



# Save Our Streams

- Conservation organization
  - stream monitoring, clean-ups, restoration, buffer plantings, stream monitoring
- Watershed Watch Network & AmeriCorps used SOS



THE IZAAK WALTON LEAGUE OF AMERICA





# NJ WATERSHED AMBASSADORS PROGRAM



- Environmental Community Service Program
- Raise Public Awareness about Water and Watersheds
  - Partnership Projects
    - rain gardens and rain barrels
    - stream clean ups
    - training workshops
  - Environmental Presentations
  - Water Monitoring (1000 assessments per year)



# *Volunteer Biological Monitoring: Can It Accurately Assess the Ecological Condition of Streams?*

- Sampling w/ professional methods concurrently w volunteers using SOS protocol
- Solely based on presences or absences of taxa
- 35% of samples were not in agreement
- Due to inaccuracy of oversimplified numeric analysis

**Voshell, J. R, and Sarah R. Engel. 2002.**

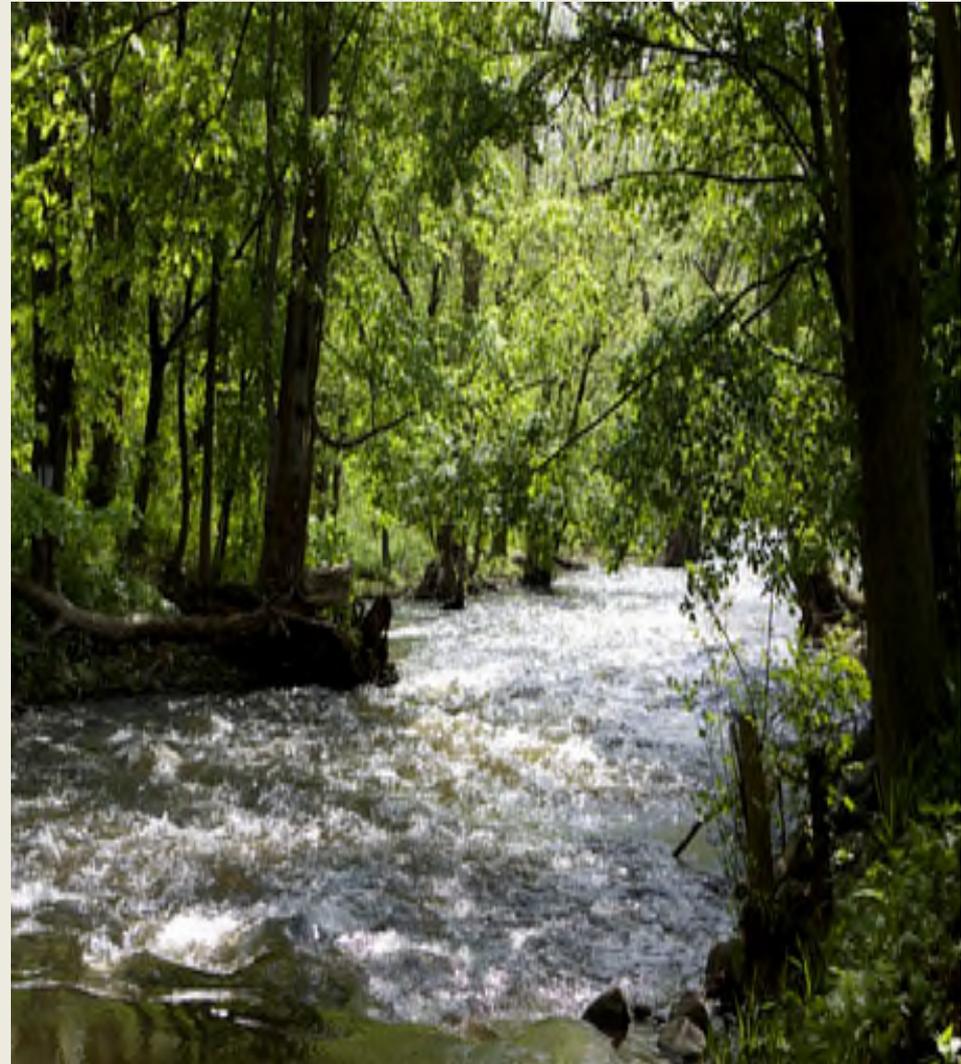
# Conclusion of Study

*“...volunteer biological monitoring programs can provide reliable information about ecological condition, but every protocol needs to be validated by standard quantitative methods.”*



