

Constructing vernal pools for wetland mitigation: how well are we doing?



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BACKGROUND – *vernal pools*

- Seasonally-flooded, shallow depressions
- Timing and length of inundation
- Isolated waters, often associated with forests



NO FISH!



Critical breeding habitat for focal species!



BACKGROUND – creating vernal pools

- Creating vernal pools: mitigation, enhancing habitat
- *“Among the most difficult wetland systems to create”**
- Limited monitoring; success criteria
- To date, research studies have not been holistic

*National Research Council 2001

<http://jeffjosephwoodworker.com/2012/10/31/vernal-pools/>



Upper Susquehanna Coalition



Schuyler, Chemung,
& Tompkins Co., NY



Study Sites – mixed deciduous-coniferous forests

Stewart International Airport

2006: 12 vernal pools created

- Mitigation for wetland impacts from access road

Monitoring (10 years); 5 pools with no water!



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Yale Myers Forest

Six vernal pools

Long history: wood frog & spotted salamander breeding



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2013 and 2014: physical, chemical, and biotia

RESULTS - physical

- Created pools:
 - Smaller size; more open canopy (leaf off)
 - 5 of 7 pools dried seasonally
- Similar substrate cover, leaf litter input
- Vegetation:*
 - More duckweed, *Phragmites*, and cattail

Results – biota

- Algae (no difference)



RESULTS – water chemistry

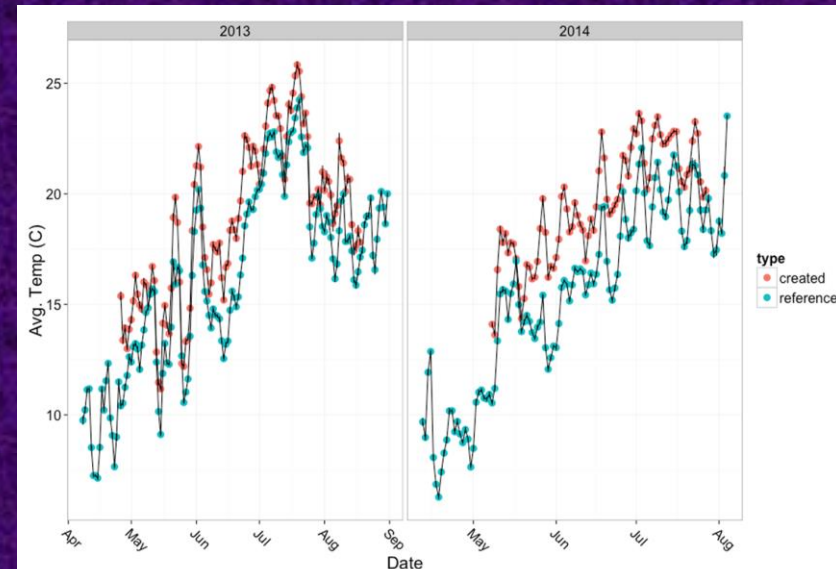
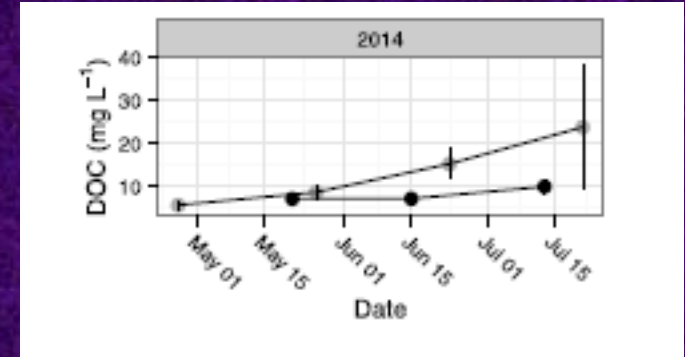
Nutrients

- Seasonal increase in N, P, DOC; especially reference pools

Higher pH, conductivity;
created pools

Water temperature

- Higher in created pools



RESULTS – macroinvertebrate (family)



- 39 families
- Similar richness
- Separated out by pool type (cluster, NMDS)

