5-7-2004

Effects of Runoff from Downtown Middleboro on the Nemasket River

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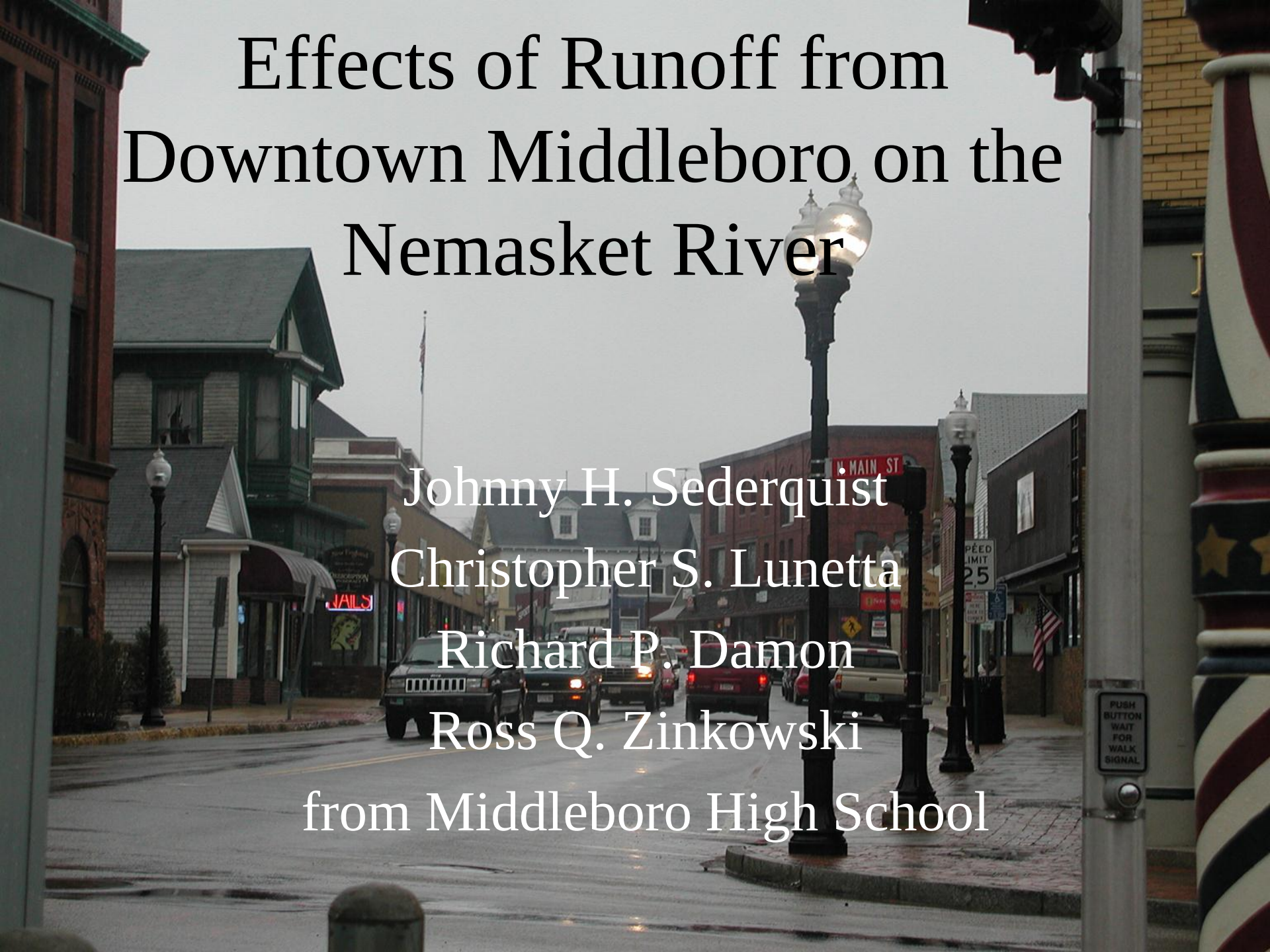