# Change in Protocol—VA SOS

- Developed quantitative multimetric index appropriate for both volunteers and professionals
- New protocol has an agreement of 96% between professional and volunteer methods



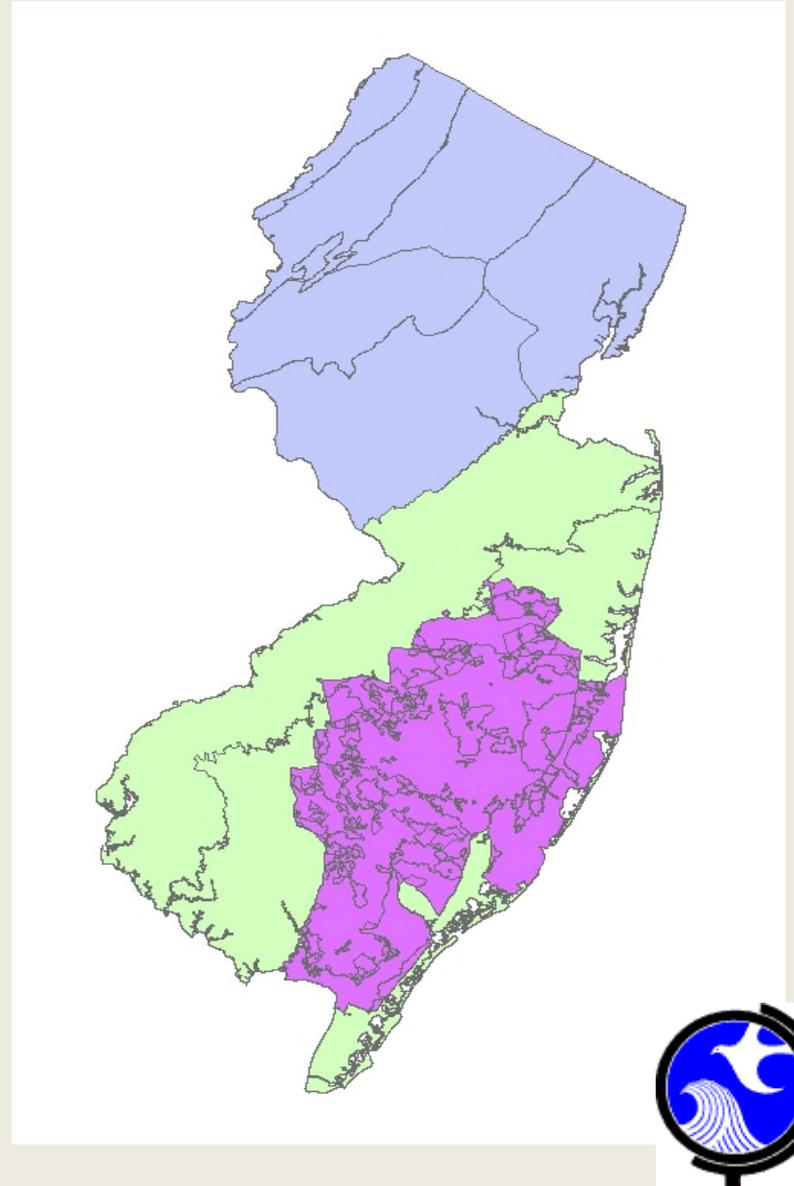
# NJDEP Streamside Macroinvertebrate Protocol

