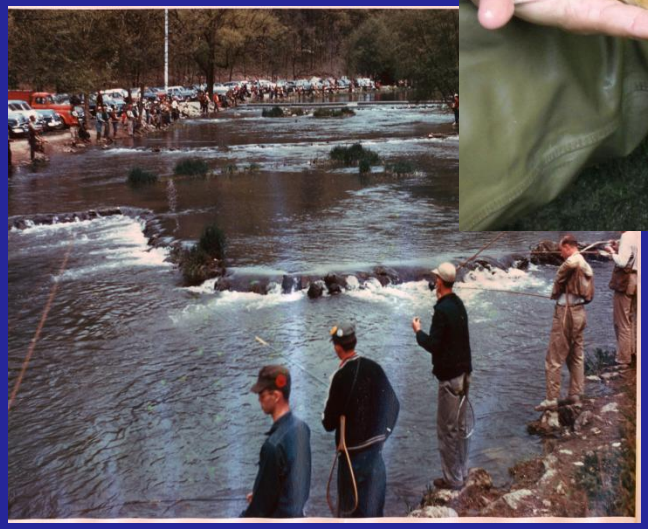
The Fishery of Spring Creek: A Watershed Under Siege

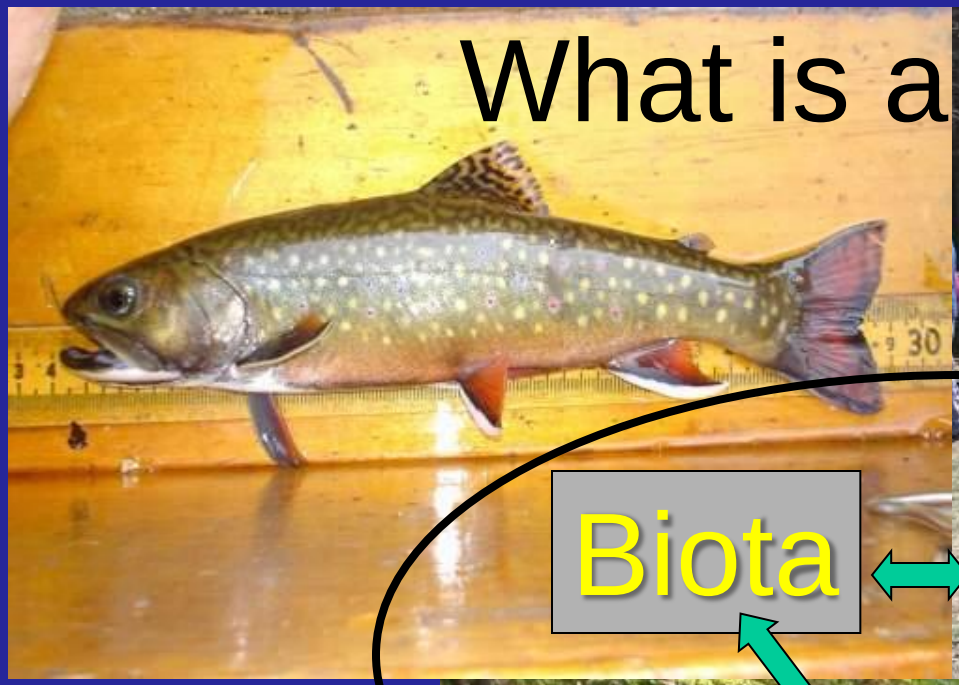


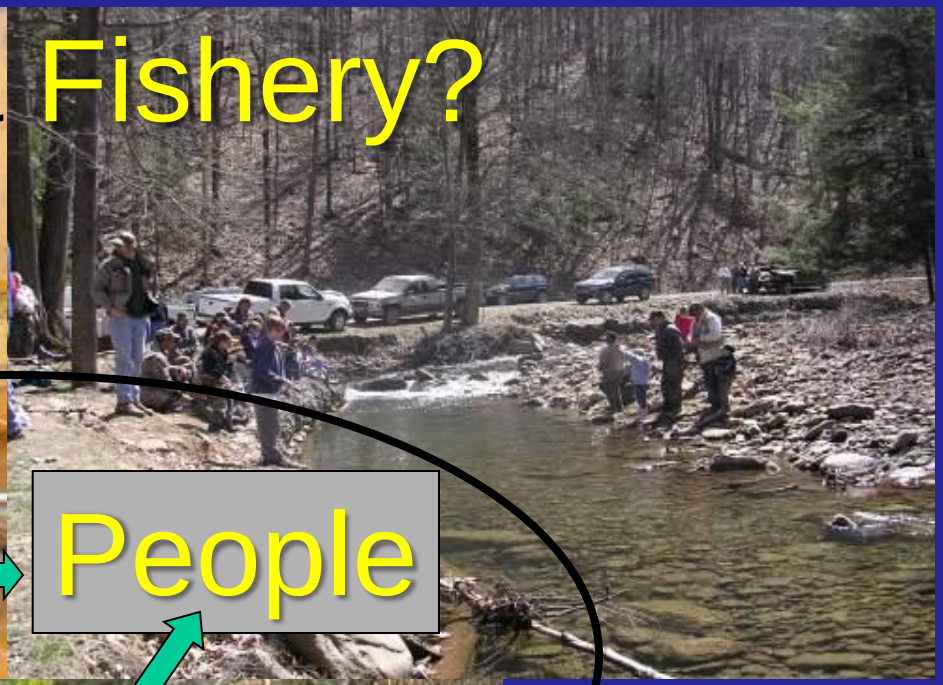
Coauthors

- Dr. Bob Carline – USGS Cooperative Fish and Wildlife Research Unit (retired)
- Becky Dunlap – Trout Unlimited
- Bruce Hollender – PA Fish and Boat Commission (retired)

Spring Creek 1969

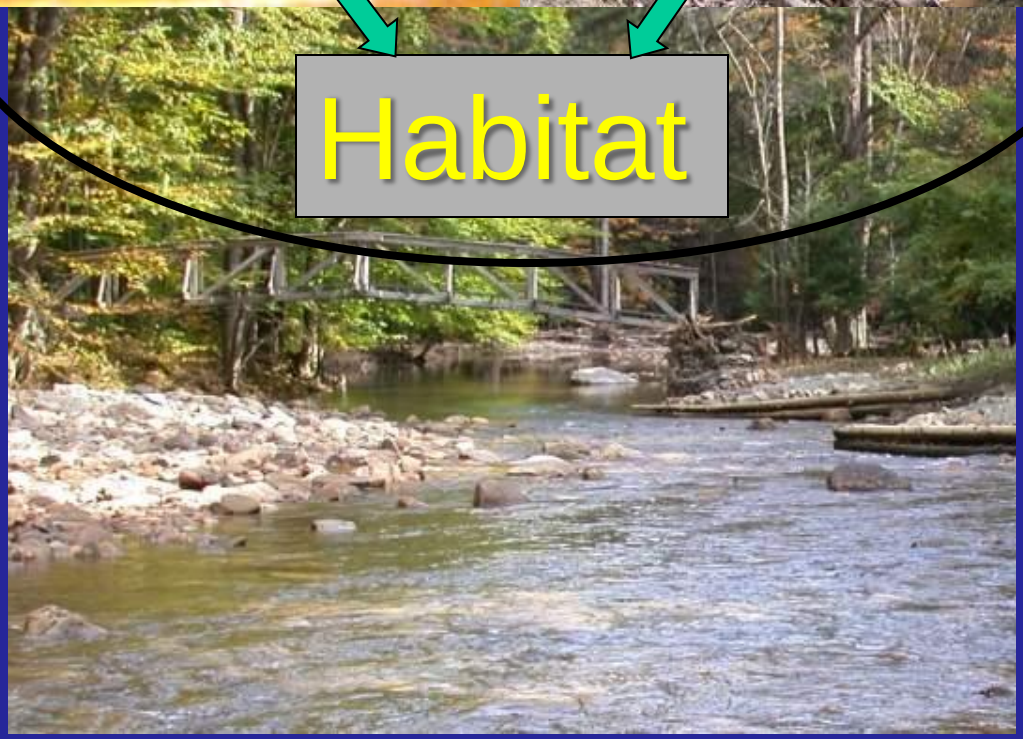
What is a Fishery?

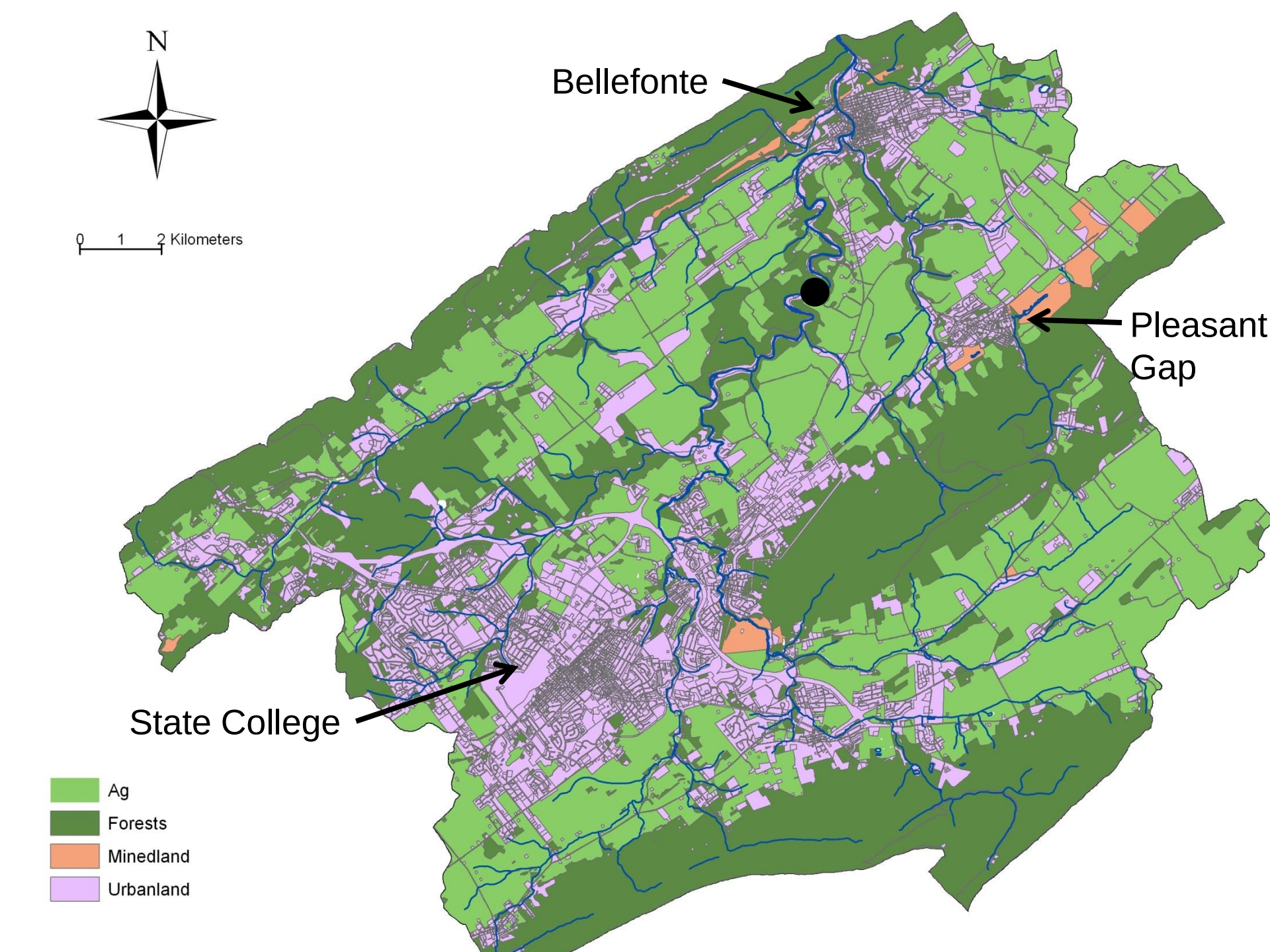




Biota ↔ People

Habitat




N
0 1 2 Kilometers
Bellefonte
Pleasant Gap
State College
Ag
Forests
Minedland
Urbanland

History of the Spring Creek Trout Fishery

- Historically, native brook trout
- Largely replaced by brown trout
- When did the replacement occur?