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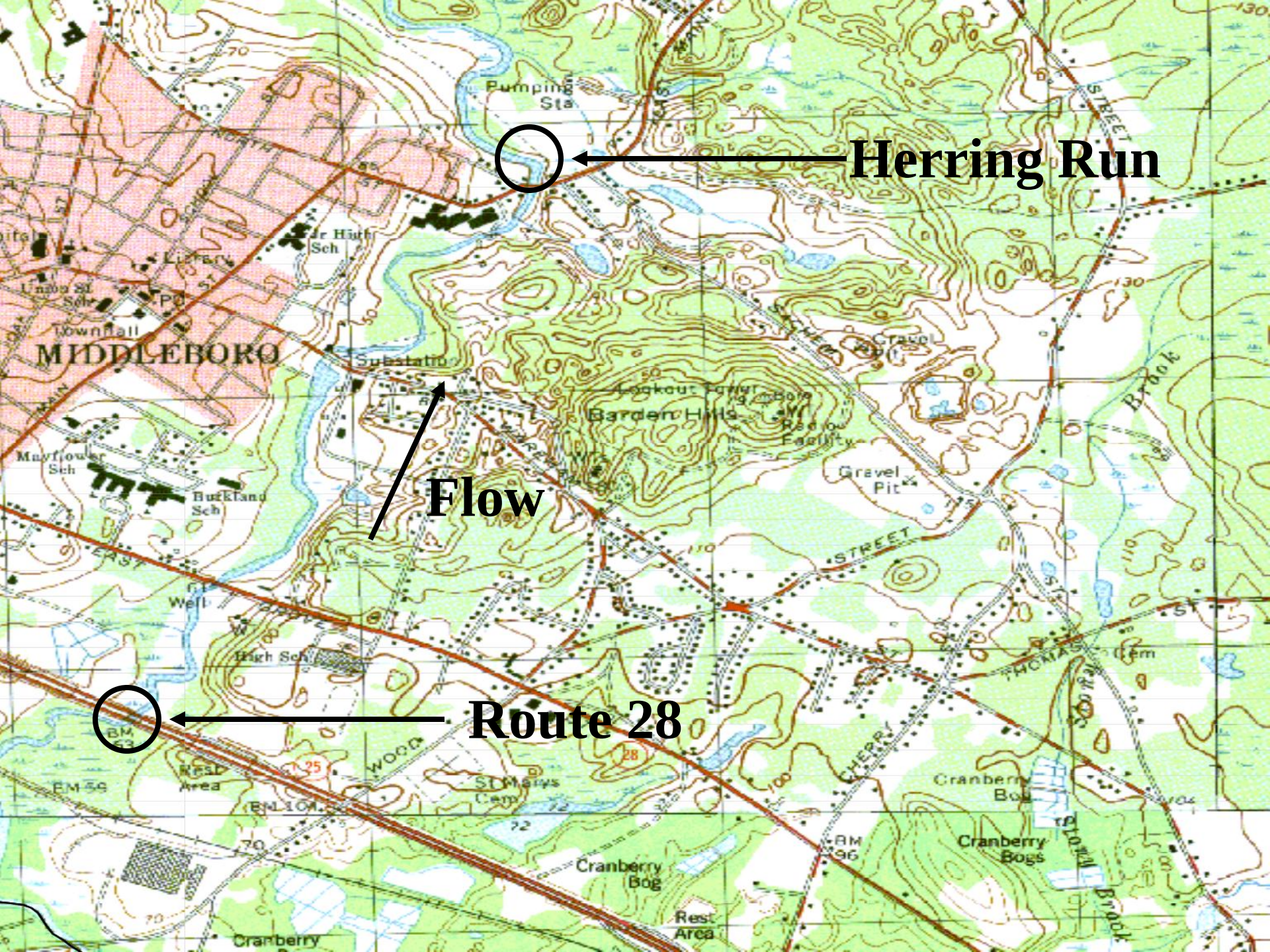
from Middleboro High School

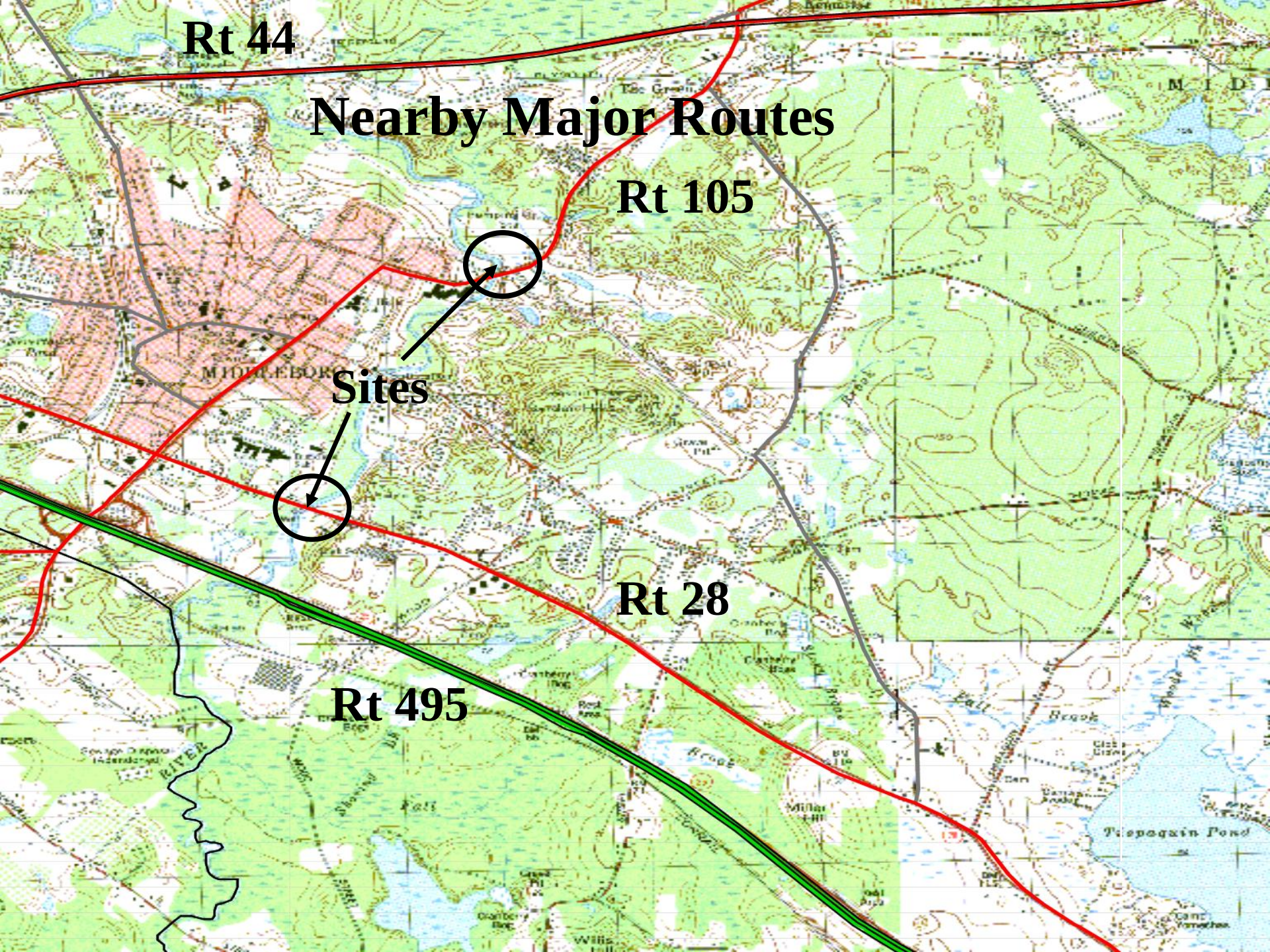
The Nemasket River Watershed

- area ~ 7.5 square miles
- transportation, fishing and recreation
- means of biodegrading some of our waste

Our Study

- "Urban" Runoff from the town
- Local impact on Nemasket?

