

Non-regulatory Protection of Vernal Pools in the Queen's River Watershed

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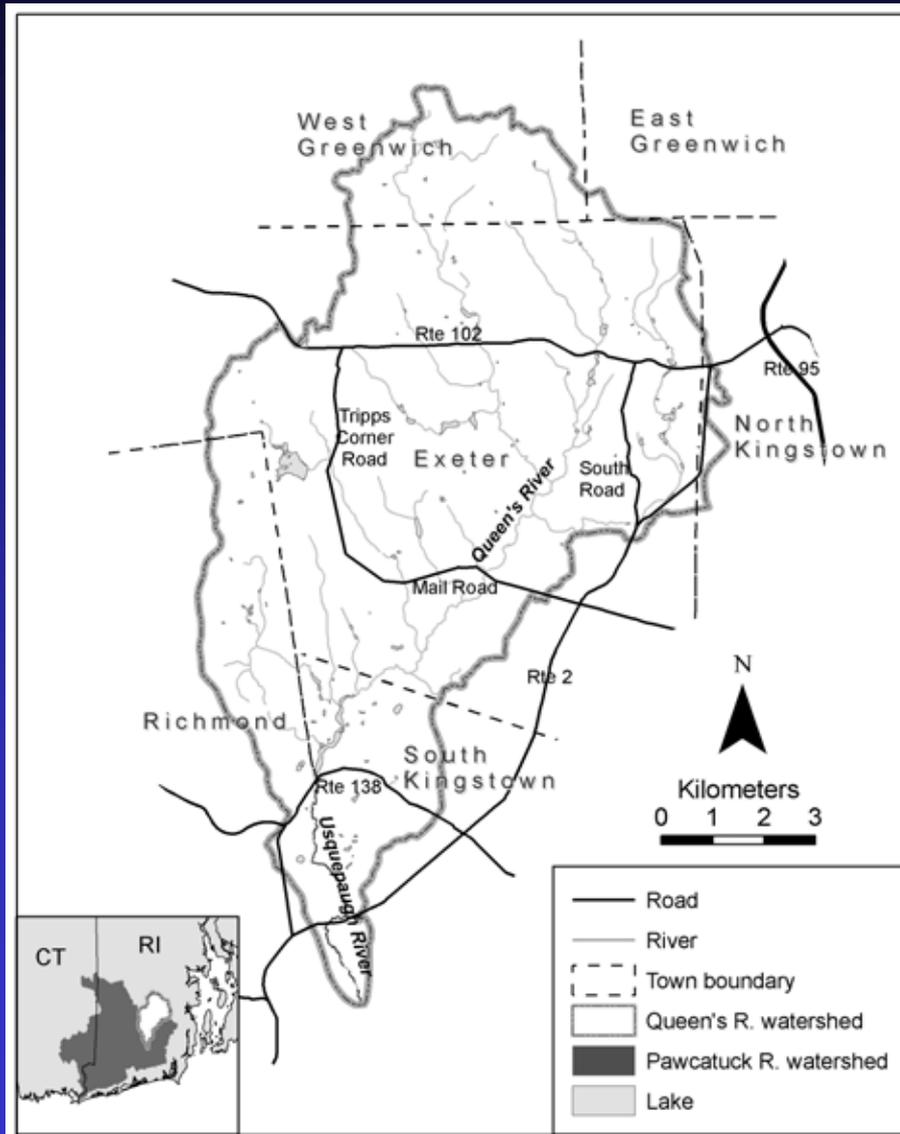
Department of Natural Resources Science



Methods : Overview

- **Identified area and sites**
- **Gathered data on pools**
 - Initial visit
 - Follow-up visits
 - Land use / cover GIS analysis
- **Classified and ranked pools**
 - Hydroperiod class
 - Pool size
 - Surrounding upland forest
- **Delineated hotspots and corridors**

Methods: Identifying Study Sites



- **Study area:**
Queen's River watershed
- **Identified pools** using digital orthophotos
- **Contacted landowners**

Methods: Field Visits

Initial Visit

- **Located pools**
- **Spoke with landowners**
 - Answered questions
 - Gathered information
- **Identified pools for further study**
 - Included if likely to support pool-breeding amphibians
 - Excluded if known or likely to support fish population



