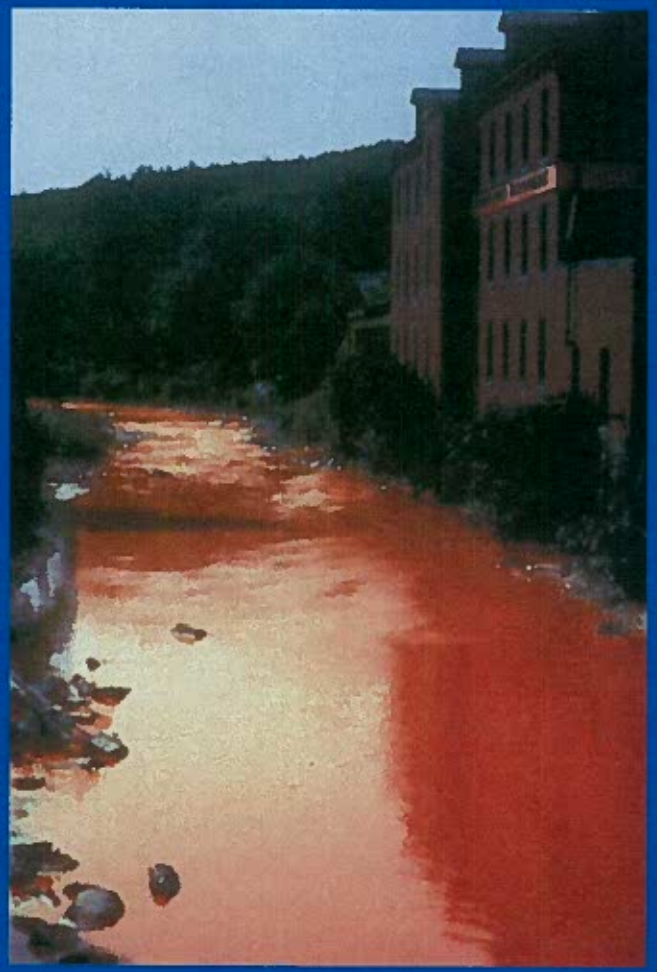
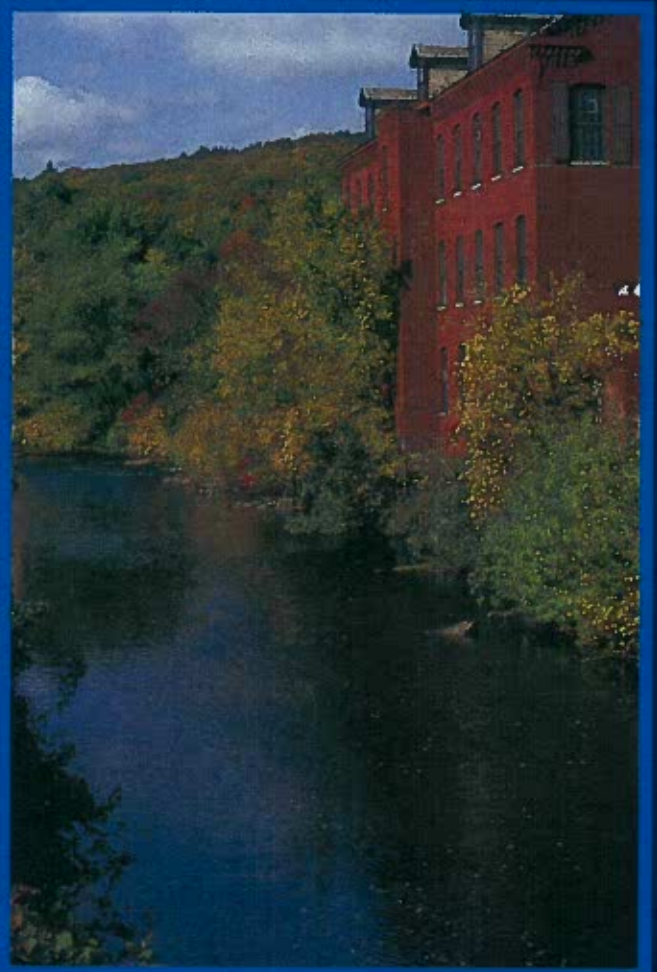
PP-2