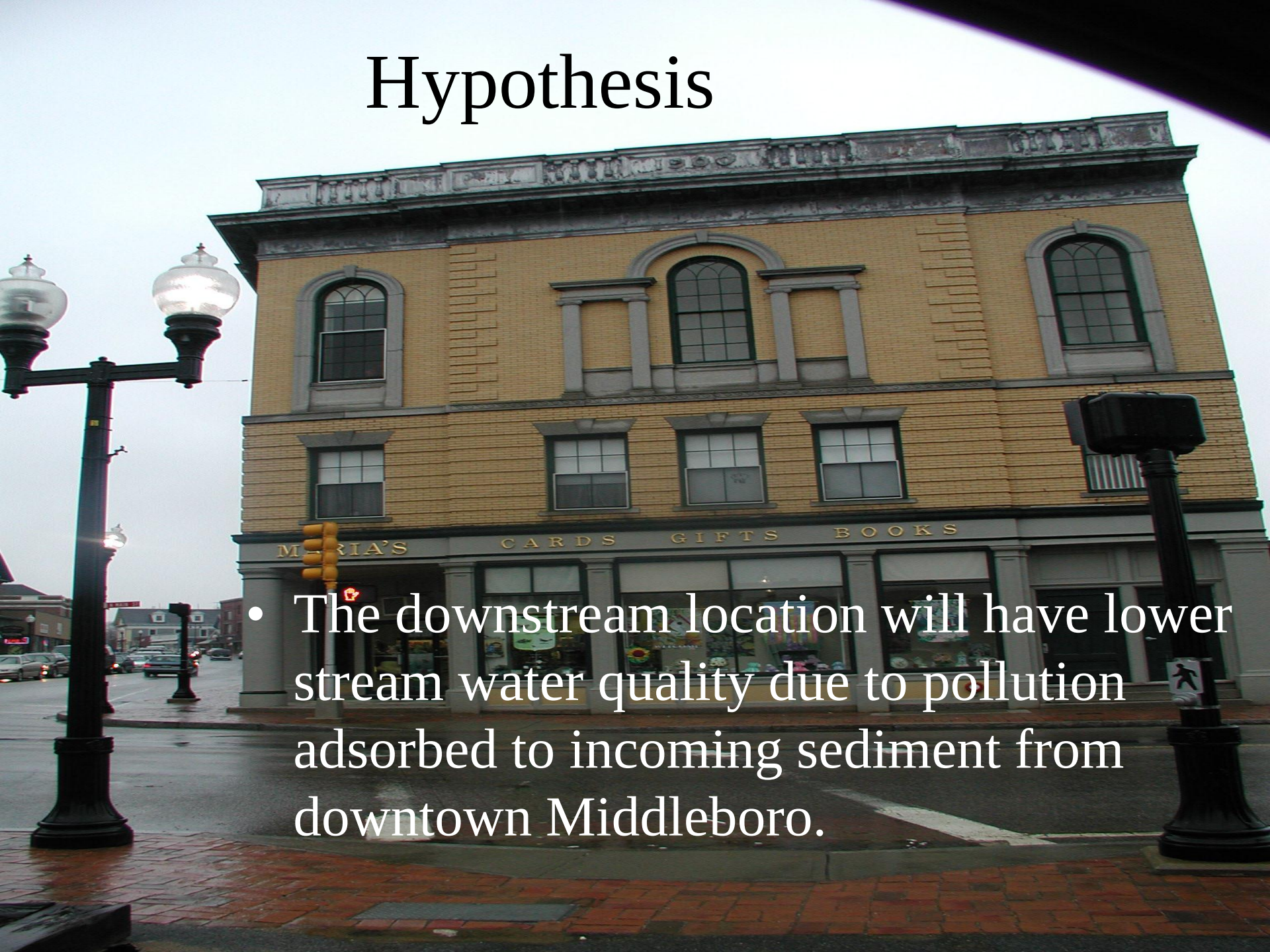

Herring Run
Flow
Route 28
MIDDLEBORO
Pumping Sta
Jr High Sch
Library
Town Hall
Substation
Lookout Tower
Barden Hills
Gravel Pit
Mayflower Sch
Buckland Sch
High Sch
Rest Area
Cranberry Bog
Cranberry Bogs
Rest Area
Cranberry
Cem
STREET
EAST
WEST
Brook