Methods: Field Visits



Follow-up Visit

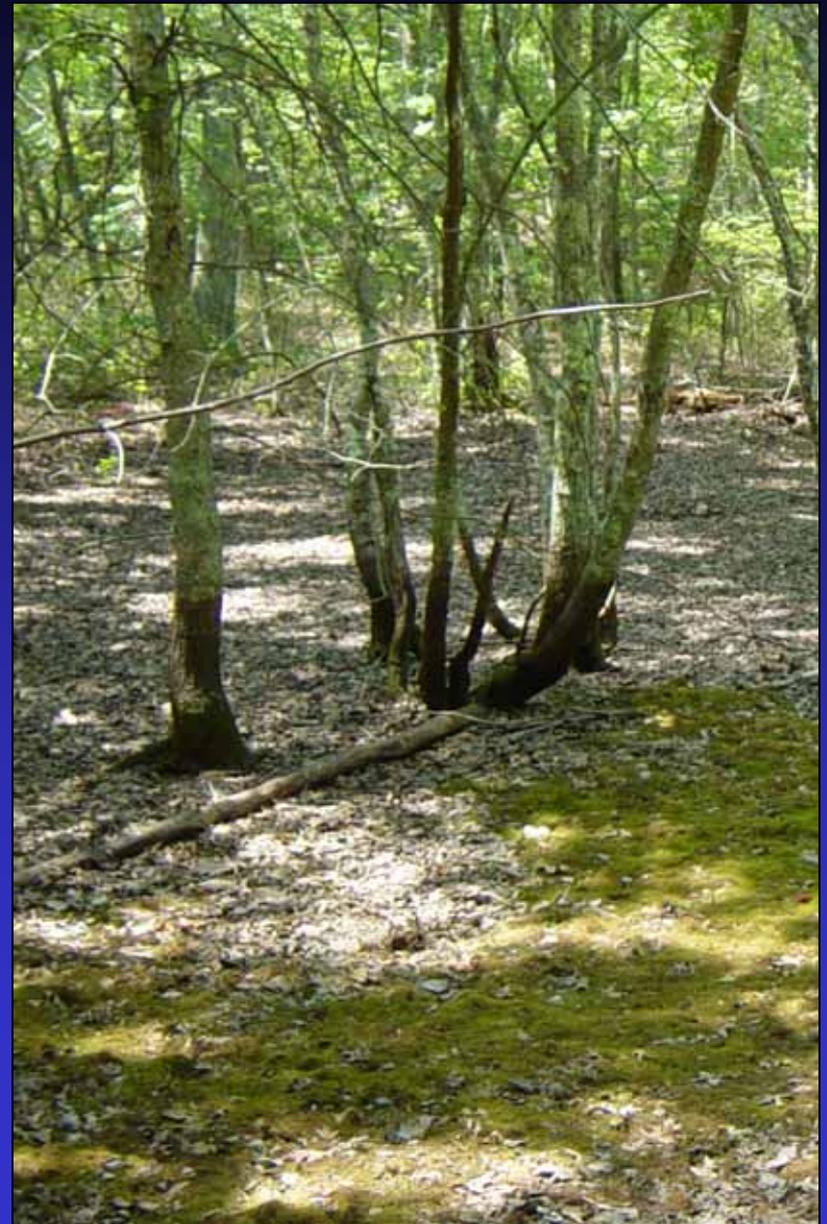
Focused on data collection for hydroperiod estimation models

- **Plant method** – identified plants in deepest areas of pools
- **Skidds Model** (modified) –
 - specific conductivity
 - pool depth
 - canopy cover
 - surficial geology
 - forest cover

Methods: Field Visits

All Visits

- Area of pool using GPS
- Surrounding landscape
- Amphibian presence (eggs, calls, larvae, adults)
- Aquatic life (e.g., fish, beavers)
- Inlets, outlets
- Human impacts or disturbance
- Indicators of high water level
- Vegetation
- Substrate composition
- Water level, fluctuation



Methods: Classifying and Ranking Pools

- **Fishless pools were ranked based on 3 characteristics:**
 - Pool size (1 – 3)
 - Hydroperiod class (1 – 4)
 - Upland forest within 300 m of pool (1 – 3)
- **Pools considered to support fish were not ranked**
- **Pools not visited were ranked solely on upland forest (1 – 3)**