Site Selection for the Nashua River Watershed Association Volunteer Water Monitoring Program

The Nashua River Watershed

The Nashua River



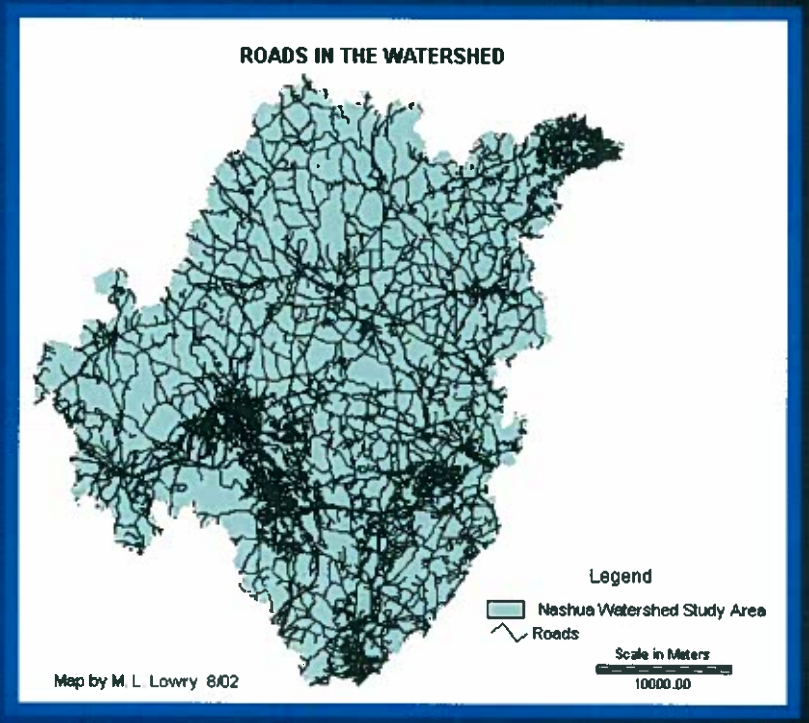


The Nashua River Watershed Association Volunteer Water Monitoring Program

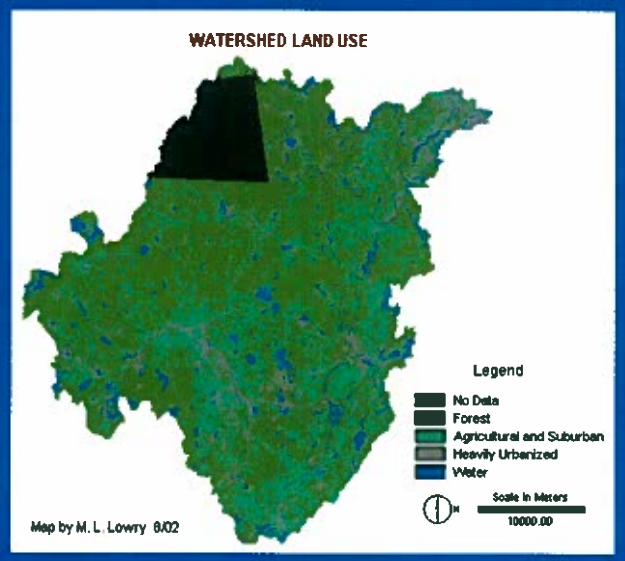
- Began in 1993
- Monitoring areas of local concern
- Testing for water quality problems and trends
  - 25-40 changing sites chosen by monitors
  - April to October, 3rd Saturday each month
  - pH, alkalinity, DO, coliform bacteria, air and water temperature, visual assessment, recent precipitation, current water level
- Uses inconsistent site selection process

