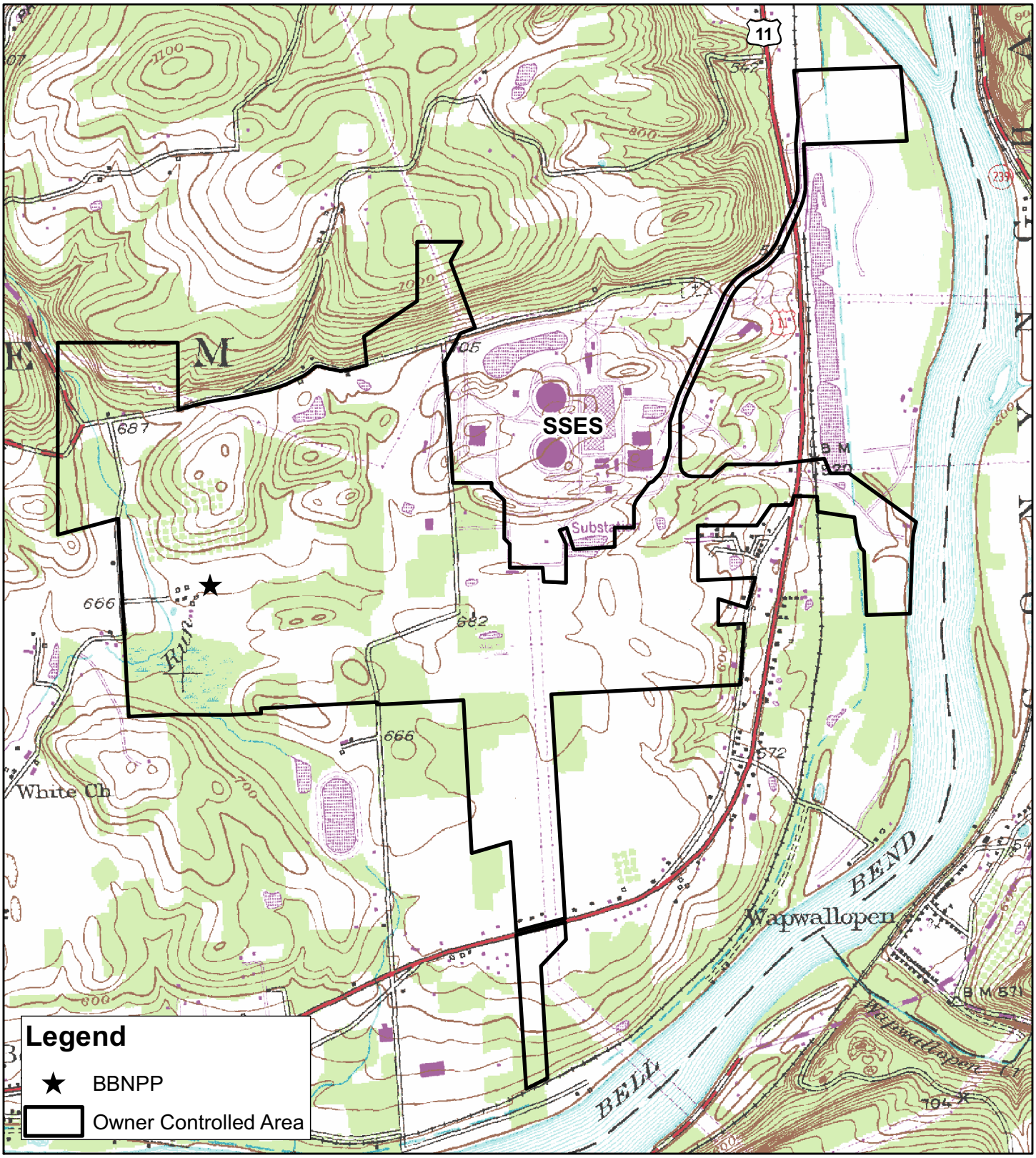

Figure 1.
Location of Proposed BBNPP.