Rt 44
Nearby Major Routes
Rt 105
Sites
Rt 28
Rt 495

Rt. 28 – Upstream Location

Herring Run – Downstream Location

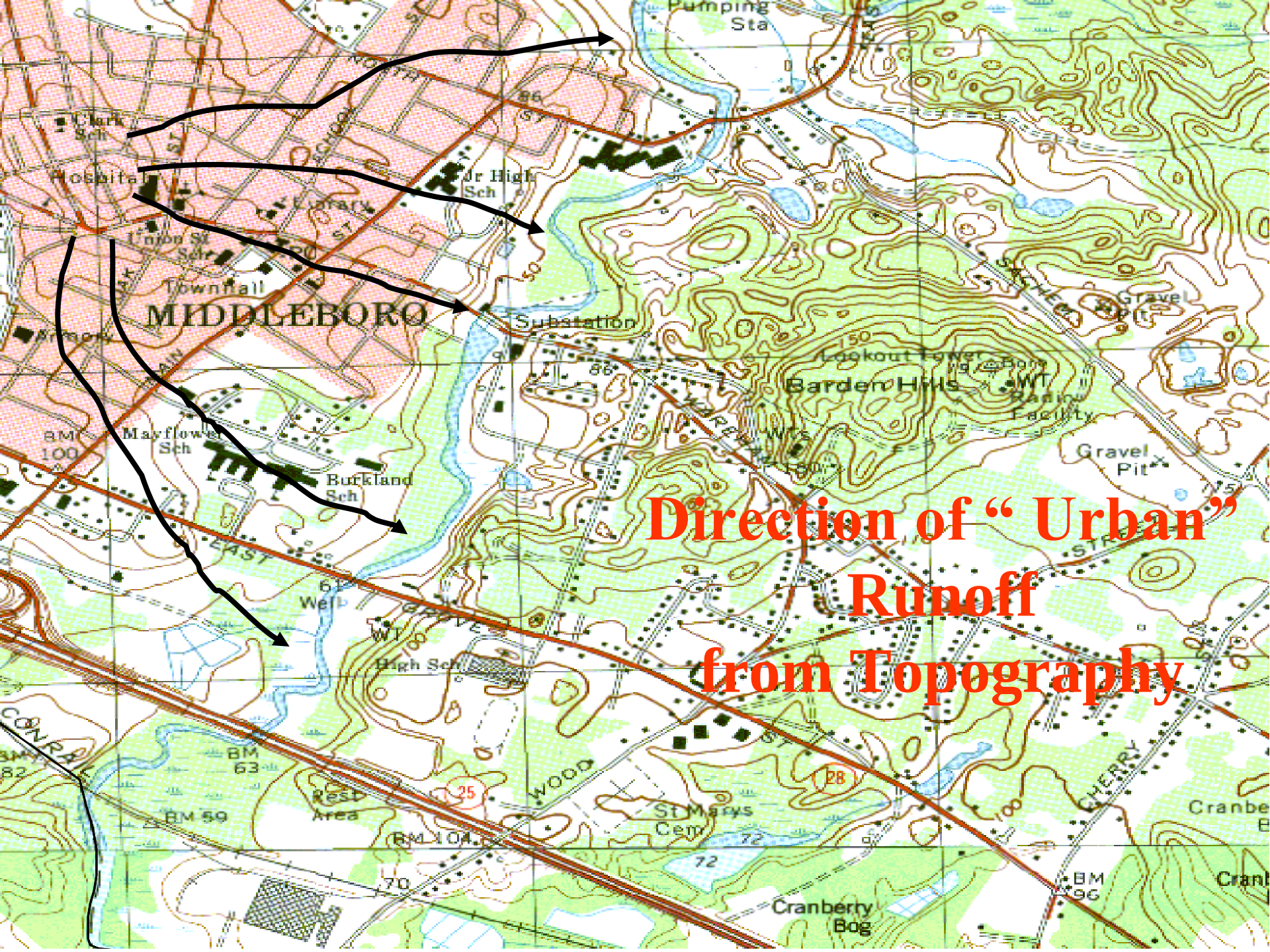
Hypothesis



- The downstream location will have lower stream water quality due to pollution adsorbed to incoming sediment from downtown Middleboro.

Things We Studied

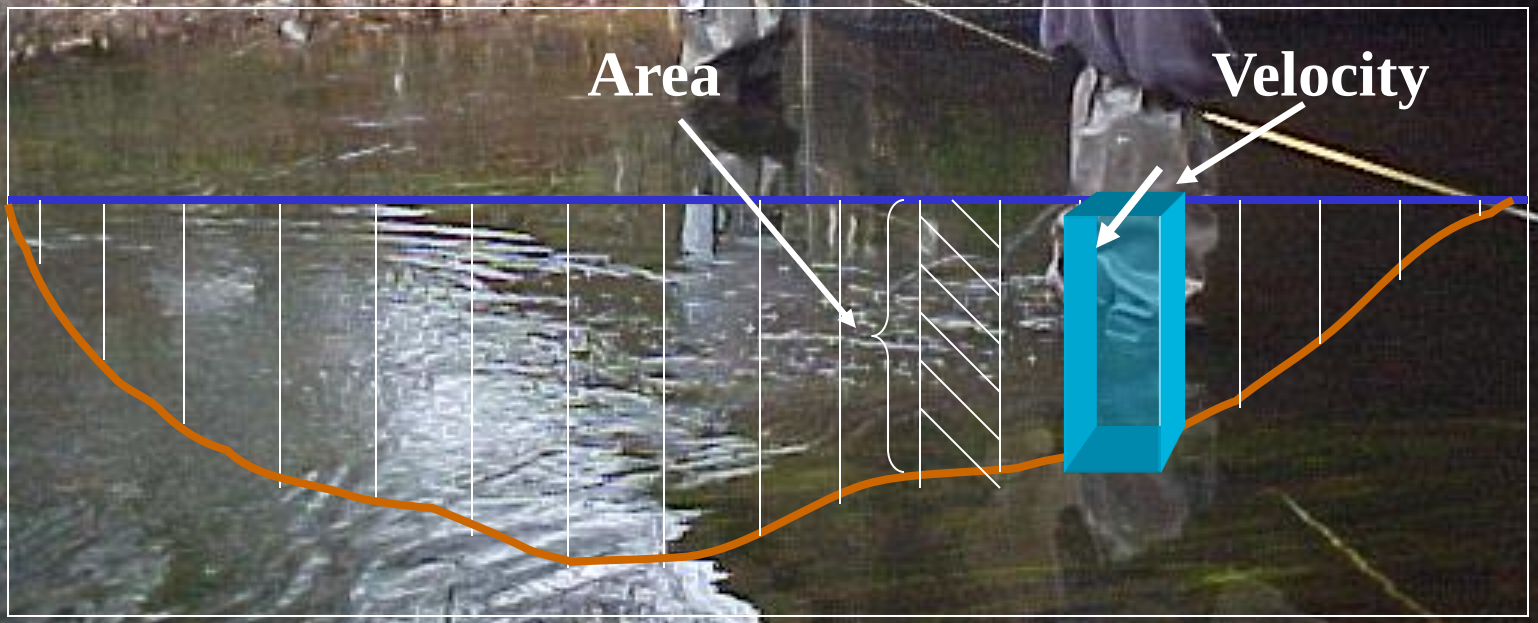
- Flow Rates
- Nutrient Concentrations and Loading
- Bugs
- Dissolved Oxygen
- pH
- Temperature
- Specific Conductivity