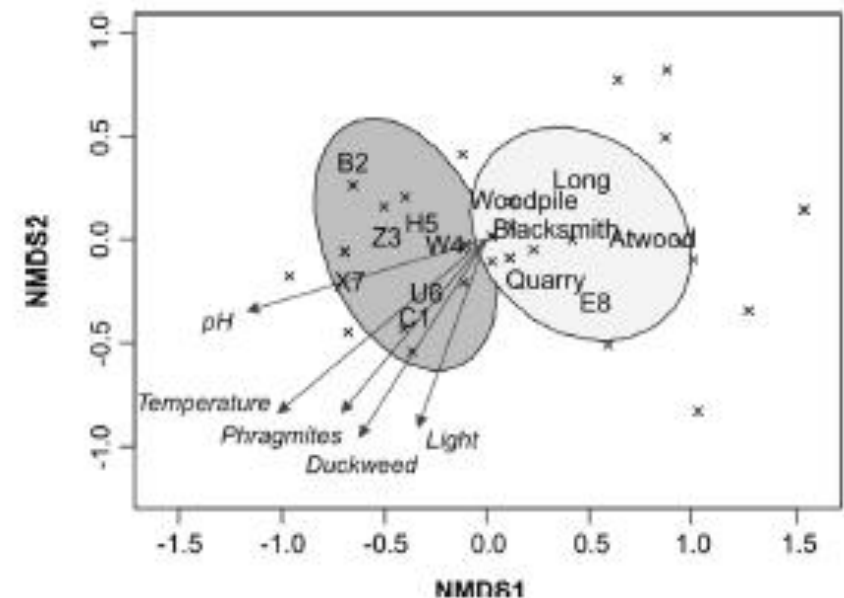
Shared common families	Common in created pools	Common in reference pools
Aeshnidae	Belostomatidae	Asellidae
Chaoboridae ^a	Coenagrionidae	Chirocephalidae ^c
Chironomidae ^a	Crangonyctidae ^b	Corydalidae
Corixidae	Haliplidae	Gyrinidae ^c
Culicidae	Hydrophilidae ^b	Phryganeidae ^c
Dytiscidae ^a	Physidae ^b	
Gerridae ^a		
Lestidae		
Libellulidae		
Limnephilidae		
Notonectidae ^a		
Sphaeriidae		



^a denotes families found in all thirteen pools

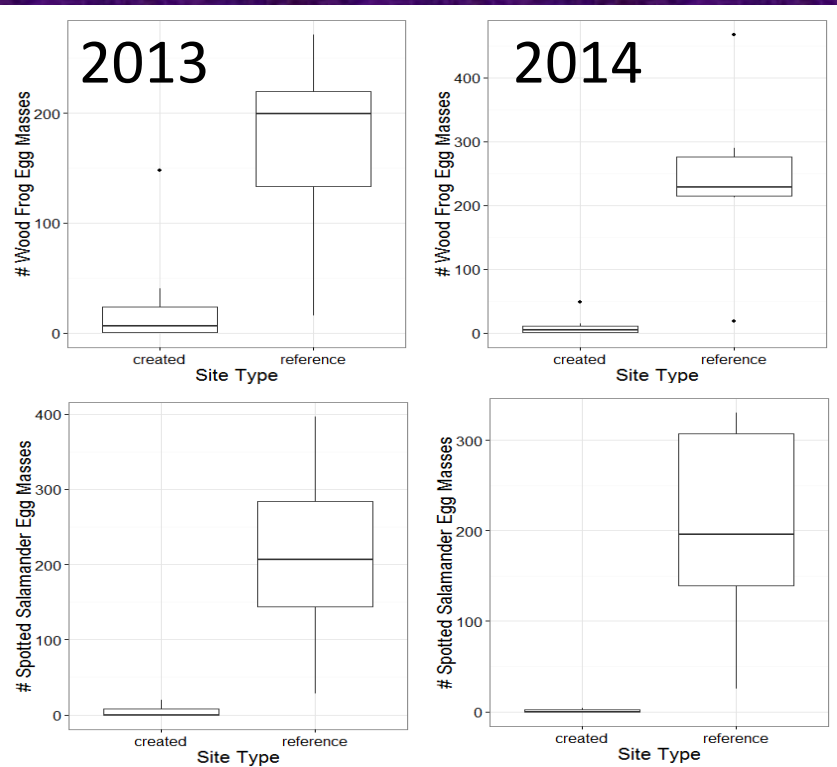
^b denotes families found exclusively in created pools

^c denotes families found exclusively in reference pools



RESULTS – wood frogs & spotted salamanders

- Seven amphibian species
- No difference in species richness or composition



Reference pools:

- Higher densities of egg masses and larval abundance

Created pools:

- 4 of 7 pools (both species)
- 2 wood frogs only
- 1 pool had neither

IMPLICATIONS/ACKNOWLEDGMENTS

- Should include canopy cover and forest connectivity (affect temperature, food resources, species)
- Improve ability to predict pool duration
- Monitoring needs to be long-term and more holistic



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