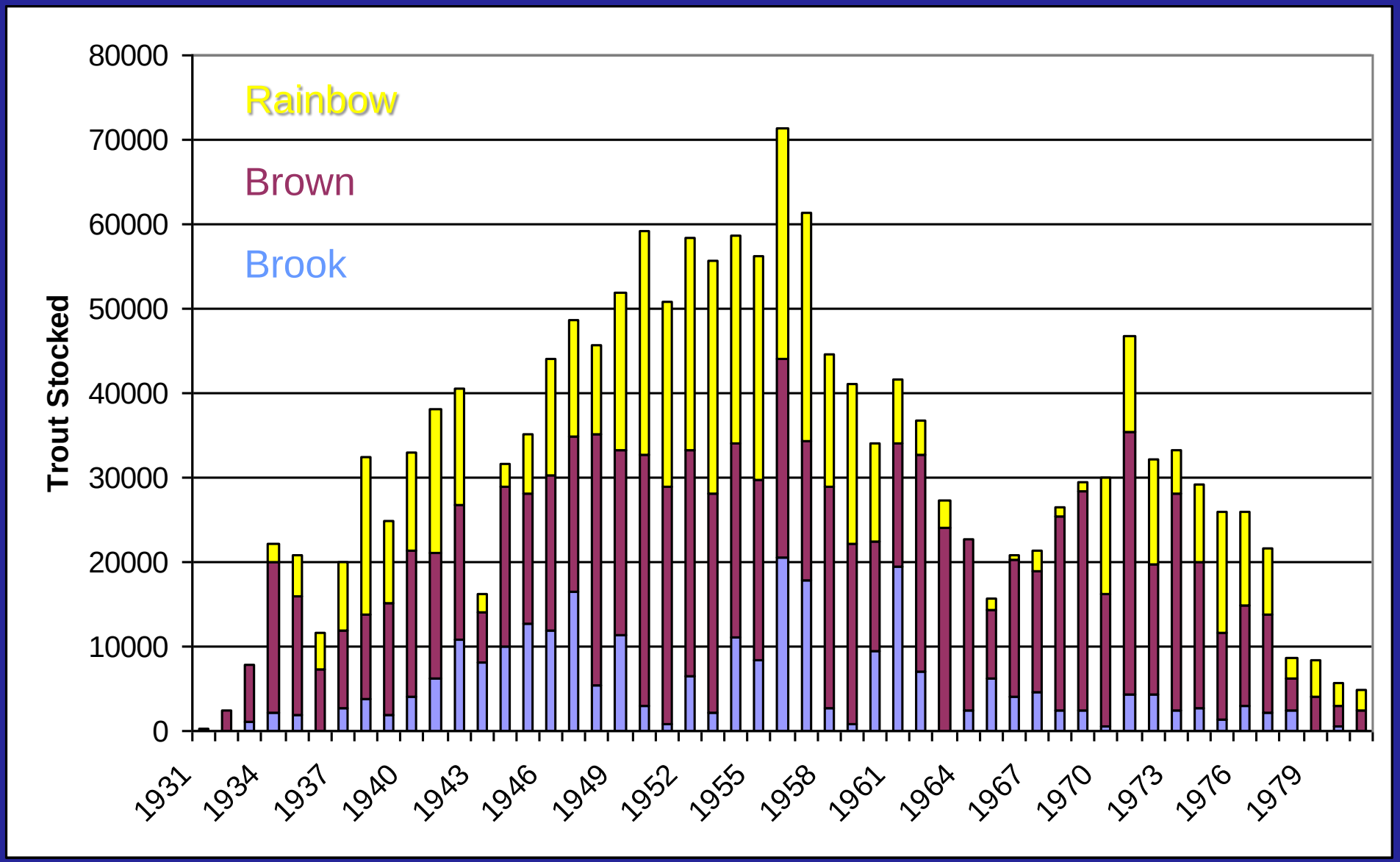
Theodore Gordon Fishes in Bellefonte

- Early 1870s excellent brook trout fishing
- In a 1915 letter, he states that brown trout have “taken possession” of the stream

Brown Trout Shipments to Watershed

- 1892-1898
- 23 shipments
- Axemann, Bellefonte, Houserville, Lemont, Pleasant Gap, Shingletown, State College