Direction of " Urban"
Runoff
from Topography

Flow Calculations

Flow (Q) = Area (A)* Velocity (V)

***Total Flow was found by averaging velocity and area for each column and adding columns.**



Flow Values, Concentrations and Phosphorus Loading

Location	Flow (cfs)	Average Concentration of Phosphorous (SRP) (mg/l)	Loading (kg/day)
Herring Run	53.2	.01	1.34
Rt. 28	40.3	.008*	.79

*DL

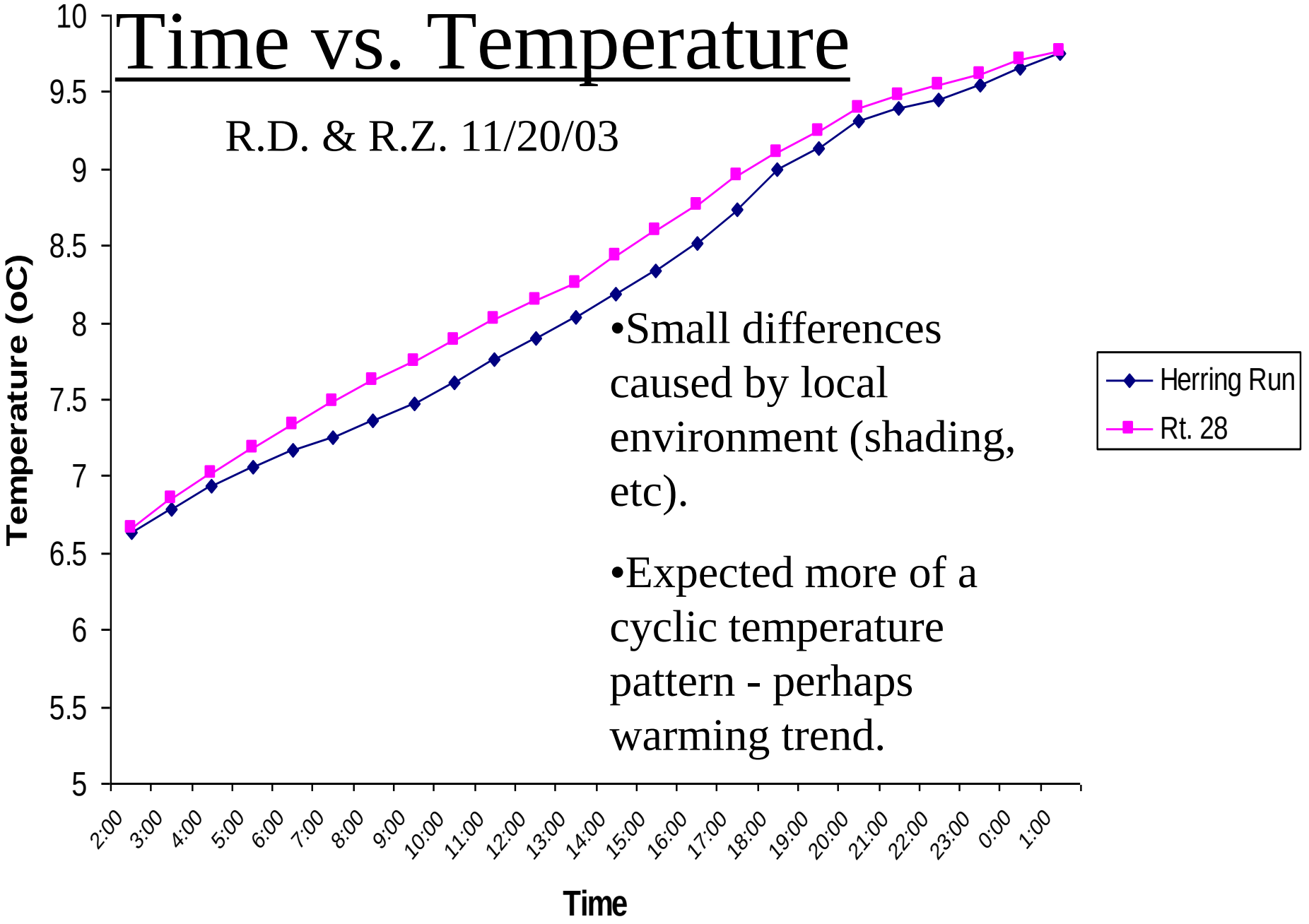
Flow Values, Concentrations and Nitrogen Loading

Location	Flow (cfs)	Average Concentration of Nitrogen (NO_3 – N) (mg/l)	Loading (kg/day)
Herring Run	53.2	.11	14.3
Rt. 28	40.3	.1*	9.9