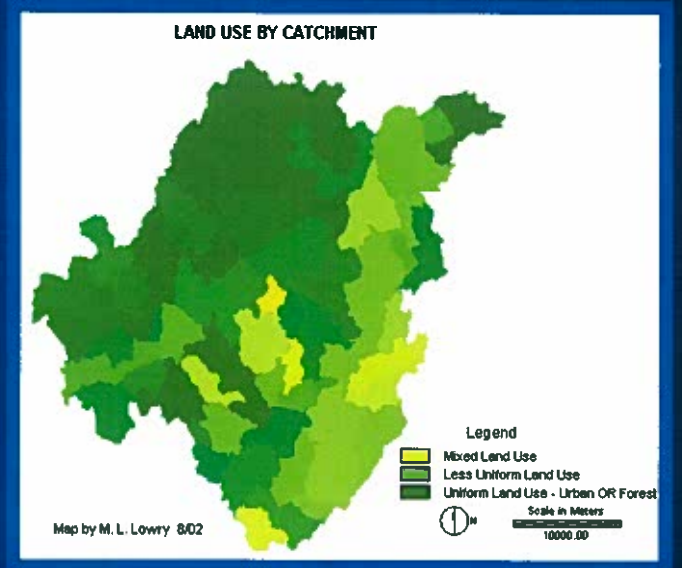
Analysis Factors

- Areas with Water Quality Issues: Class A or Impaired
- Large and Mid-Sized Confluences
- River Recreation Areas
- Public Water Supply Wells
- Point Discharges
- Waste Disposal / Transfer Areas
- Site Access
- Land Use



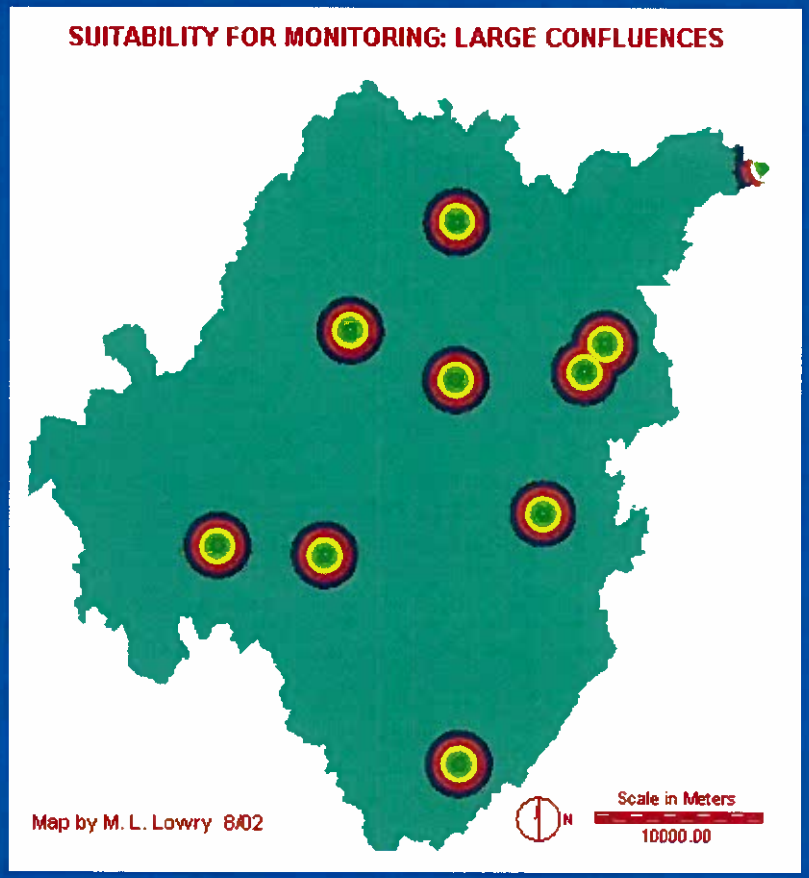
Land Use





- Land Use Affects Water Quality
- Forests and Imperviousness are Important Qualities
- Land Use Reclassified to 4 Categories
- Dominant Catchment Land Use Calculated
- Most Suitable Sites are Mostly Forest or Mostly Urban