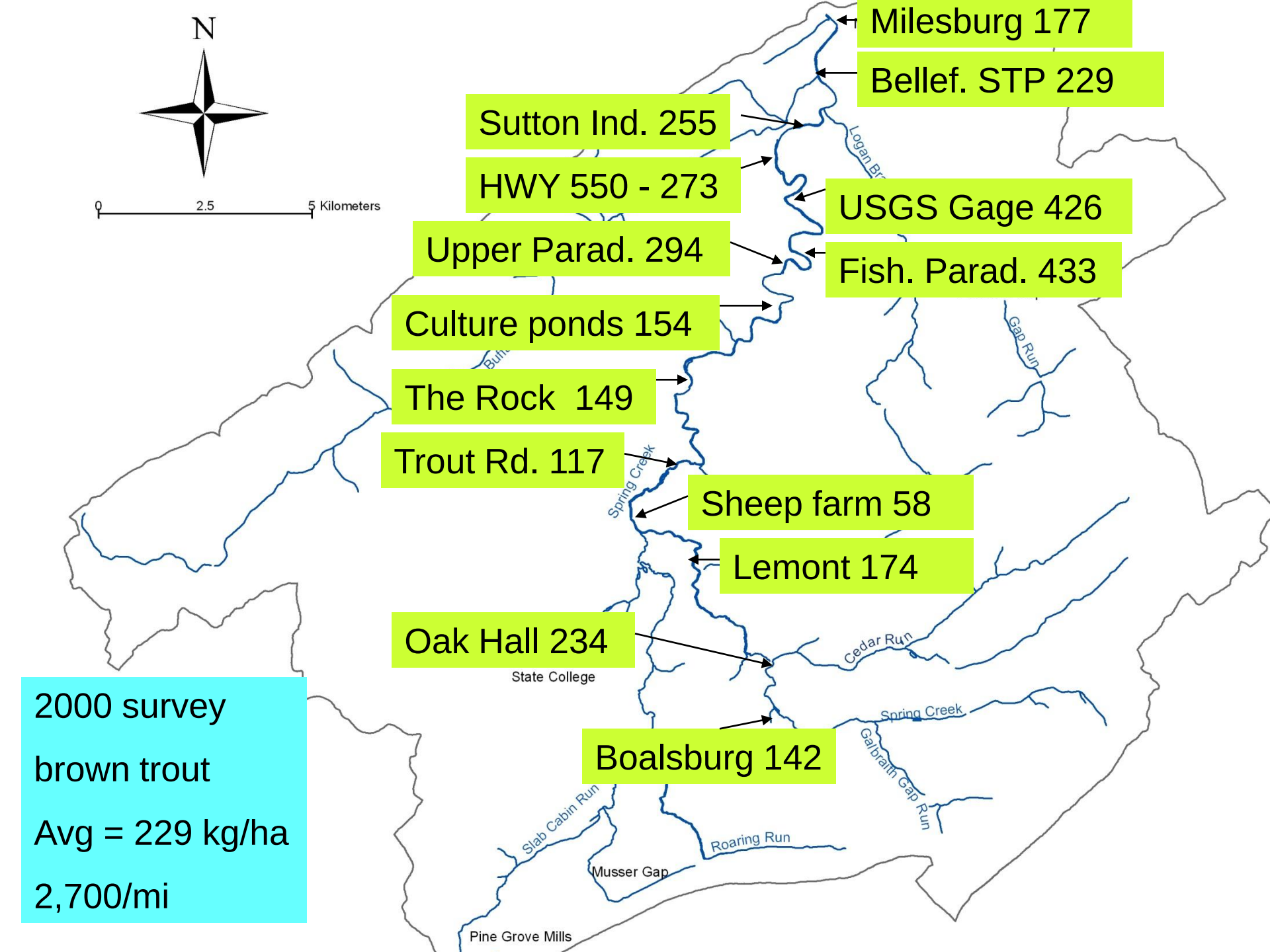
Spring Creek Trout Stocking

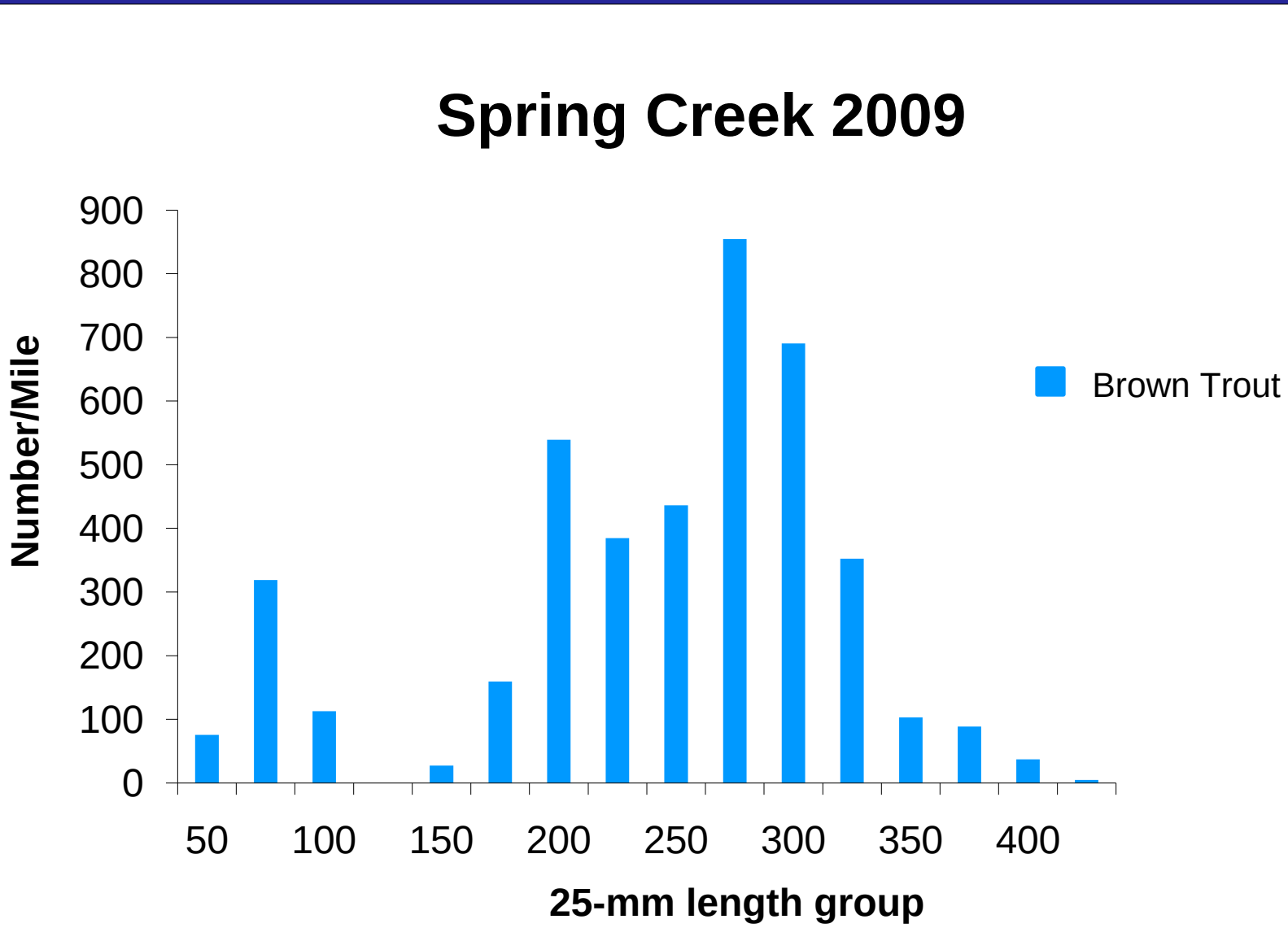


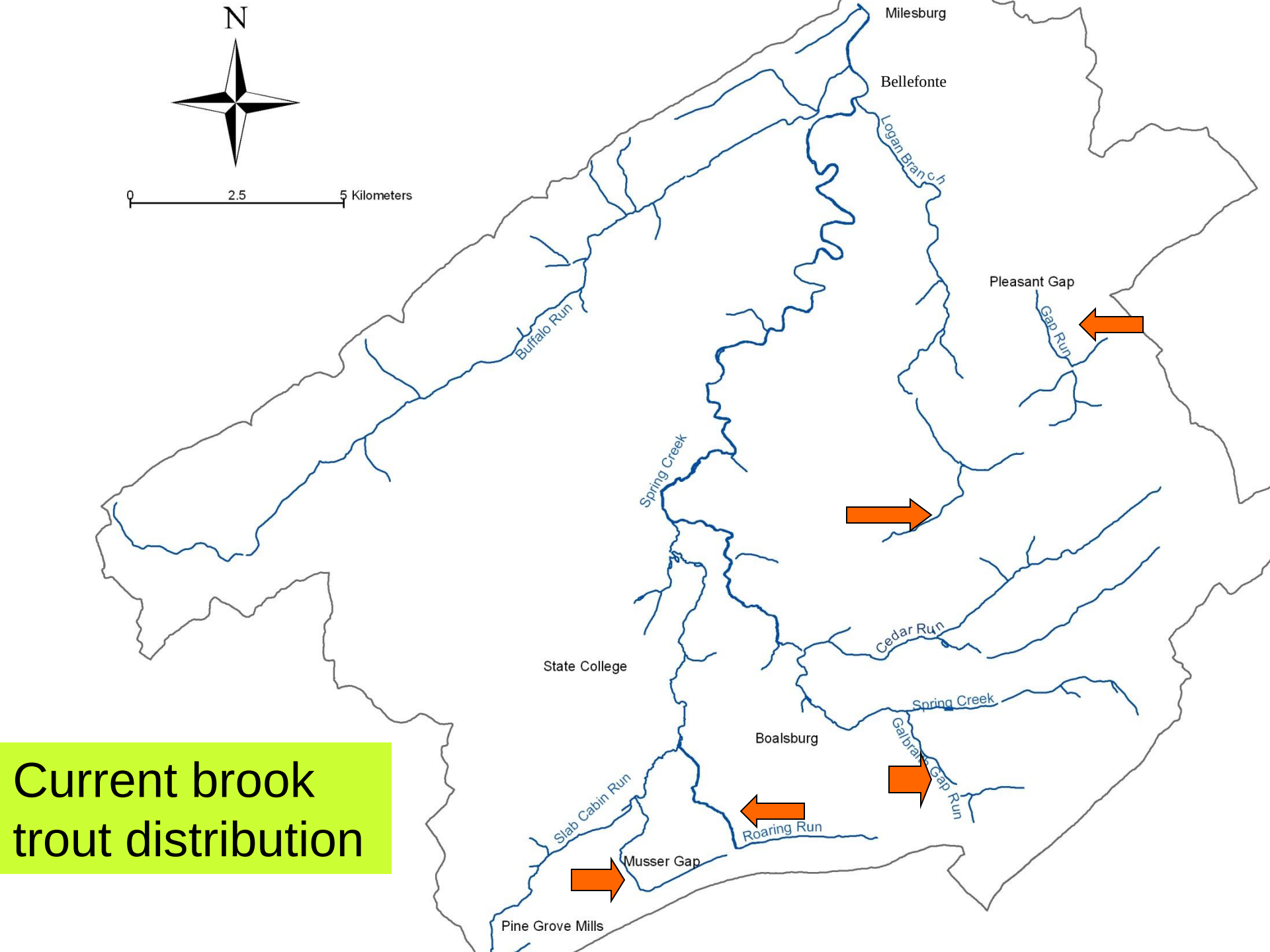
Wild Trout Management

- 1982 – present: wild trout management
- Kepone and Mirex pollution in 1960-70s resulted in stocking cessation and no harvest due to pollution regulations
- Spring Creek continues to be managed under catch and release regulations

Current Status of Fishery


N
0
2.5
5 Kilometers
Milesburg 177
Bellef. STP 229
Sutton Ind. 255
HWY 550 - 273
USGS Gage 426
Upper Parad. 294
Fish. Parad. 433
Culture ponds 154
The Rock 149
Trout Rd. 117
Sheep farm 58
Lemont 174
Oak Hall 234
Boalsburg 142
2000 survey
brown trout
Avg = 229 kg/ha
2,700/mi
Logan Br
Gap Run
Spring Creek
State College
Cedar Run
Spring Creek
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Pine Grove Mills


Spring Creek 2009
Number/Mile
900
800
700
600
500
400
300
200
100
0
50
100
150
200
250
300
350
400
25-mm length group
Brown Trout



Current brook trout distribution

Fishery Statistics

1988-89 vs 2006
April – June: Hours/mile

	Fisherman's Paradise	RT 550
1988-89	4,068	1,318
2006	8,146	6,989

*Trout caught an average of 5 times per year

Angler-hours/mile

2004 Statewide – opening day to SEP 3	239
2006 RT 550 – opening day to JUN 30	6,989
2006 Fisherman's Paradise – opening day to JUN 30	8,146

Economic Value

- Shafer et al. (1993) estimated economic revenue generated by angler use was $14,000/mile for the lower section and $71,000/mile for the middle section.