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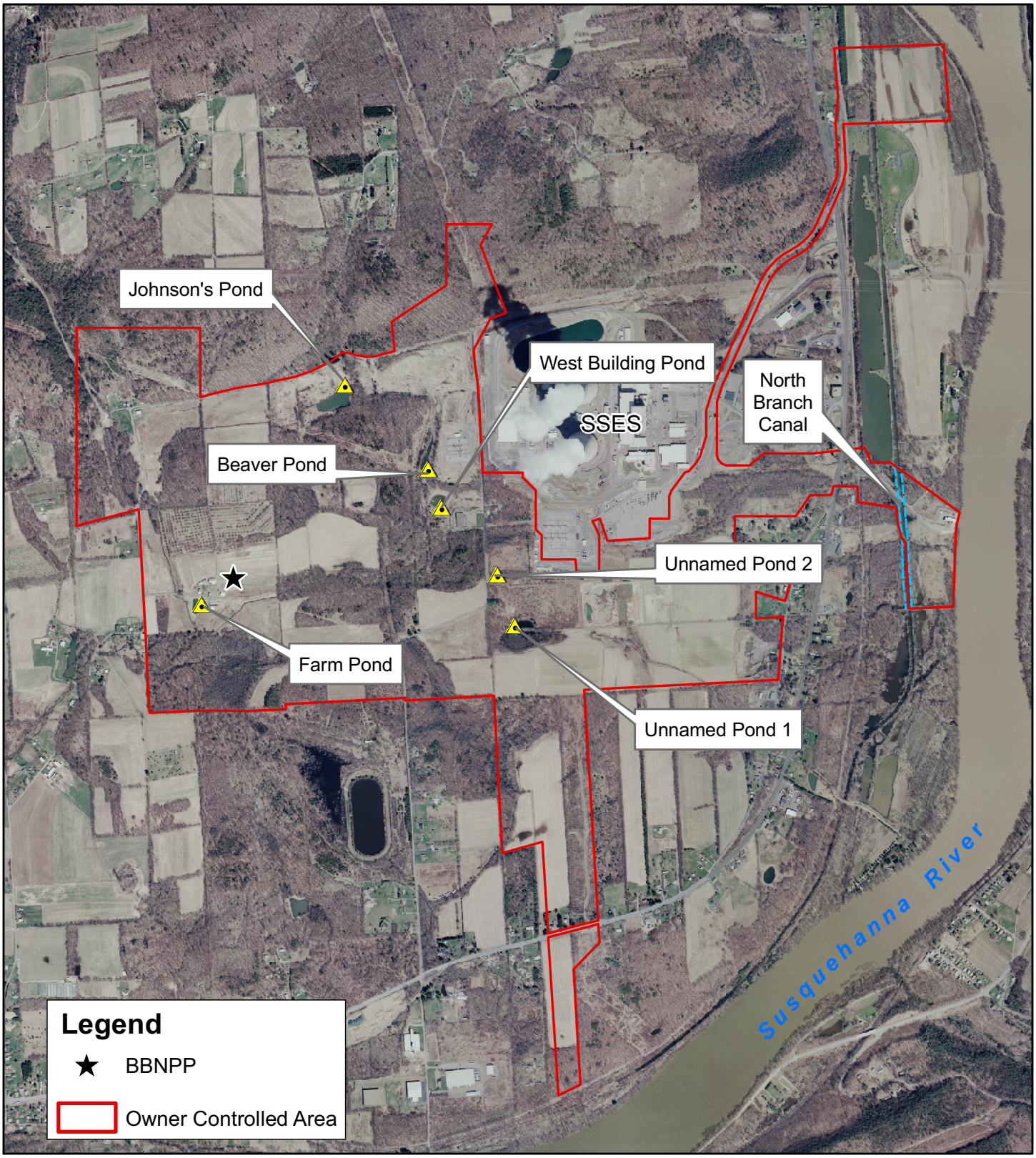
ENVIRONMENTAL CONSULTANTS
400 Old Reading Pike, Bldg A, Suite 101 Stowe, PA 19464

date: 09/11/08
project: 21159.004
prepared by: s.sherman

checked by: b.lees
project name: Bell Bend
file name: Fig1.BBNPP_Site_USGS



PAMAP Color Orthophoto of PA, 2005

0.4 0.2 0 0.4 Miles

Figure 2.
Location of the pond and North Branch Canal biota collection stations.