*DL

Time vs. Temperature

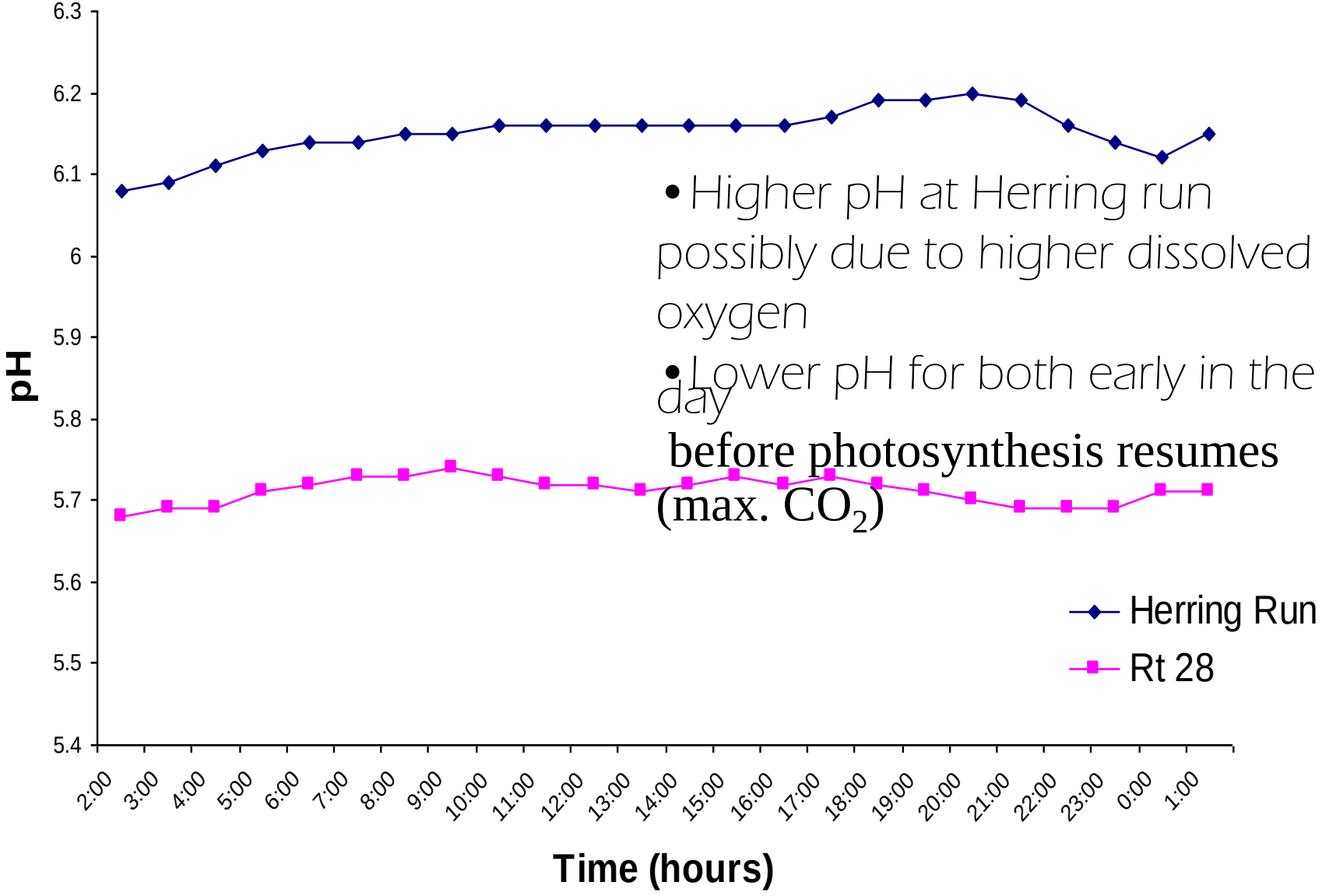
R.D. & R.Z. 11/20/03



- Small differences caused by local environment (shading, etc).
- Expected more of a cyclic temperature pattern - perhaps warming trend.