- 15 miles in length x $40,000/mile avg x an increase in angler use 2-4 fold =

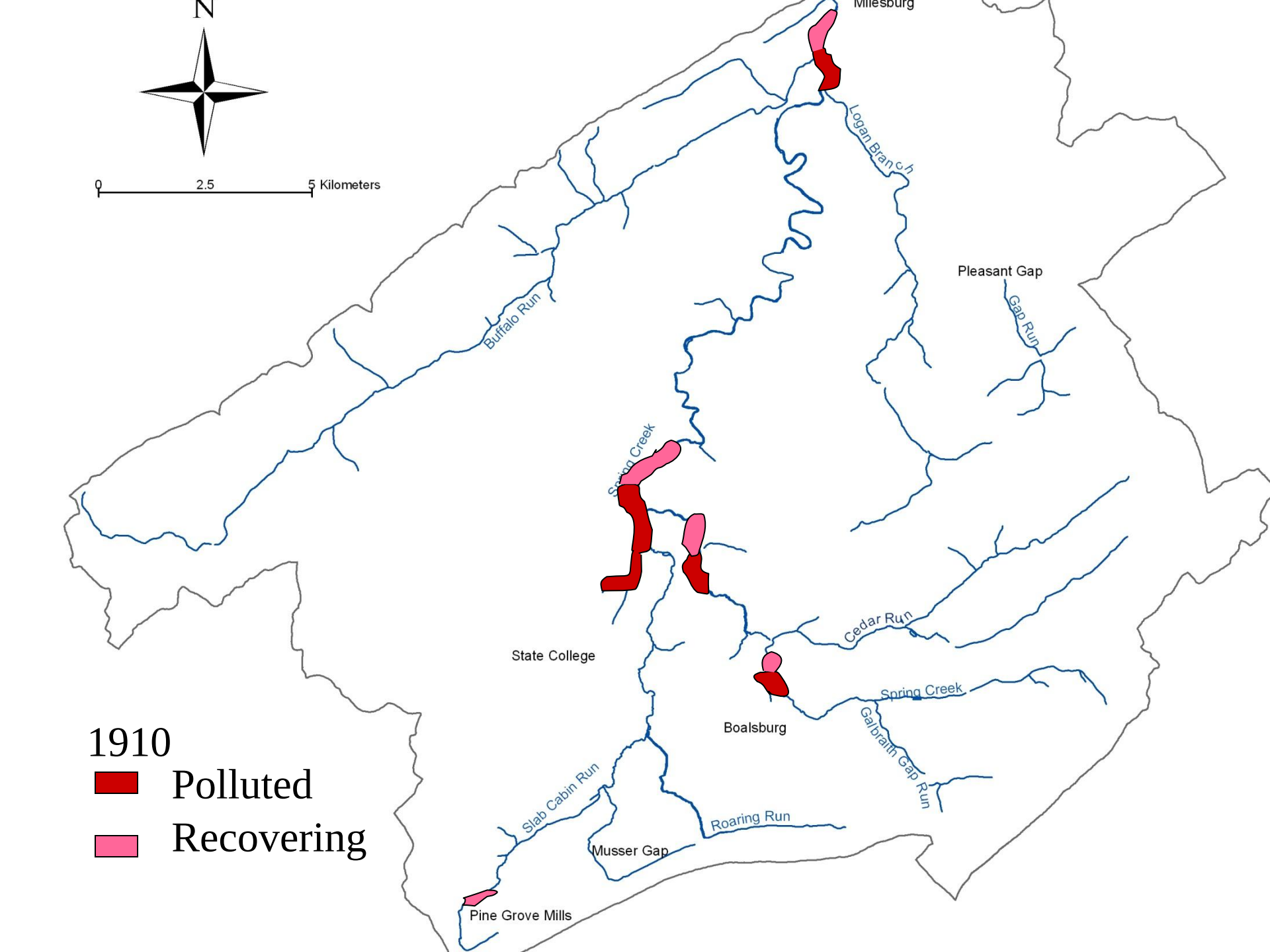
$1 million annually

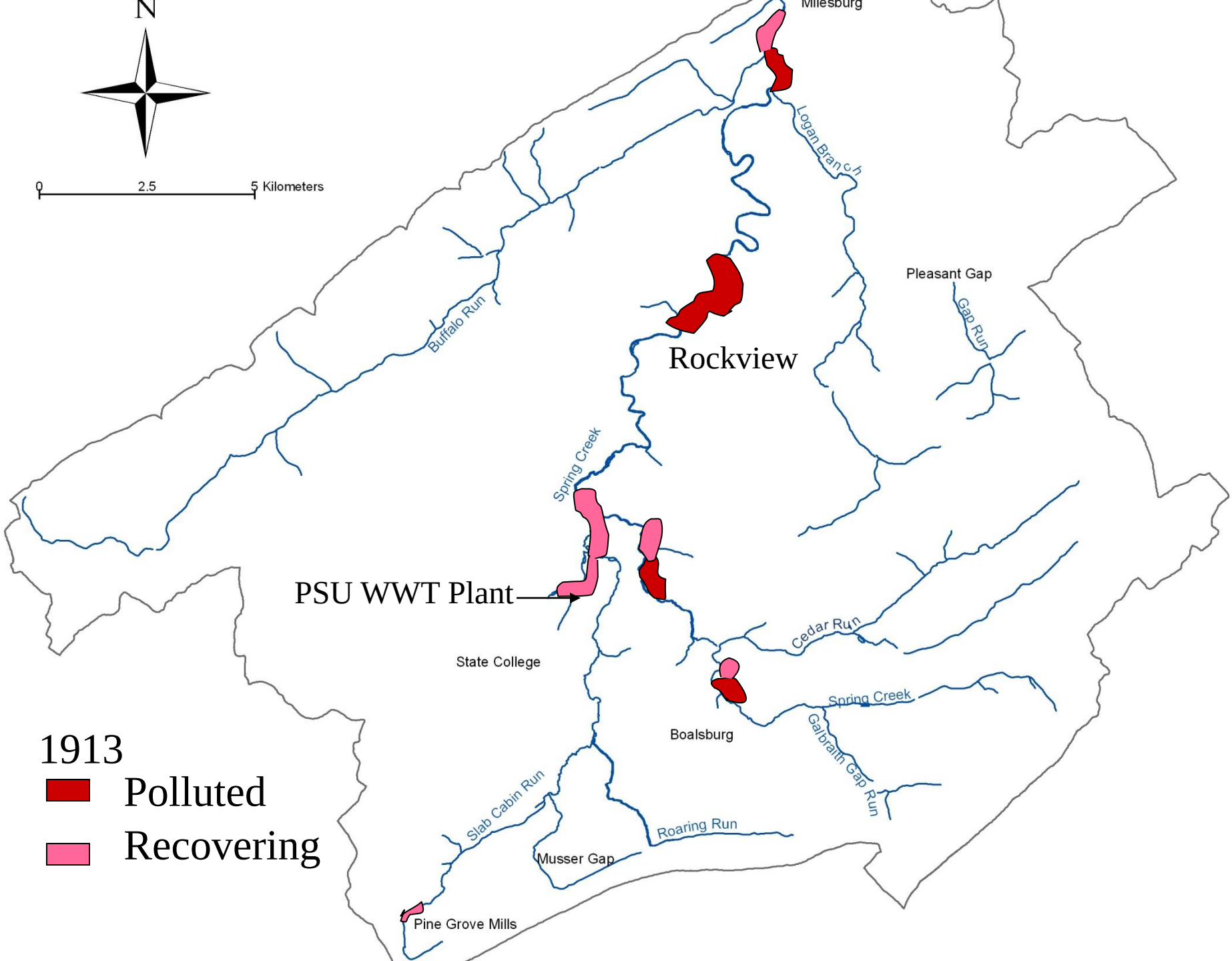
Water Quality and Quantity Importance

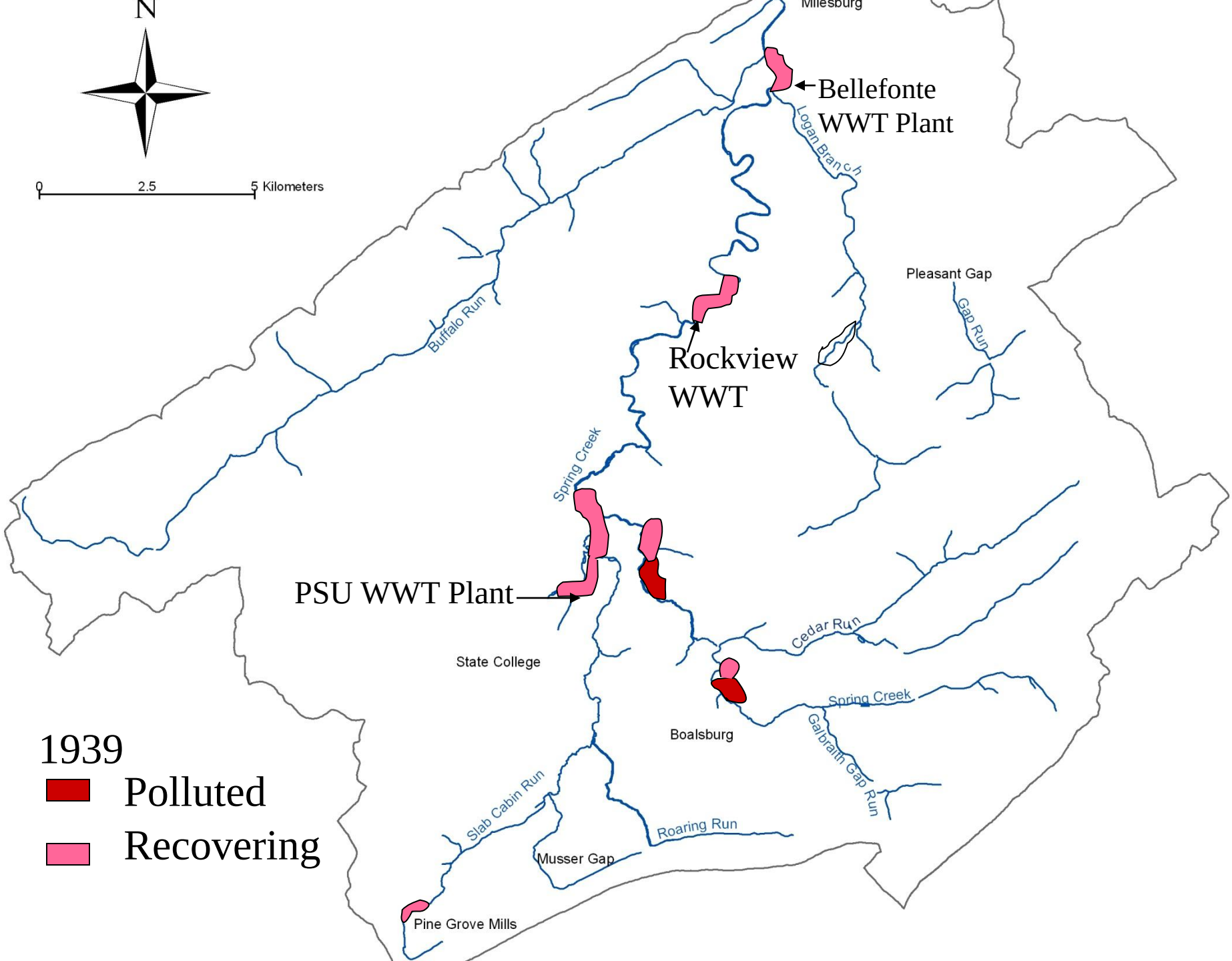
- Exceptional wild trout fishery
- Drinking water
- Sewage disposal
- State fish hatcheries