- 2000-05 protocols based on presences/ absences of taxa
- 2005-2010 added counting number of individuals
  - One size fits all approach to metrics was not working
  - Unreliable in the Pinelands & Coastal Plain Ecoregions



# Study Goals

- Evaluated the effectiveness of current protocol in Northern High Gradient, Coastal Plain and Pinelands ecoregions
- Developed 2 new order level multi-metric indices for Coastal Plain and Pinelands



# Better tools for Biomonitoring

- Multimetric Index
- Sensitive to Ecoregions
  - Coastal Plain
  - Pinelands
- Aligns with NJDEP's Fresh Water and Biological Monitoring Indices for HMGI, PMI, CPMI
- User friendly Stream Side Identification



# Comparing Protocols In High Gradient Streams

- Original Save our Streams ( presences/absences)
  - Only works for high gradient
- NJDEP NJ Impairment Score & High Gradient Macroinvertebrate Index
  - Agreement
- New Virginia Save our Streams
  - Agreement
- New NJDEP Volunteer Index
  - Agreement



Macroinvertebrate	Tally	Count
Caddisflies 		
Mayflies 		
Stoneflies 		
Watersnipe Flies 		
Riffle Beetles 		
Water Pennies 		
Gilled Snails 		
Hellgrammite/Fish Flies 		
Net Spinning Caddisflies 		
Crane Flies 		
Damselflies 		
Dragonflies 		

Macroinvertebrate	Tally	Count
Alderflies 		
Crayfish 		
Scuds 		
Sowbugs 		
Clams/Mussels 		
Worms 		
Black flies 		
Midge flies 		
Leeches 		
Lunged snails 		
Check one: <input type="checkbox"/> High Gradient <input type="checkbox"/> Pinelands <input type="checkbox"/> Coastal Plain		<b>Total Number of Organisms in Sample</b>
Check here if sample count does not equal 100 macroinvertebrates.		Score:

# Volunteer Coastal Plains Macroinvertebrate Index

1 Number of EPT Taxa

2 Percent NonInsect Taxa

3 Beck's Biotic Index

4 Percent Intolerant Taxa

5 Percent Worm, Leech and Lunged Snail Individuals



# Volunteer Pinelands Macroinvertebrate Index

- 1 Percent Crustacea & Mollusca Taxa
- 2 Number of Insect Taxa
- 3  $\text{Number of EPT Taxa} / (\text{Number of Tolerant Taxa} + 1)$
- 4 Percent Worm, Leech & Lunged Snail Individuals
- 5 Number of Tolerant Taxa



Coastal

Then 22% agreement

VS

Now 62% agreement

Pinelands

Then 2% agreement

VS

Now 56% agreement



# *Ah-ha Moment*

- Use for Integrated Report
  - data of a known quality
  - chemical, pathogens, physical, habitat and macroinvertebrate
- The Macroinvertebrate tell the story....
  - Recalibrated Indices
  - Excellent or Poor Quality Streams
  - List or Delist for Assessment



# New Breakdowns

## Volunteer High Gradient Index

$\geq 20$  healthy

19-13 undetermined

$12 \leq$  Stressed

## Volunteer Coastal Plains Index

$\geq 65$  Healthy

64-36 undetermined

$\leq 35$  Stressed

## Volunteer Pinelands Index

$\geq 75$  Healthy

74-46 undetermined

$< 45$  Stressed



# New Approach

- More Accessible to Citizen Scientists
- Reliable Assessment Tool for Eco-regions
- Cost effective Method for Assessment



# References

- **Voshell, J. R, and Sarah R. Engel. 2002.** Volunteer Biological Monitoring Can It Accurately Assess the Ecological Condition of Streams? American Entomologist: p164-176
- **Stamp, J., and Benjamin Jessup, and Danielle Donkersloot. 2010.** Stewardship-Level Macroinvertebrate Index Development for Northern NJ High Gradient, Pinelands and Coastal Plain Streams.
- **Jessup, B. 2007.** Multimetric Indices and Regulatory Thresholds For Benthic Macroinvertebrate Data In Wadeable Streams