Other Factors and Suitability



- 9 Factors for analysis
- 9 Suitability maps: Land Use, Water Class, 7 Distance
- Example of Suitability by Distance: Factor Map → Distance Map → Suitability Map

Multi-Criteria Evaluation

	Roads	LgCon	LU	MdCon	PtDisch	Wells	RivRec	SWD	WQ
Roads	1								
Large Confluences	1/2	1							
Land Use	1	1/2	1						
Medium Confluences	1/2	1	1/2	1					
Point Discharges	1/2	1	1/2	1	1				
Public Wells	1/3	1/2	1/3	1/2	1	1			
River Recreation Areas	1/3	1/2	1/3	1	1	2	1		
Waste Disposal	1/3	1/2	1/3	1/2	1	1	1	1	
High/Low Water Quality	1/3	1/2	1/3	1	1	1/2	1/2	1/2	1

- MCE = Suitability + Weight
- Pairwise comparison of factors for relative importance
- Eigenvector of importance of each factor in MCE calculation

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The eigenvector of weights is :

distance from roads : 0.2027
large confluence : 0.1452
land use : 0.1795
mid-sized confluence : 0.1011
point discharge : 0.0861
public water supply : 0.0680
river recreation : 0.0852
solid/hazardous waste : 0.0726
water class : 0.0596

Consistency ratio =   0.03
Consistency is acceptable.
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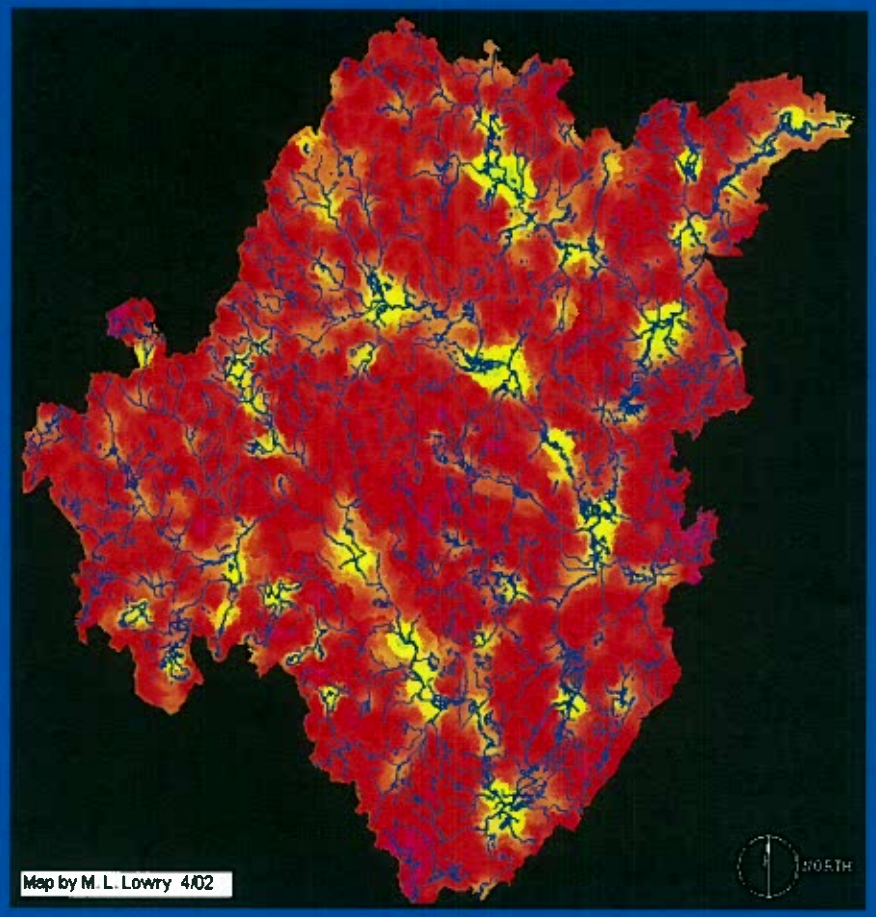
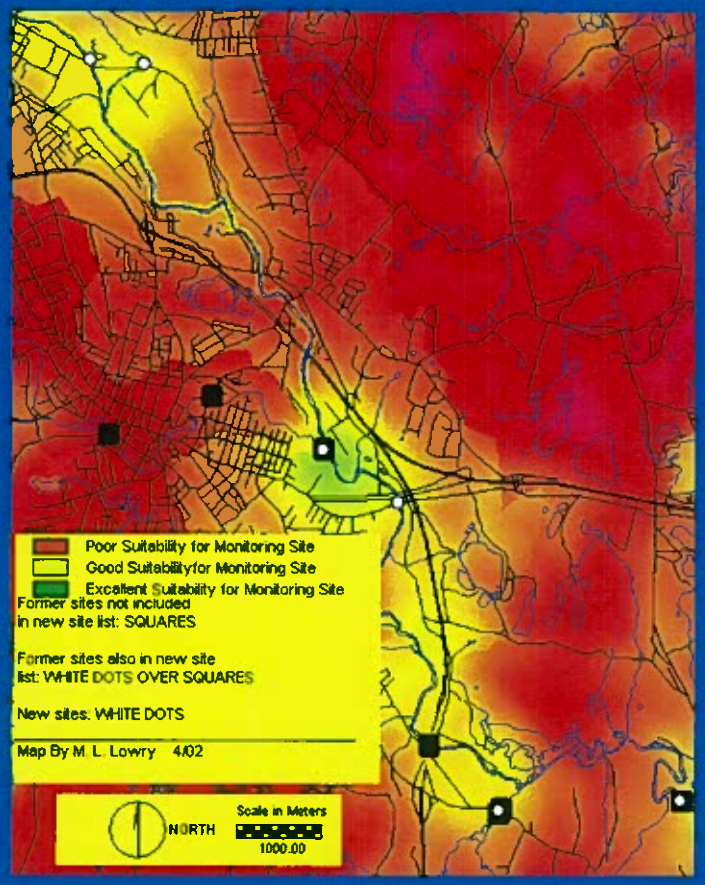
MCE Results