Table

Site visit?	Fish presence?	Pool variables	Classes	Class rank	Final rank				
Site visited	Fish present or likely	Not considered	NA	NA	Not ranked				
	Fish population absent or unlikely	Pool hydroperiod class	Class 1	1	Sum of all class ranks, one rank per variable				
			Class 2	2					
			Class 3	4					
			Class 4	3					
		Pool area (hectares)	< 0.05	1					
			0.05 - 0.15	2					
			> 0.15	3					
		Upland forest within 300 meters (percent)	< 30	1		Ranges from 3 to 10			
			30 - 60	2					
			> 60	3					
		Site not visited	Fish population unknown	Upland forest within 300 meters (percent)			< 30	1	Ranges from 1 to 3
							30 - 60	2	
> 60	3								

Methods: Delineating Hotspots & Corridors

- **Hotspot is an area capable of supporting unusually high productivity or high diversity of pool-breeding amphibians.**
 - Clusters of 3 or more high-ranking pools (rank of 8 – 10)
 - Pools within 1.5 km grouped together
 - Maximized forested area and minimized developed area
 - Extended 300 m beyond pools, unless developed
- **Corridor is an area of contiguous forest that connected at least two hotspots but that may not contain high numbers of ponds.**

Results: Pools

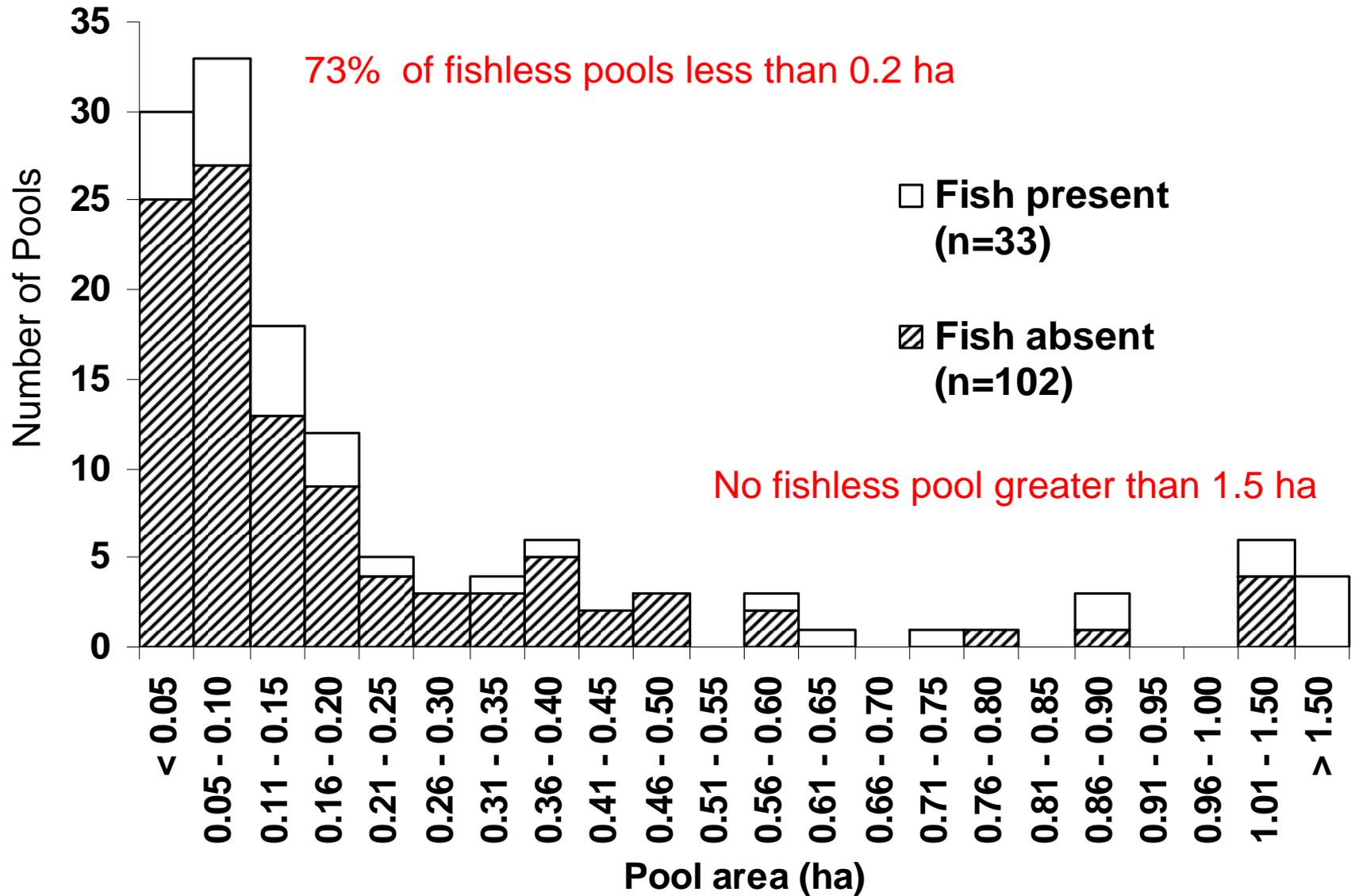
In Queen's River watershed, we identified:

- 253 pools
 - 118 were not visited
 - 135 were visited
 - 33 supported fish (single visit)
 - 102 estimated hydroperiod class

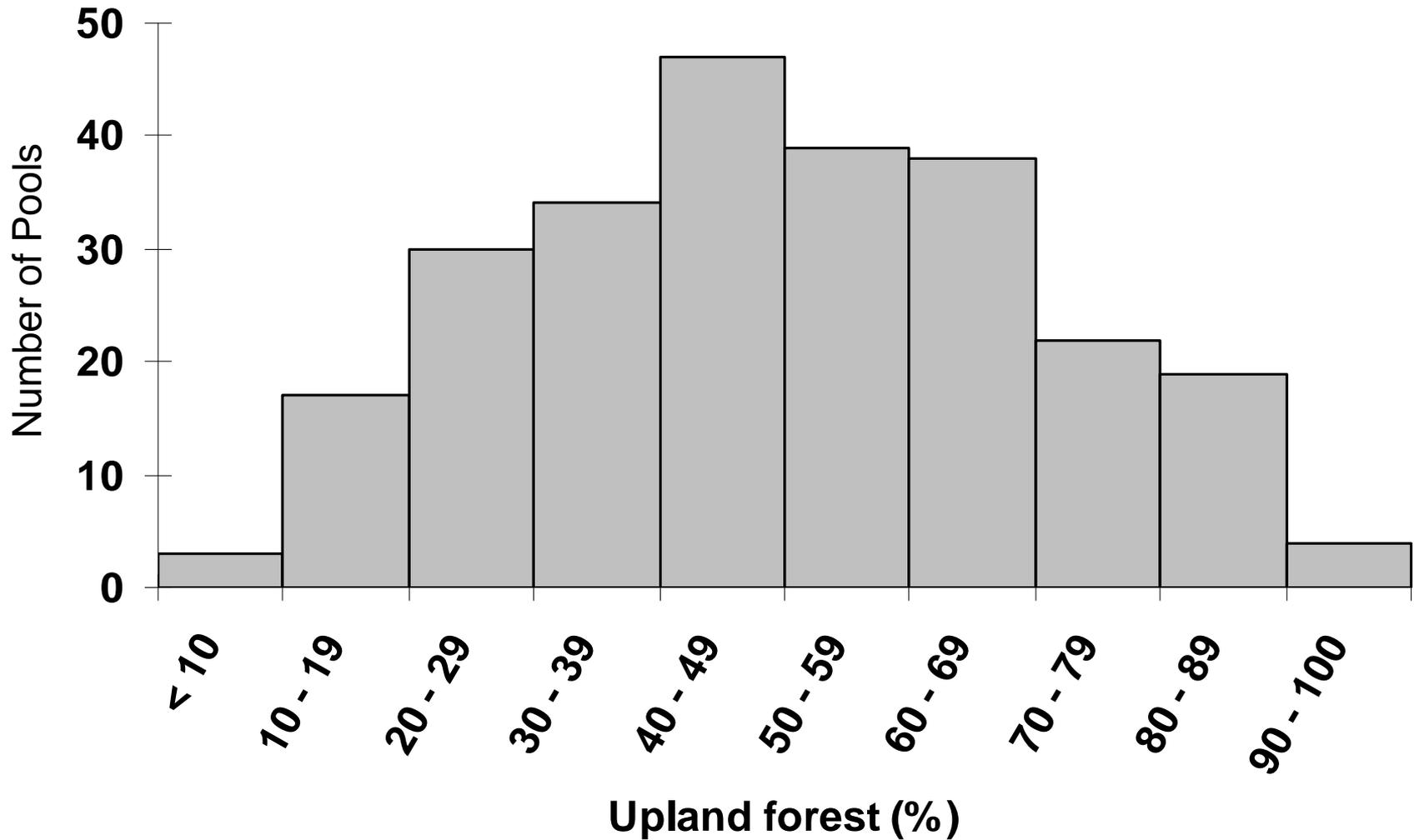
All but 11 pools were identified from orthophotographs.

