



# Cost and Benefits of Buffer Zones

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# What is Spring Creek?

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- A high-quality - coldwater and migratory fishery that runs through Central PA
- Noted for its environmental, economic, and social impacts to the area
- Cleanliness and overall quality

Association and its visitors



/watershed

# Riparian Buffers on Spring Creek

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Riparian buffers are designed to maintain or restore streamside land in its natural vegetated state, in order to take advantage of the benefits that a forest's biological processes can provide to the stream's habitat.

College Township - No development within 100 feet of a perennial stream or within 50 feet of an intermittent stream

Ferguson Township - The Riparian Buffer shall extend a minimum total width of 100 feet from each edge of any perennial watercourse or surface water body, or shall equal the extent of the 100-year floodplain, whichever is greater.

# Benefits of Buffer Zones

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## Environmental protection

Runoff

Erosion

## Water quality

Preserve aquatic life

Social/economic benefits

# Costs of Buffer Zones

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**Maintenance by municipality**

Invasive species

**Short term costs**

Initial

**Land taken out of production**

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# BIOLOGICAL BENEFITS

# Why is Maintaining Water Quality Important?

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*We looked at...*

**Temperature**

**pH**

# Temperature

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**Cold Water Trout Thrive 40-60 Degrees**

(Not Accounting for Individual Species)

**Natural Variation in Temperature Occurs**

(Impervious Surface RunOff, Climate, Weather, etc.)

**Fish, insects, zooplankton, and other aquatic species all have a preferred temperature range**



# How does the buffer zone play a role?

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**Natural Ecology Provides Shade → Lower Temp for Ecology**



# Why is pH Important?

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Natural Stream pH should be between 6.5 and 8.5.

The pH of water determines the solubility (amount that can be dissolved in the water)

Biological availability (amount that can be utilized by aquatic life) of chemical components such as nutrients (e.g., phosphorus, nitrogen, and carbon)

# Buffer Zone & pH

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- Light & Carbon Dioxide → Plant Produces Oxygen
  - Carbon Lowers → Decreases Acidity = Increased pH
  - Dead Plants Release Ammonia/Nitrogen → More Carbon --> Decrease pH
  - Plants → Absorb Ammonia and Nitrogen (Prevent from Dropping)



# Water Quality

## (Nutrients & Physicochemical) 2009

Site Name	Abbrev	pH	Diss. Oxygen (mg/L)	Temperature (°C)	Conductivity (mS)	Nitrate-N (mg/L)	Orthophosphorus (mg/L) Total
Galbraith Gap Run	GGU	8.3	10.94	8.4	32.7	0.2	0.005*
Cedar Run - Lower	CEL	8.3	12.92	9.9	545.5	4.7	0.011*
Slab Cabin Run - Upper	SU	8.1	11.56	11.6	397.0	2.7	0.024*
Slab Cabin Run - Lower	SLL	7.9	13.34	10.5	516.6	2.3	0.014*
Slab Cabin Run - Millbrook	MIL	8.1	12.33	11.2	575.0	3.5	0.015
Thompson Run - Lower	THL	8.1	12.25	11.7	577.0	4.1	0.017
Buffalo Run - Upper	BUU	8.1	11.72	8.6	414.3	1.4	0.010*
Buffalo Run - Valley View	BVV	8.1	12.56	9.0	226.5	0.3	0.026
Buffalo Run - Lower	BUL	8.3	14.22	10.1	552.5	1.8	0.009*
Logan Branch - Upper	LOU	7.9	11.33	12.2	528.5	3.1	0.057
Logan Branch - Lower	LOL	8.0	11.68	10.5	387.2	3.2	0.017
Spring Creek - Upper	SPU	7.8	9.51	9.6	368.8	2.3	ND
Spring Creek - Houseville	SPH	8.3	13.26	10.1	466.3	3.2	0.013*
Spring Creek - Axemann	SPA	8.4	13.57	11.1	520.9	4.2	0.036
Spring Creek - Milesburg	SPM	8.4	13.18	11.1	518.8	3.5	0.033

Mean pH: 8.14 (Health Stream Environment Temp Here)

Mean Temp: 50.666 Degrees Fahrenheit (Healthy Temp)

## (Nutrient & Physicochemical) 2011

Site Name	Abbrev	pH	Diss. Oxygen (mg/L)	Temperature (°C)	Conductivity (mS)	Nitrate-N (mg/L)	Orthophosphorus (mg/L)
							Total
Galbraith Gap Run	GGU	7.9	10.61	11.2	37.3	0.09	0.008*
Cedar Run - Lower	CEL	8.3	10.93	11.8	559.0	4.37	0.012*
Slab Cabin Run - Upper	SLU	8.1	10.62	12.0	300.2	3.06	0.015
Slab Cabin Run - Lower	SLL	8.1	11.15	12.2	503.2	2.95	0.011
Slab Cabin Run - Millbrook	MIL	8.1	10.61	12.3	611.5	3.20	0.015
Thompson Run - Lower	THL	8.1	10.73	12.2	672.0	3.65	0.016*
Buffalo Run - Upper	BUU	8.2	10.63	12.5	577.5	1.09*	0.016*
Buffalo Run - Valley View	BVV	7.9	10.41	12.9	179.4	0.18	0.030
Buffalo Run - Lower	BUL	8.3	11.24	12.9	517.5	1.51	0.013*
Logan Branch - Upper	LOU	7.9	10.64	12.8	512.4	2.76*	0.028
Logan Branch - Lower	LOL	8.1	10.92	11.7	481.3	1.54	0.015*
Spring Creek - Upper	SPU	7.8	10.35	12.0	382.0	1.76	0.008*
Spring Creek - Houseville	SPH	8.3	10.48	12.3	540.5	2.92	0.011*