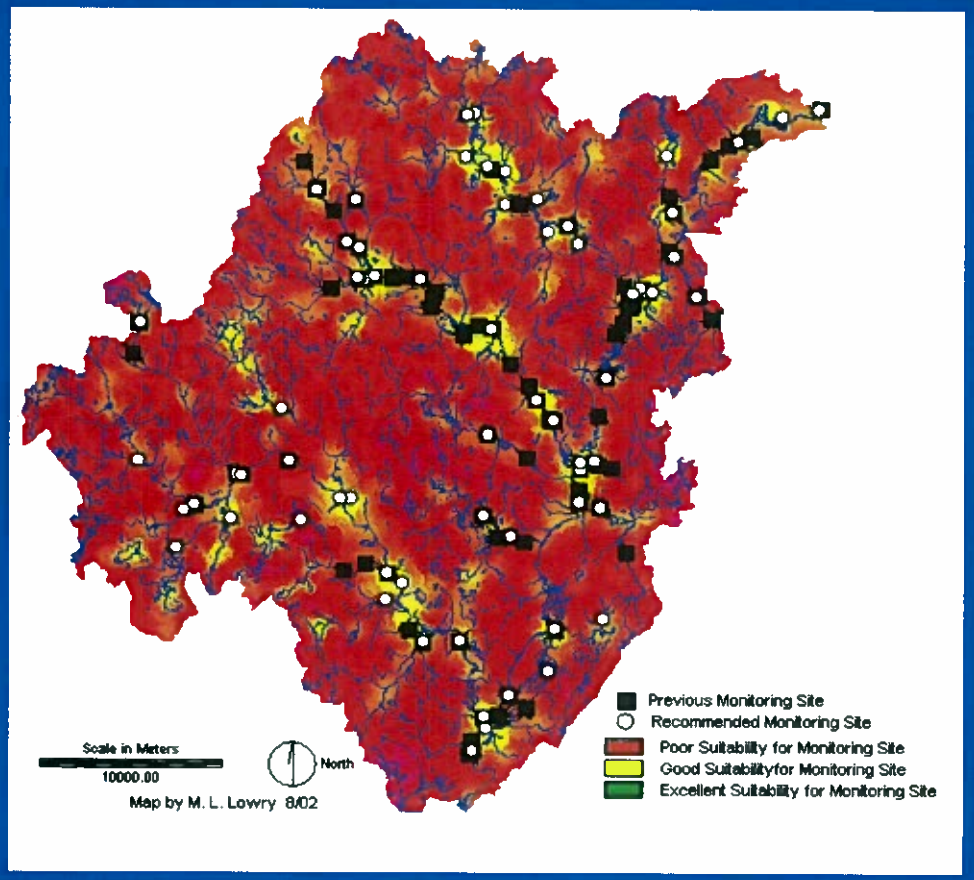
- Suitability for monitoring everywhere in the watershed
- Next step is site selection