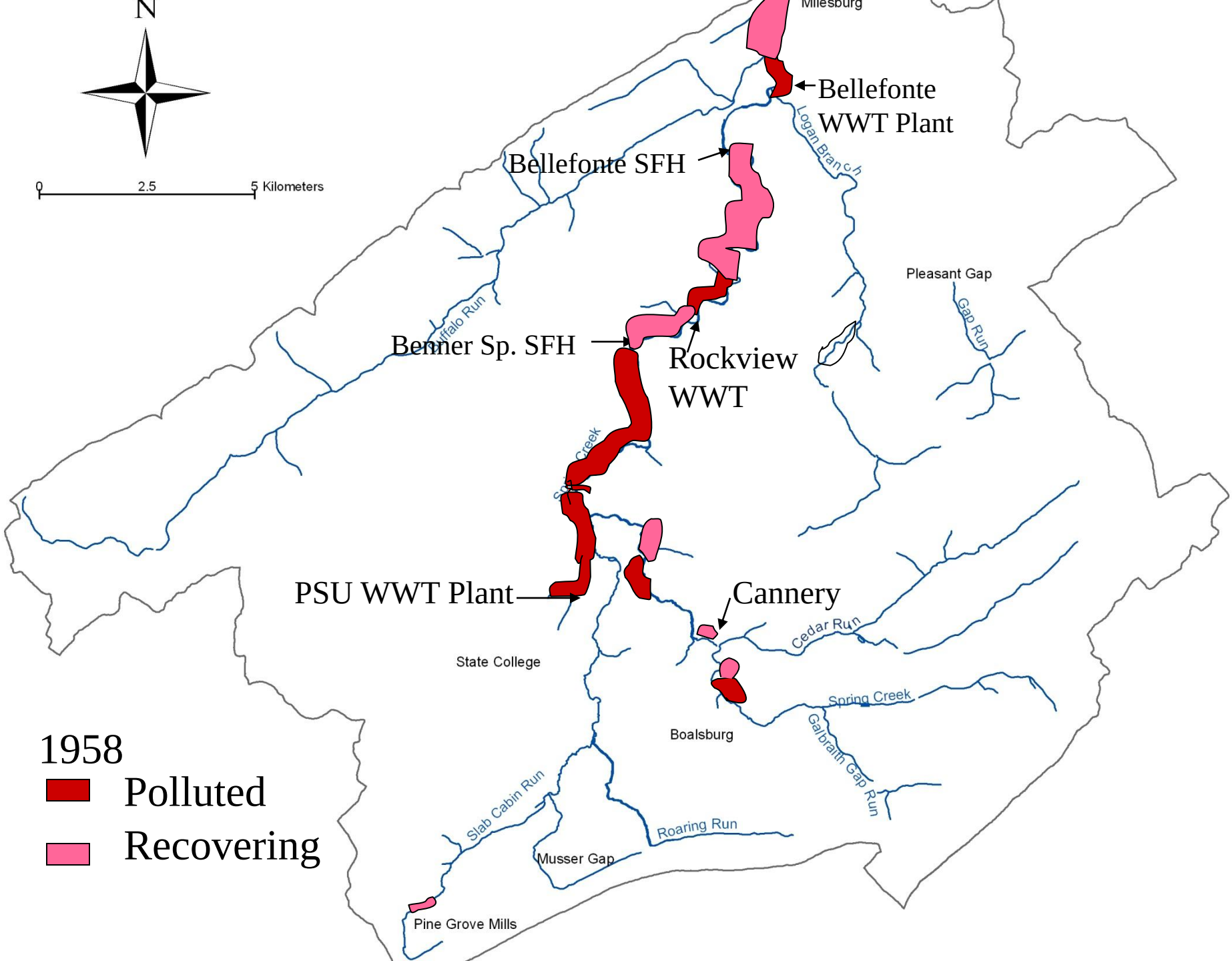
History of Water Quality

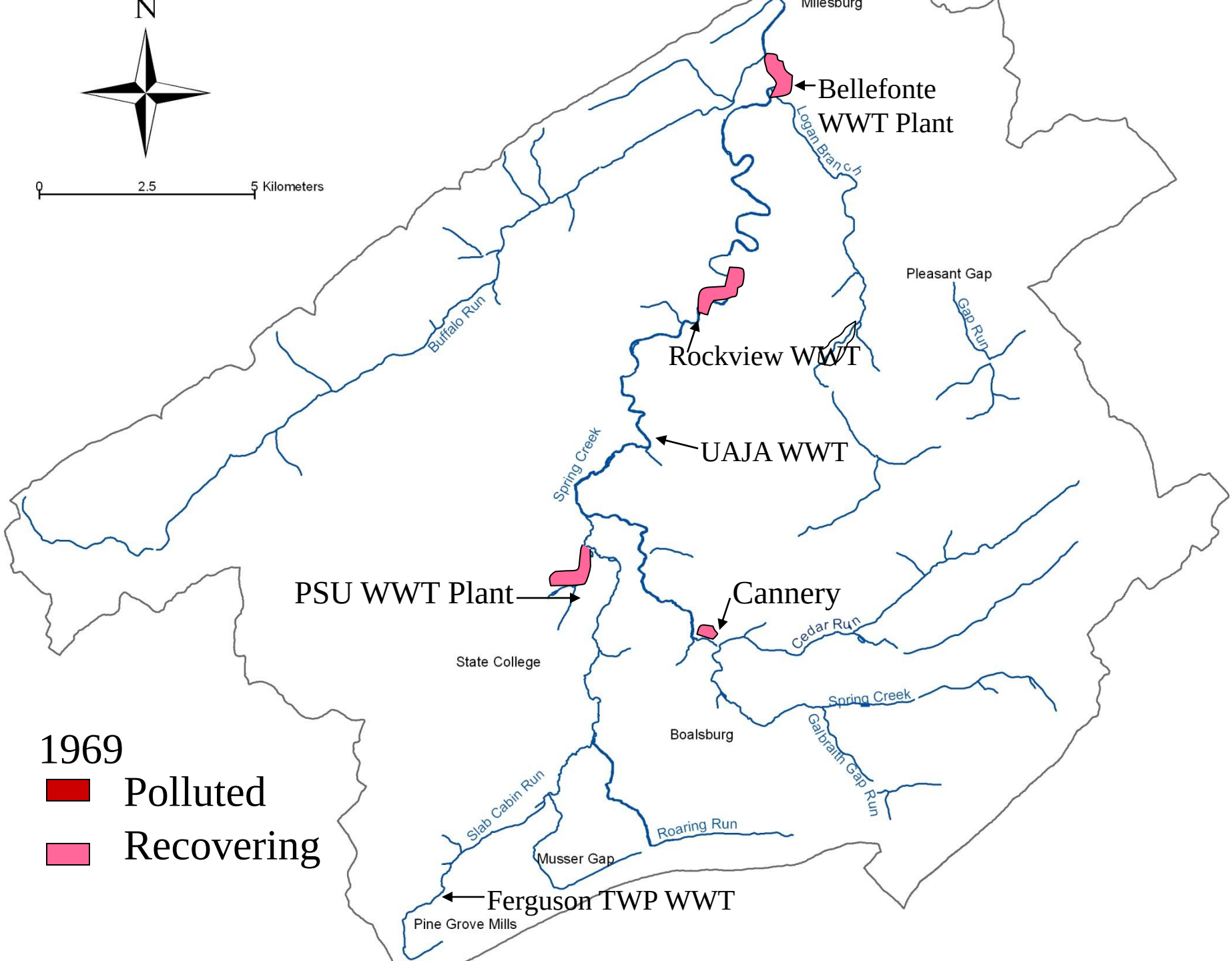
UAJA sewage treatment plant outflow

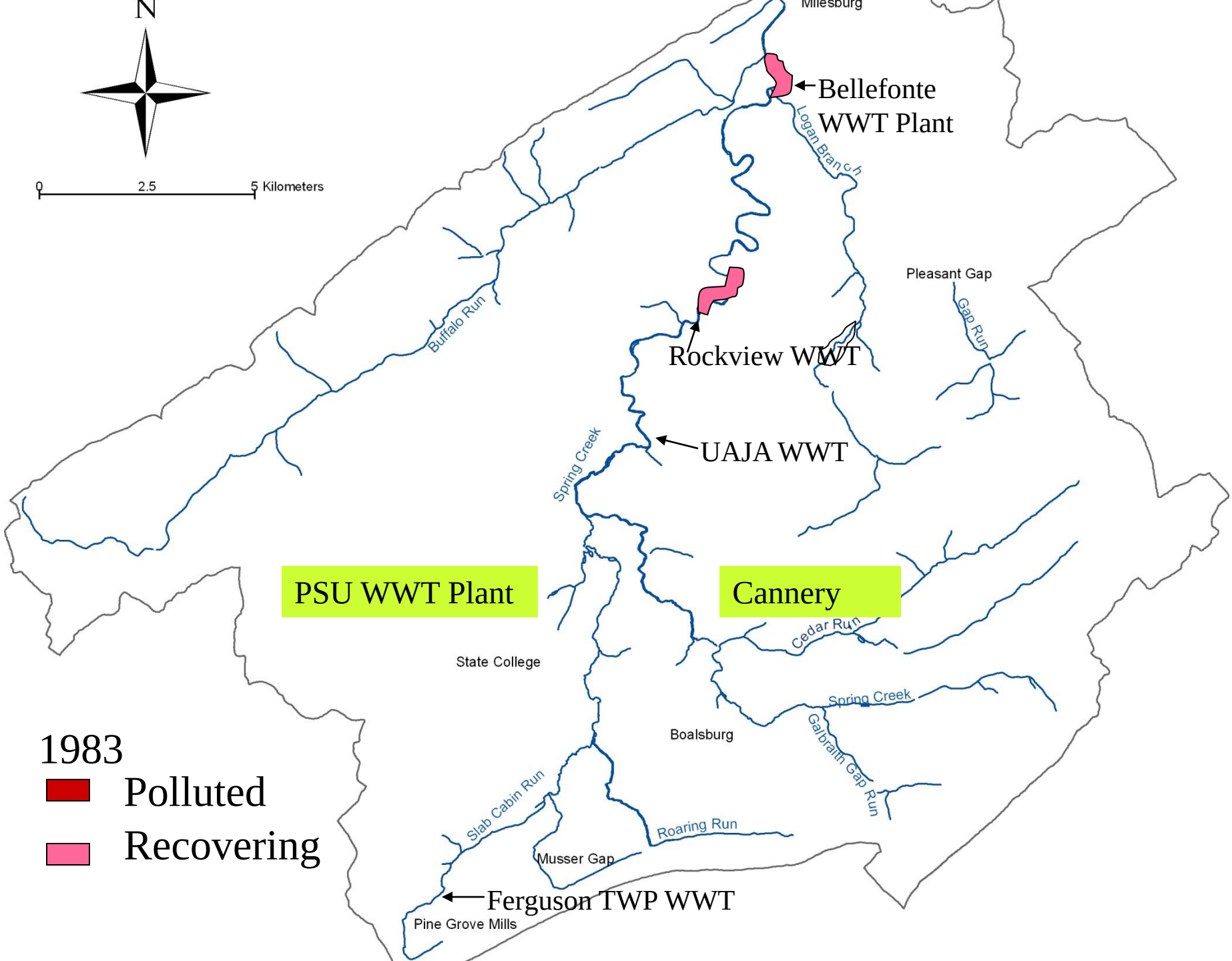

N
0
2.5
5 Kilometers
Milesburg
Logan Branch
Pleasant Gap
Gap Run
Buffalo Run
Spring Creek
State College
Cedar Run
Spring Creek
Boalsburg
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Pine Grove Mills
1910
Polluted
Recovering