Time vs. pH

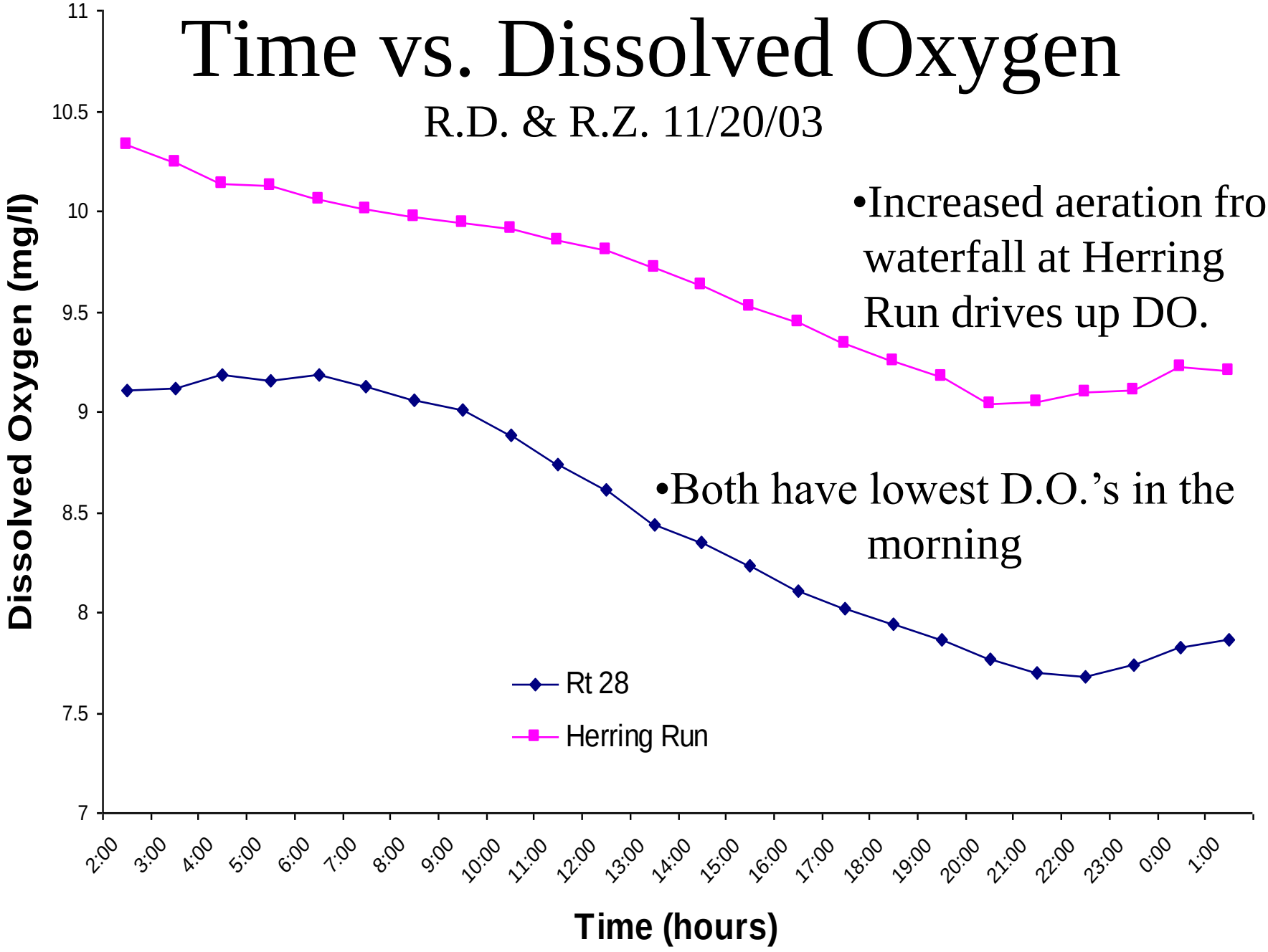
R.D. & R. Z. 11/20/03



- Higher pH at Herring run possibly due to higher dissolved oxygen
- Lower pH for both early in the day before photosynthesis resumes (max. CO_2)