Eleven were found in the field or by direction from a landowner.

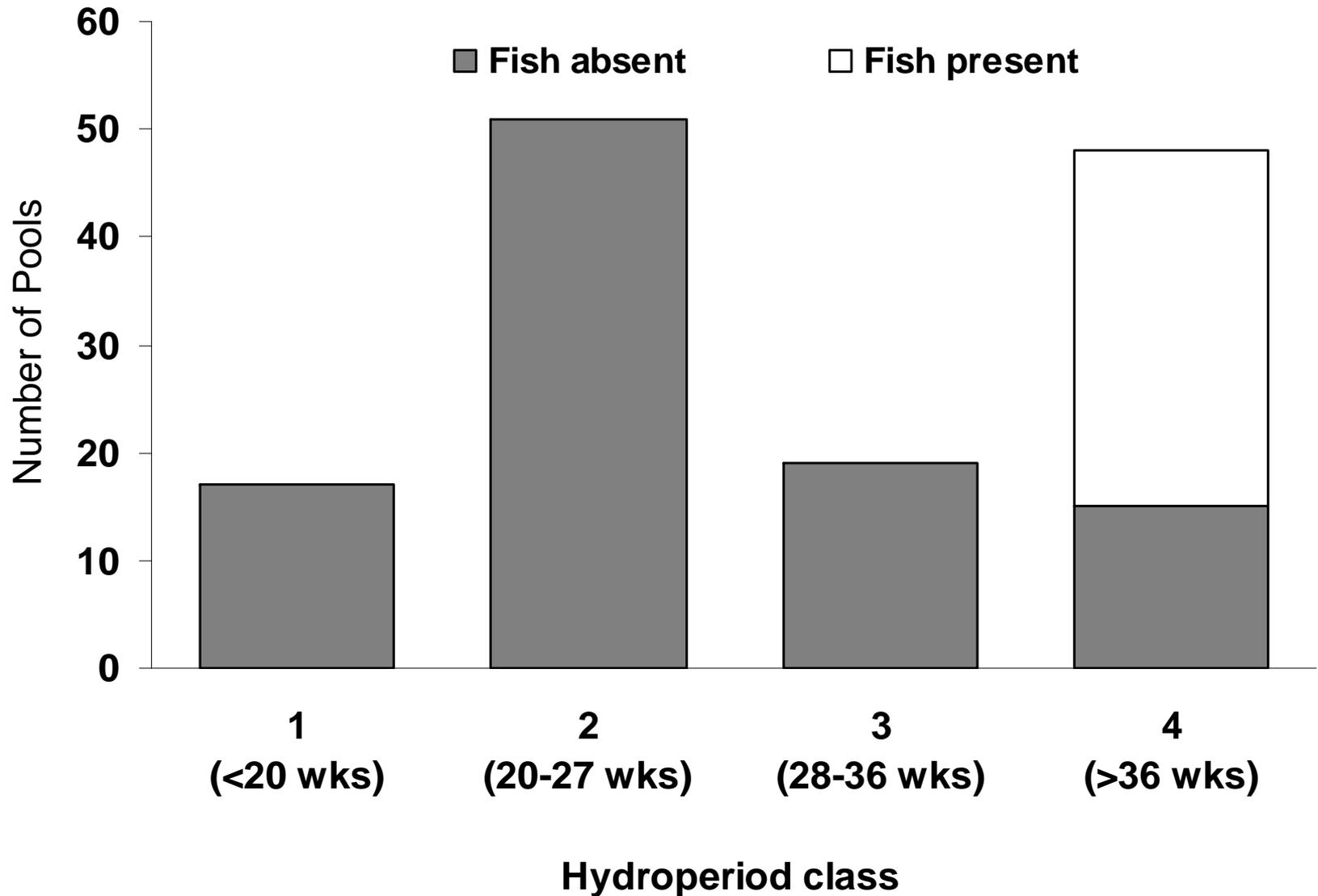