Mean pH: 7.006

Mean Temp: 51.0548 Fahrenheit

## (Nutrient & Physiochemical) 2013

Site Name	Abbrev	pH	Dissolved Oxygen (mg/L)	Temperature (°C)	Conductivity (mS)	Nitrate-N (mg/L)	Orthophosphorus (mg/L) Total
Galbraith Gap Run	GGU	6.7	11.3	7.5	39.1	0.10	0.007*
Cedar Run - Lower	CEL	8.2	10.6	11.0	554.0	4.50	0.005*
Slab Cabin Run - Upper	SLU	7.7	10.5	9.0	569.0	3.46	0.012*
Slab Cabin Run - Lower	SLL	8.0	12.0	10.6	678.0	2.49	0.005*
Slab Cabin Run - Millbrook	MIL	8.2	12.2	12.1	633.0	3.57	0.010*
Thompson Run - Lower	THL	8.1	11.3	11.8	671.0	3.82	0.011
Buffalo Run - Upper	BUU	8.0	12.4	6.7	622.5	1.20	ND
Buffalo Run - Valley View	BVV	7.6	12.2	9.0	348.5	0.20	0.023
Buffalo Run - Lower	BUL	8.3	11.8	9.6	513.5	1.55	ND
Logan Branch - Upper	LOU	7.7	11.2	11.3	586.0	3.01	0.044
Logan Branch - Lower	LOL	7.8	11.5	10.8	460.0	2.83	0.010
Spring Creek - Upper	SPU	7.5	10.0	10.2	505.0	2.55	0.009*
Spring Creek - Houserville	SPH	8.3	13.6	10.6	608.5	3.07	0.005*
Spring Creek - Axemann	SPA	8.3	12.0	10.7	625.5	3.58*	0.016
Spring Creek - Milesburg	SPM	8.5	12.2	11.6	536.0	2.90	0.012*

Mean pH: 7.94

Mean Temp: 50.288 Degrees Fahrenheit

# Other Biological Benefits

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Organic Inputs → Attract Insects → Fish Eat Them

Bats Forage for insects near creek

Fallen Branches Provide Hiding Spots For Fish

Trees like the river birch host butterflies

Traps Sediment

Recharges Ground Water

# Survey (Community without Water on Property)

- 1.) Are you aware of the riparian buffer zone ordinances in Centre County?
  - a. Yes b. No
- 2.) Do you believe that the riparian buffer zones aid in enhancing water quality?
  - a. Yes b. No
- 3.) On a scale of 1-4, how would you rate Spring Creek's water quality?
  1. (Poor) 2. (Poor to moderate) 3. (Moderate) 4. (Excellent)
- 4.) Would you like to see the Riparian Buffer Zones ordinances:
  - a. Changed b. Kept in place
- 4.) Do you fish at Spring Creek?
  - a. Yes b. No



# Survey (Cont.)

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## Survey (Water on Property)

1.) Are you aware of the riparian buffer zone ordinances in the Centre county?

a. Yes b. No

2.) If yes, do you believe that the riparian buffer zones aid in enhancing water quality?

a. Yes b. No

3.) On a scale of 1-4, how would you rate Spring Creek's water quality?

1. (Poor) 2. (Poor to moderate) 3. (Moderate) 4. (Excellent)

3.) Are you aware that you have a buffer zone ordinance on your property?

a. Yes b. No

# Cont.

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## *Include Standards:*

5.) Do you abide by the standards of the ordinance?

a. Yes b. No

6.) How do you feel about these buffer zone ordinances? Select all that apply

a. They're pointless b. They're inconvenient c. They're useful d. They're great

7.) Are you aware that if you voluntarily maintain a buffer zone on your property you are eligible for a tax deduction?

a. Yes b. No

8.) Would you be willing to upkeep the buffer zone on your property for a tax deduction?

a. Yes b. No

# Our idea - Education Plan

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**2 programs: Kids & Adults**

## **Kids**

**Why is Spring Creek important?**

**Brief history of Spring Creek**

**Less technical definition of buffer zones**

**Aquatic life**

**What can kids do to help?**

## **Adults**

# Importance of Education Program

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**Some are unaware of Spring Creek**

**Motivate all ages to act and preserve**

**Protection of buffer zone**

**Knowledge is contagious**

# Works Cited

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<http://www.springcreekwatershed.org/>

<http://fishandboat.com/>

<http://animals.mom.me/effect-aquarium-plants-ph-5049.html>

<http://extension.psu.edu/natural-resources/wildlife/habitat-management/pa-wildlife-16-riparian-buffers-for-wildlife>

<http://www.pacode.com/secure/data/025/chapter102/s102.14.html>