Site Selection

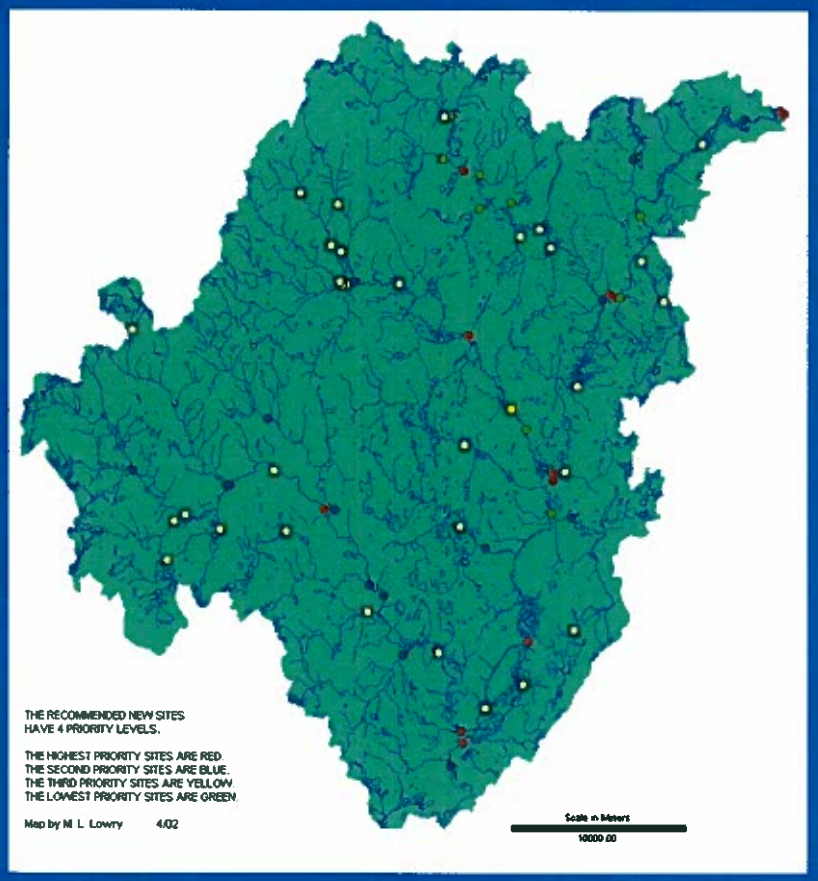


- Use MCE +Hydrography + Previous Sites + Roads to chose new sites
- Consider direction and volume of streamflow and site redundancy
- Keep many old sites
- Add some new sites
- Drop some old sites

Recommended Sites



Site Priority



- Priority 1: 11 sites to monitor every year for overview of water quality
- Priority 2: 14 sites to reach most tributaries
- Priority 3: 33 sites to attain complete coverage of the watershed
- Priority 4: 9 sites to monitor if volunteers are focused on a particular stream or river reach