N

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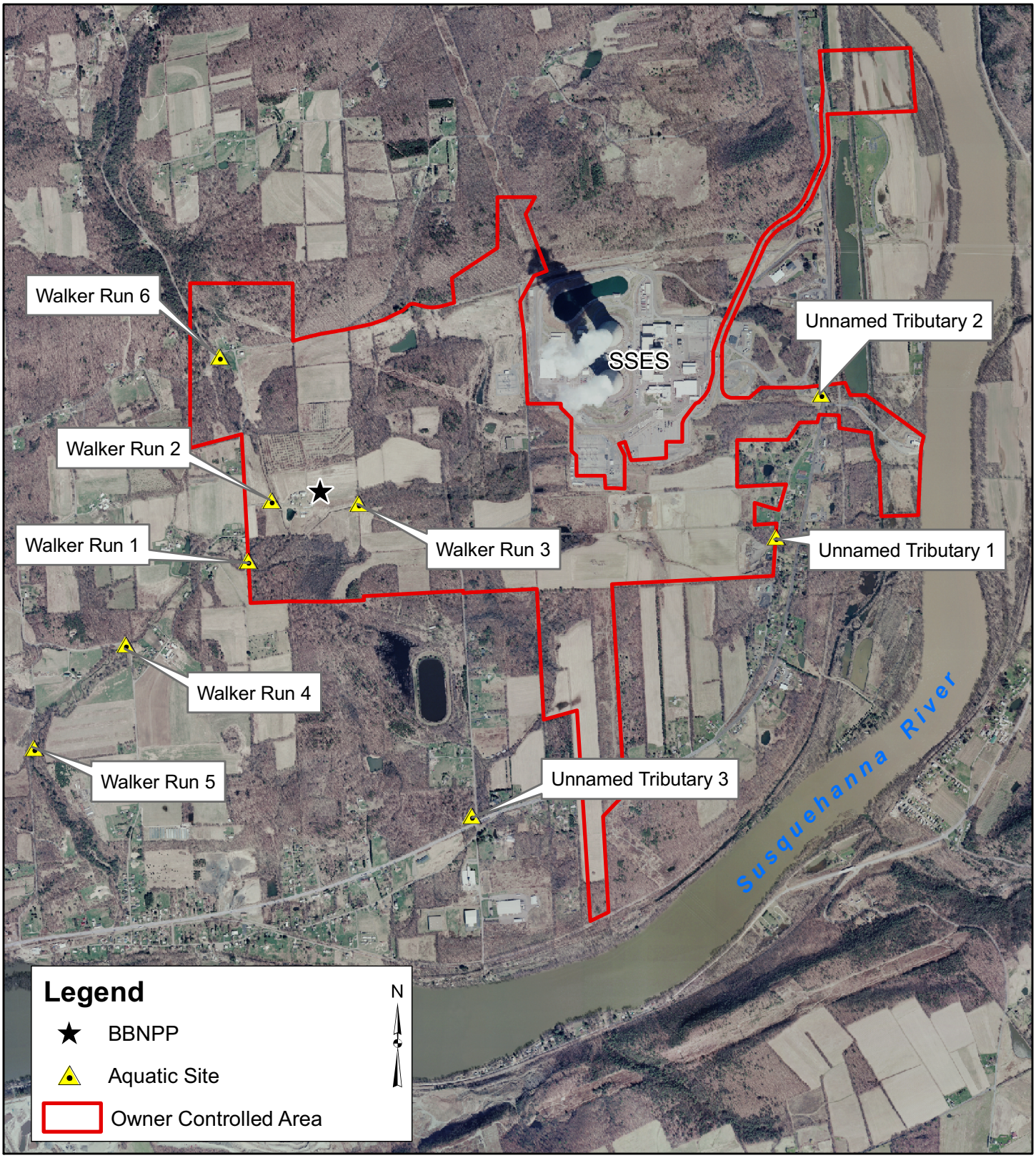
project name: Bell Bend
file name: Fig2.BBNPP_PondsandCanal



PAMAP Color Orthophoto of PA, 2005

0.5 0.25 0 0.5 Miles

Figure 3.
Location of biota sample stations on Walker Run and unnamed tributaries.

N

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project name: Bell Bend
file name: Fig3.BBNPP_StreamSamples