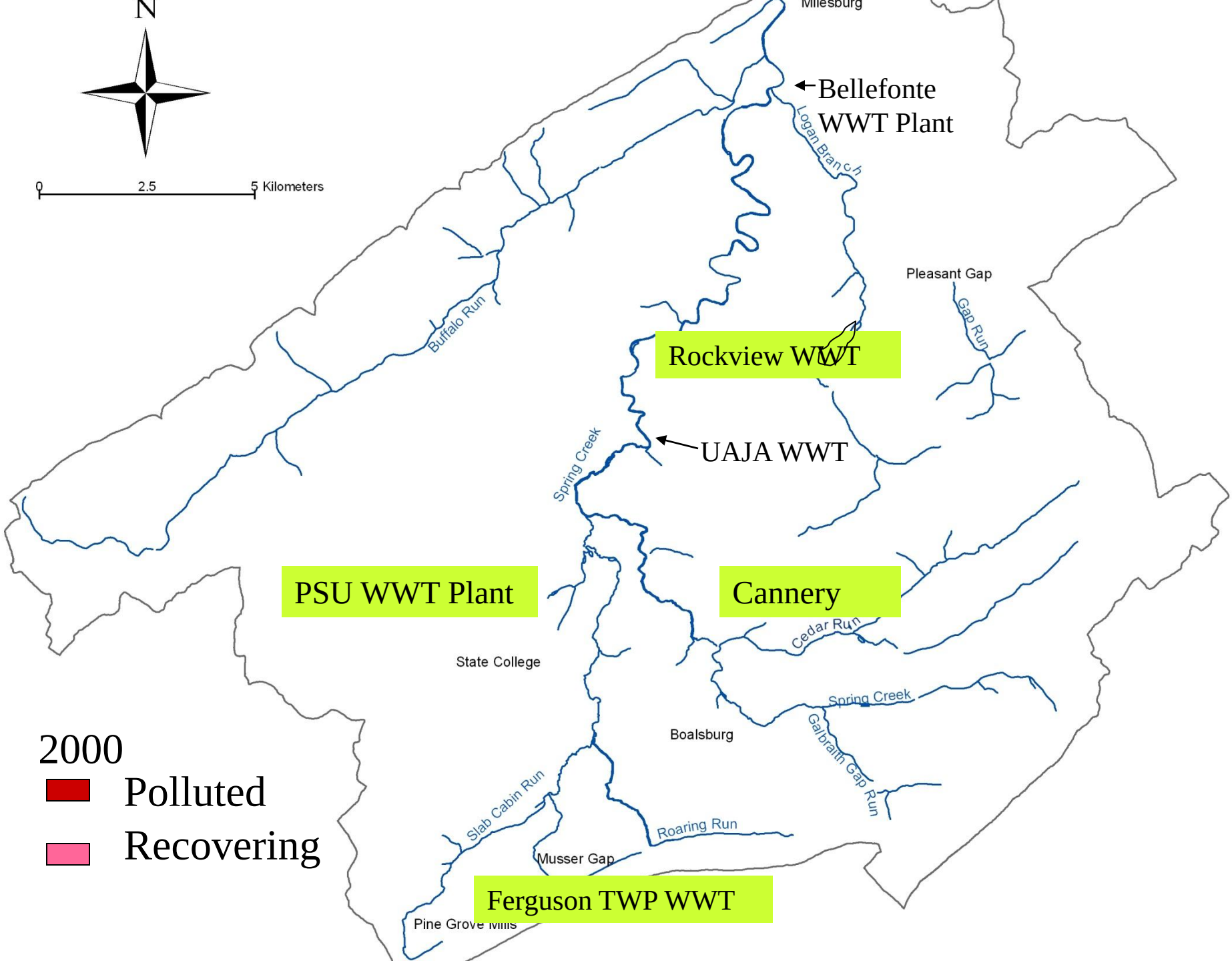

N
0
2.5
5 Kilometers
Milesburg
Logan Branch
Pleasant Gap
Buffalo Run
Gap Run
Rockview
Spring Creek
PSU WWT Plant
Cedar Run
State College
Spring Creek
Boalsburg
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Pine Grove Mills
1913
Polluted
Recovering


N
0
2.5
5 Kilometers
Bellefonte
WWT Plant
Logan Branch
Pleasant Gap
Gap Run
Buffalo Run
Rockview
WWT
Spring Creek
PSU WWT Plant
State College
Cedar Run
Spring Creek
Boalsburg
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Pine Grove Mills
1939
Polluted
Recovering


N
0
2.5
5 Kilometers
Bellefonte
WWT Plant
Bellefonte SFH
Logan Branch
Pleasant Gap
Gap Run
Buffalo Run
Benner Sp. SFH
Rockview
WWT
Spring Creek
PSU WWT Plant
Cannery
Cedar Run
State College
Spring Creek
Boalsburg
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Pine Grove Mills
1958
Polluted
Recovering


N
0
2.5
5 Kilometers
Bellefonte
WWT Plant
Logan Branch
Buffalo Run
Pleasant Gap
Gap Run
Rockview WWT
UAJA WWT
Spring Creek
PSU WWT Plant
Cannery
Cedar Run
State College
Spring Creek
Boalsburg
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Ferguson TWP WWT
Pine Grove Mills
1969
Polluted
Recovering


N
0
2.5
5 Kilometers
Bellefonte
WWT Plant
Logan Branch
Pleasant Gap
Buffalo Run
Gap Run
Rockview WWT
UAJA WWT
Spring Creek
PSU WWT Plant
Cannery
Cedar Run
State College
Spring Creek
Boalsburg
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Ferguson TWP WWT
Pine Grove Mills
1983
Polluted
Recovering

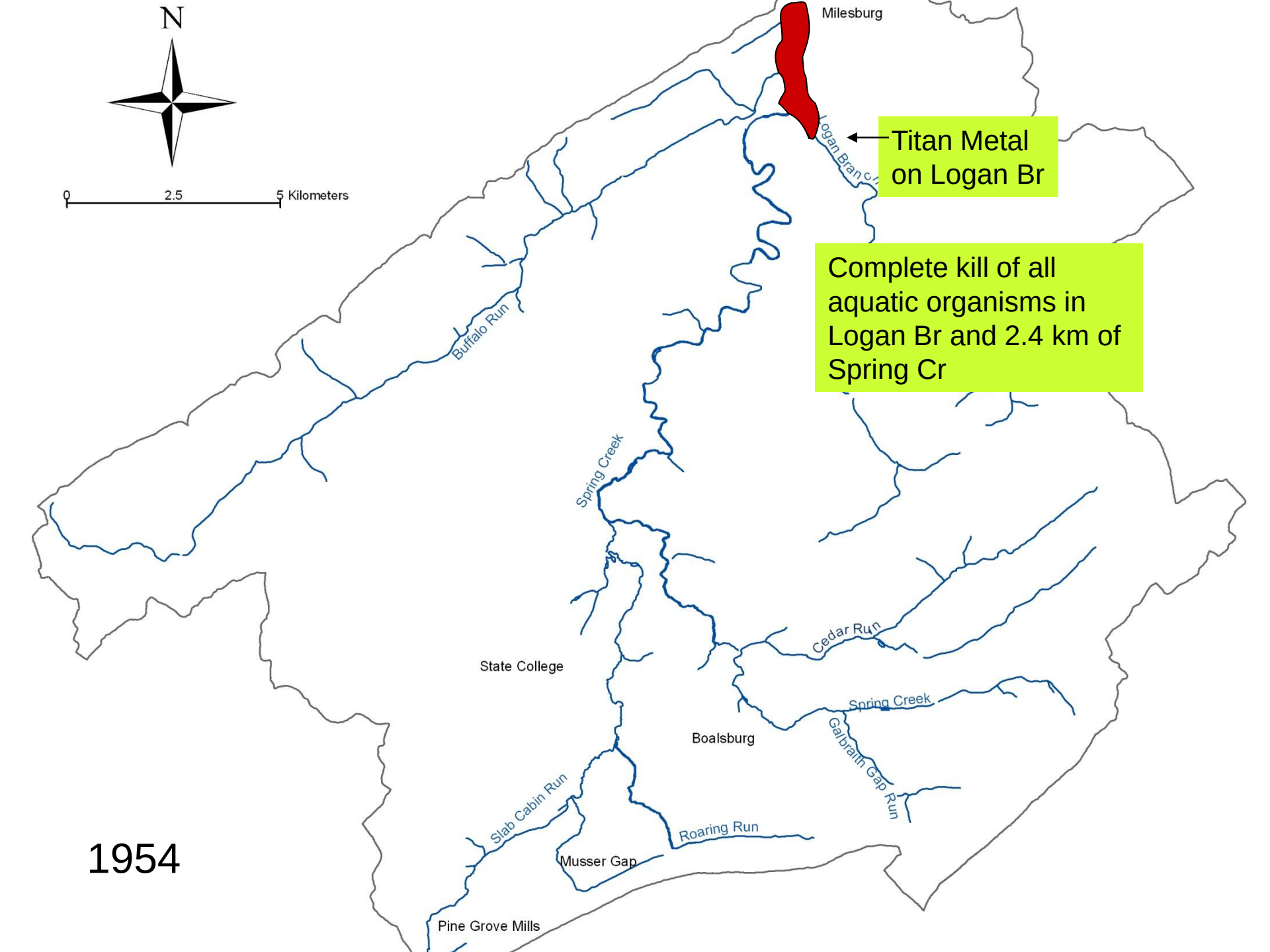

N
0
2.5
5 Kilometers
Bellefonte
WWT Plant
Logan Branch
Milesburg
Pleasant Gap
Gap Run
Buffalo Run
Rockview WWT
UAJA WWT
Spring Creek
PSU WWT Plant
Cannery
Cedar Run
State College
Spring Creek
Boalsburg
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Ferguson TWP WWT
Pine Grove Mills
2000
Polluted
Recovering

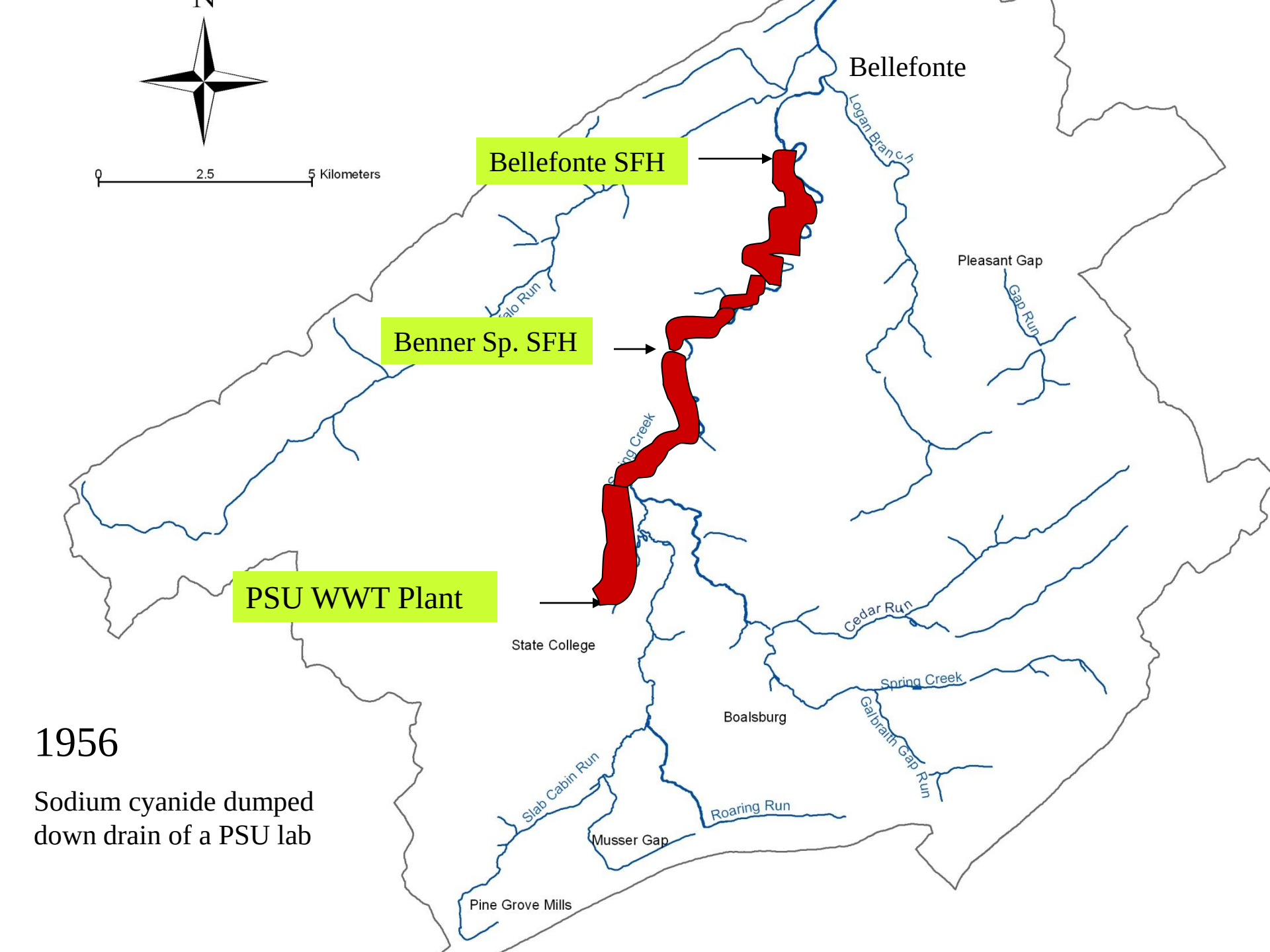
Microscreen disk filters - Pleasant Gap, Bellefonte and Benner Spring State Fish Hatcheries