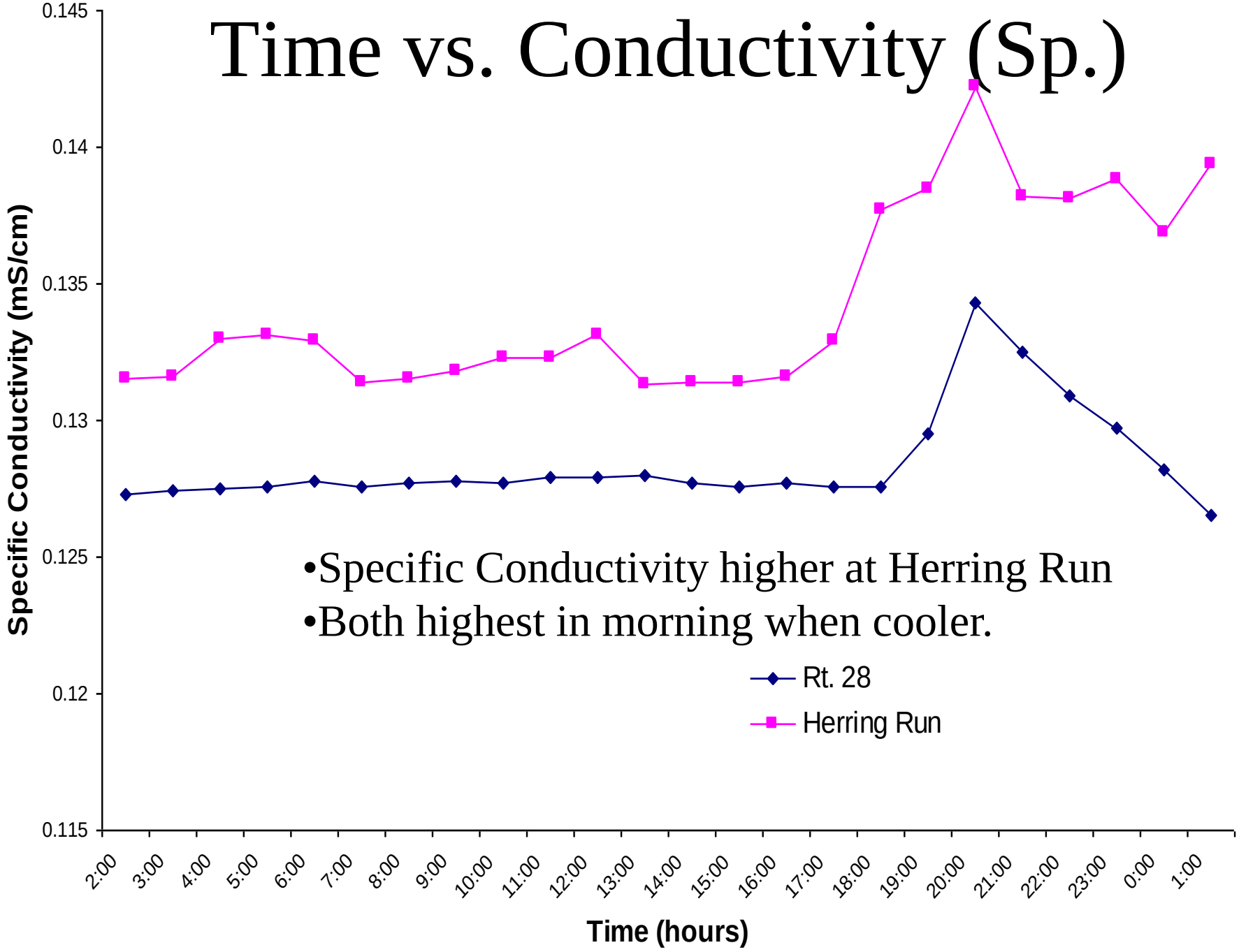
Time vs. Dissolved Oxygen

R.D. & R.Z. 11/20/03



- Increased aeration from waterfall at Herring Run drives up DO.
- Both have lowest D.O.'s in the morning

Time vs. Conductivity (Sp.)



Bugs Comparison – 1

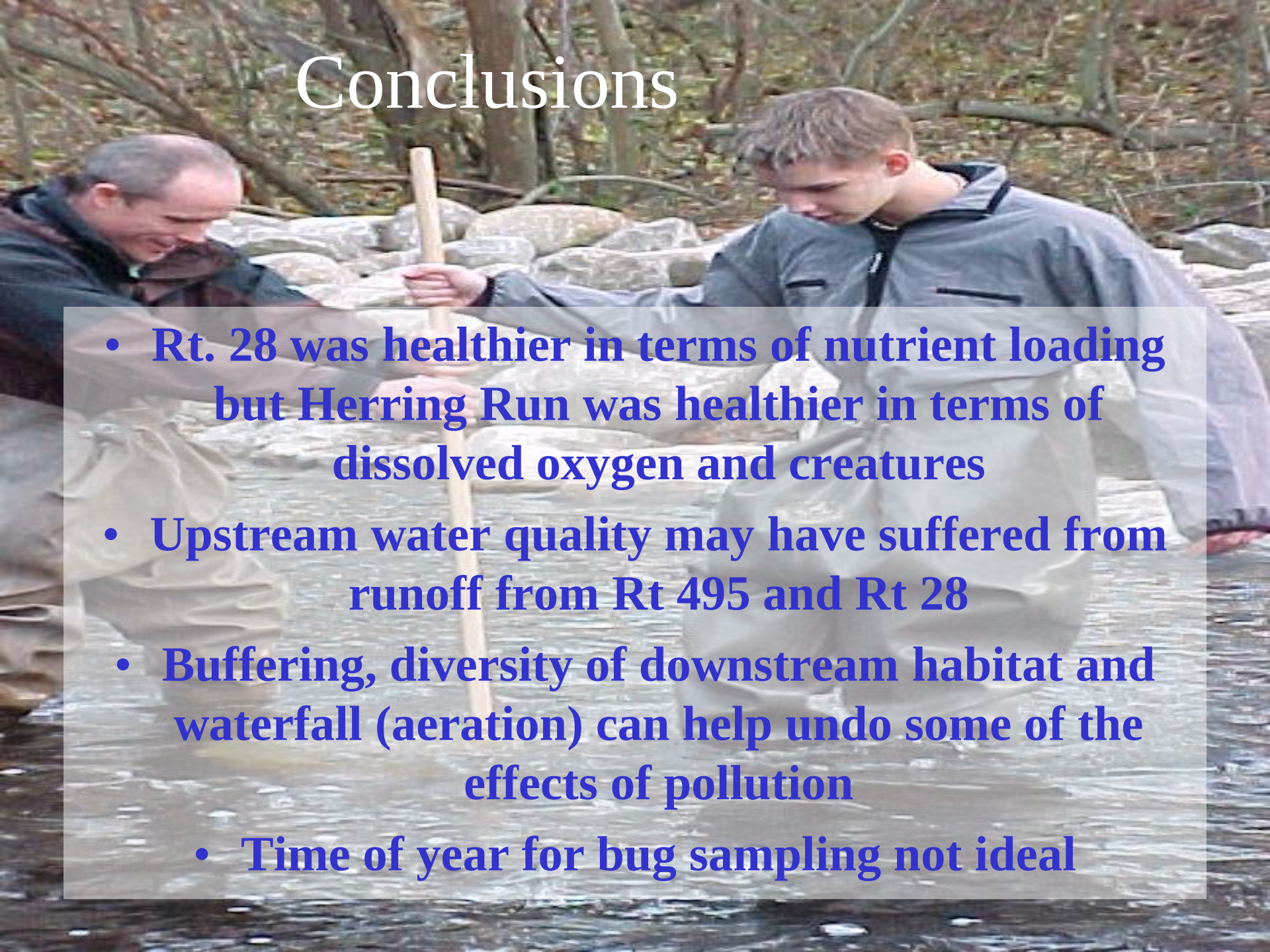
	Rt. 28	Herring Run
Sensitive Groups		
Mayflies	3	1
Caddisflies	3	2
Water Pennies	0	3
Tolerant Groups		
Leeches	3	1

Bugs Comparison - 2

	Rt. 28	**Herring Run**
Diversity (# of different groups)	14	14
% Intolerant Groups (0-3)	14.3	21.4
% Tolerant Groups (7-10)	7.1	7.1


Teamwork

Conclusions



- **Rt. 28 was healthier in terms of nutrient loading but Herring Run was healthier in terms of dissolved oxygen and creatures**
- **Upstream water quality may have suffered from runoff from Rt 495 and Rt 28**
- **Buffering, diversity of downstream habitat and waterfall (aeration) can help undo some of the effects of pollution**
- **Time of year for bug sampling not ideal**