Toxic, Anoxic, and Thermal Fish Kills

Fish Kills >100 specimens

Decade	Incidents	Range
1950	5	100s->150,000
1960	3	100s-1000s
1970	6	100s->25,000
1980	1	>1000
1990	1	100s
2000	1	>250


N
0
2.5
5 Kilometers
Milesburg
Titan Metal on Logan Br
Complete kill of all aquatic organisms in Logan Br and 2.4 km of Spring Cr
Buffalo Run
Spring Creek
Cedar Run
State College
Spring Creek
Boalsburg
Galbraith Gap Run
Slab Cabin Run
Roaring Run
Musser Gap
Pine Grove Mills
1954



1956

Sodium cyanide dumped down drain of a PSU lab

Green drake mayfly; Photo by C. Meck

History of Kepone and Mirex contamination from Nease Chemical

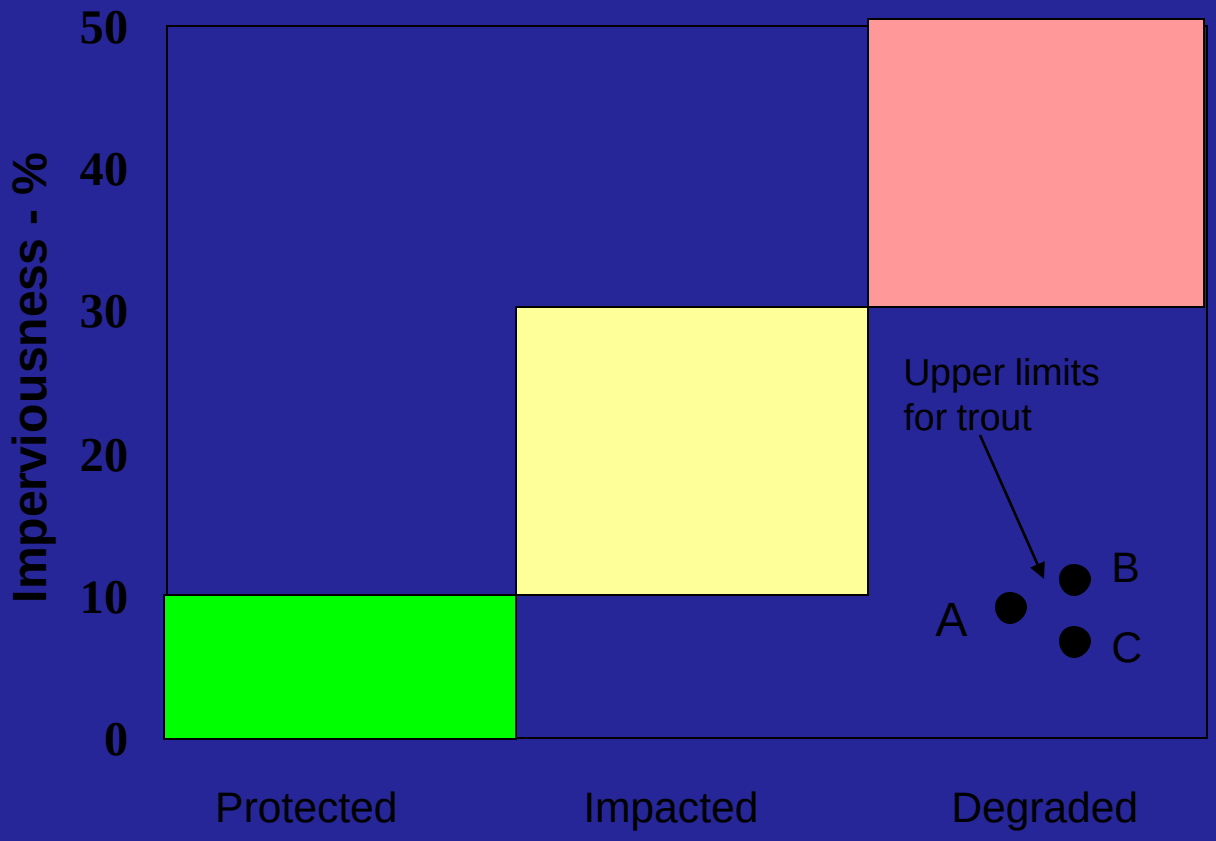
- 1976 Kepone and Mirex detected in trout
- 1977 Stocking reduced downstream
- 1978 Discontinued stocking
- 1982 No-kill regs for any species Oak Hall to Milesburg
- 1983 Designated as Superfund site
- 2001 No-harvest of trout; harvest allowed for other species

2011 and Beyond: Water Quantity

- Drinking water withdrawals
- Storm water inputs

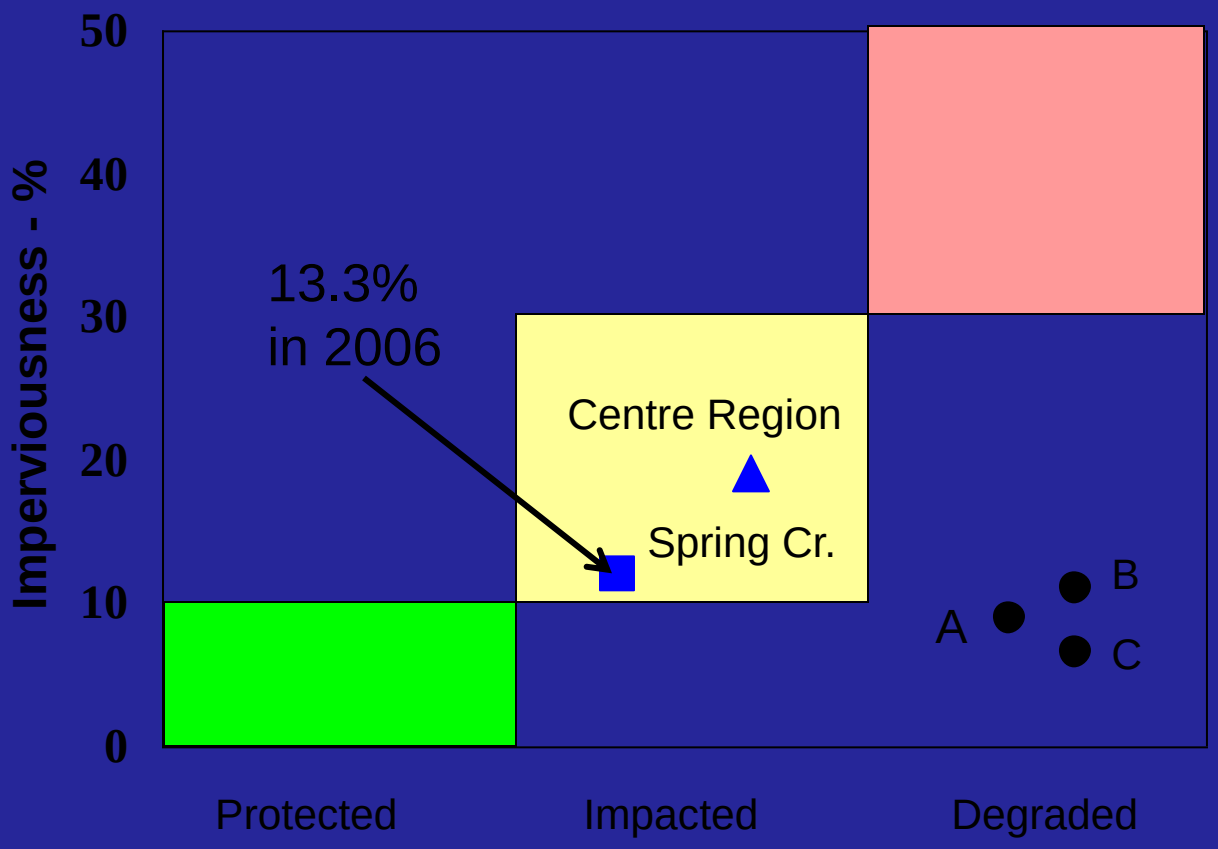
Schueler (1994) suggests that the amount of impervious surface area (roof tops and pavement) is a good measure of the intensity of development in a watershed

Status of Trout Populations



A = Ontario (>400) B = WI/MN (39) C = MD (116)

Status of Trout Populations



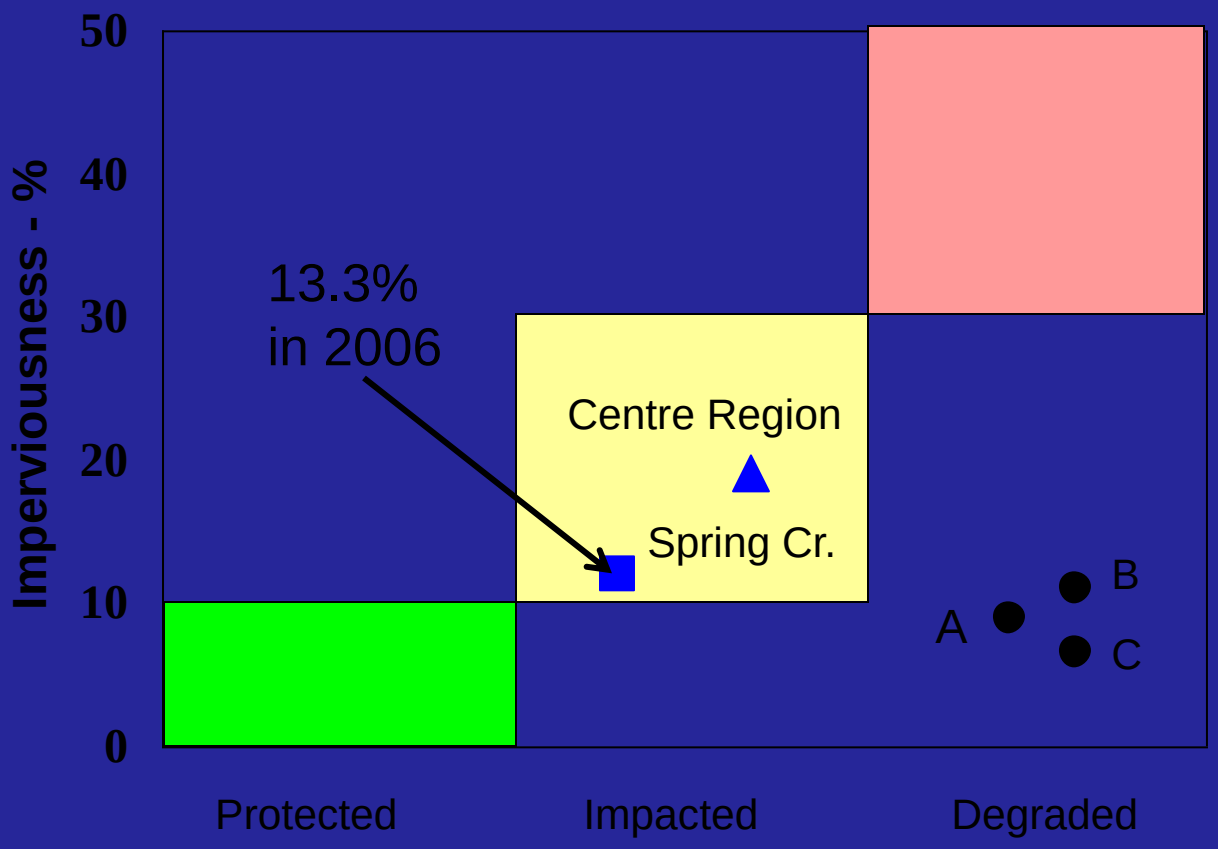
Other Streams with Trout but >10% Impervious Surface

- Valley Ck, PA and Stillwater Ck, MD
- Authors suggest large spring flow sustains wild trout

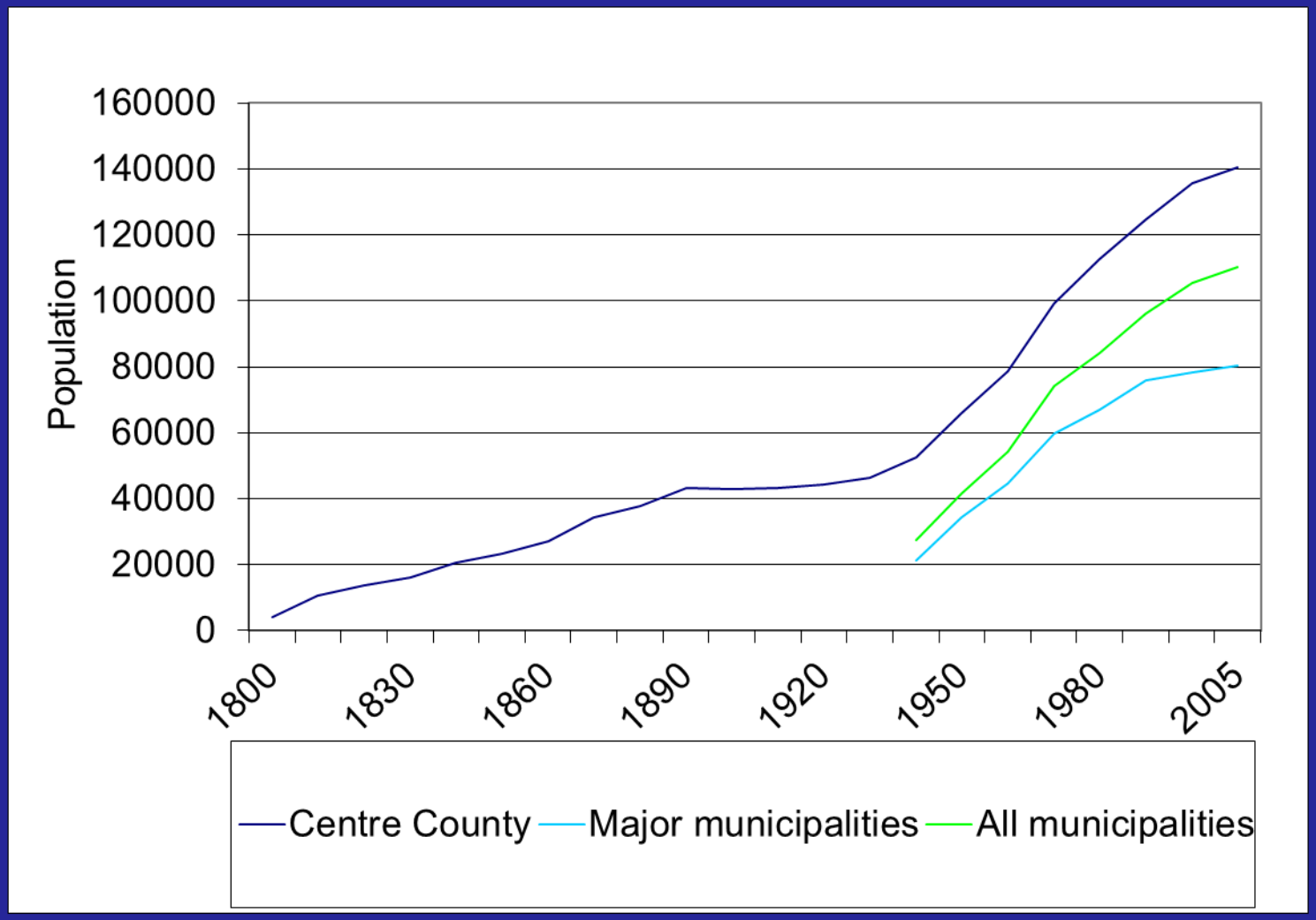
Other Streams with Trout but >10% Impervious Surface

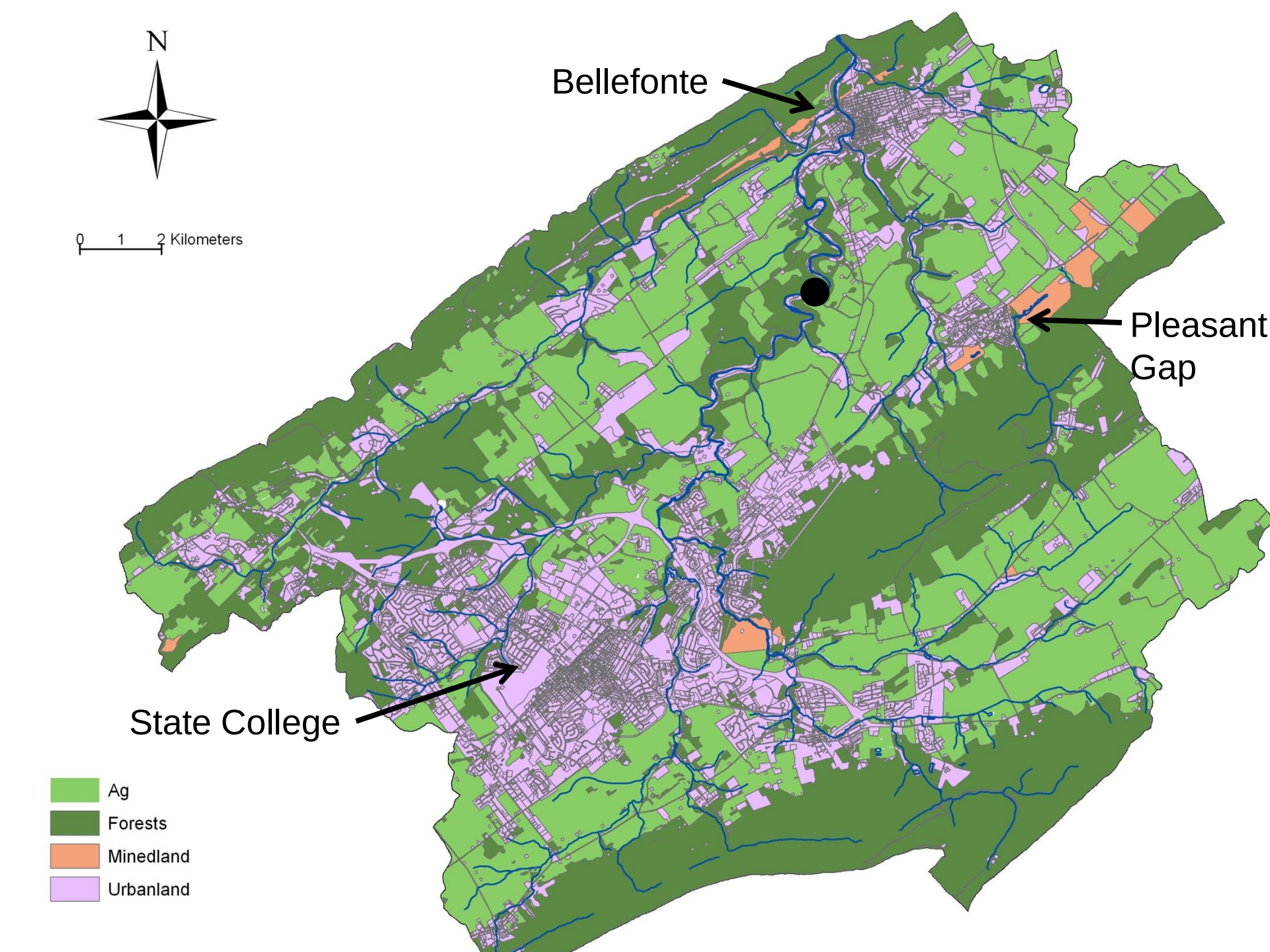
- Valley Ck, PA and Stillwater Ck, MD
- Authors suggest large spring flow sustains wild trout
- Groundwater drainage area 17% larger than surface water drainage area
- Geologic formations; sinkholes

What is the upper limit of impervious surface before we lose the wild brown trout population in Spring Creek?



Human Population Trends




N
0 1 2 Kilometers
Bellefonte
Pleasant Gap
State College
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Forests
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Urbanland

Important Decisions

- Protection of remaining groundwater recharge areas
- Enhancement of forested riparian buffers along stream and sinkholes
- Effective stormwater management on new development and retrofitting older developments
- Alternate drinking water sources?

Summary

- Water quality deteriorates from early 1900s to late 1950s
- Significant improvement in water quality from 1980s to present
- Human induced impacts historically and continue to impair the fishery

Summary

- Wild trout population good overall
- Rich groundwater resources sustaining trout population
- Increased development poses serious threat to trout population and is a major concern

Why Care?

- Most impacts to our waterways and fisheries are coming from outside sources
- 7% of Pennsylvanians are anglers
- 2% of Americans are anglers
- If we don’t stand up for the resource then who will?

Questions?