Results: Pool Size



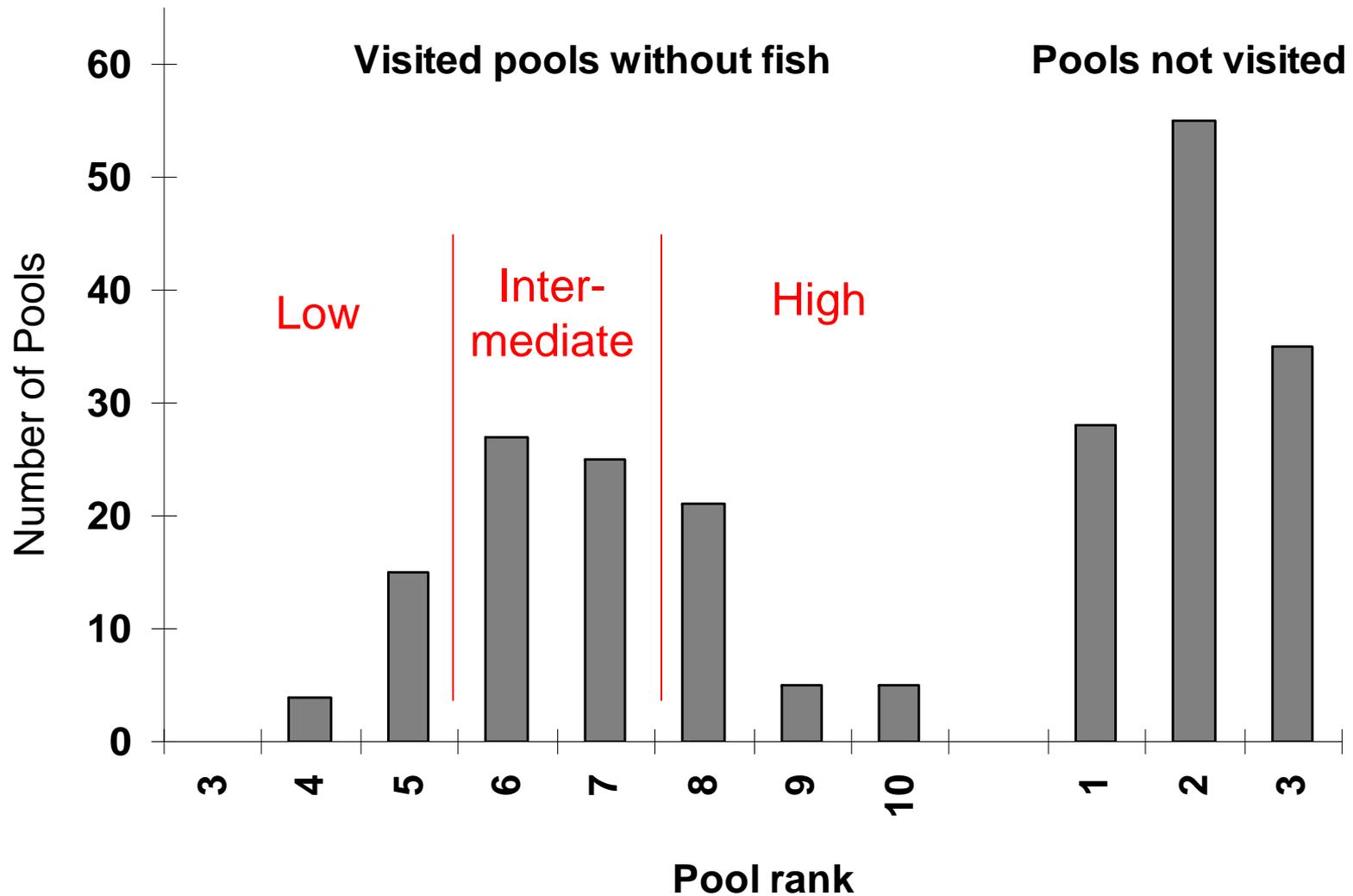
Results: Percent Upland Forest



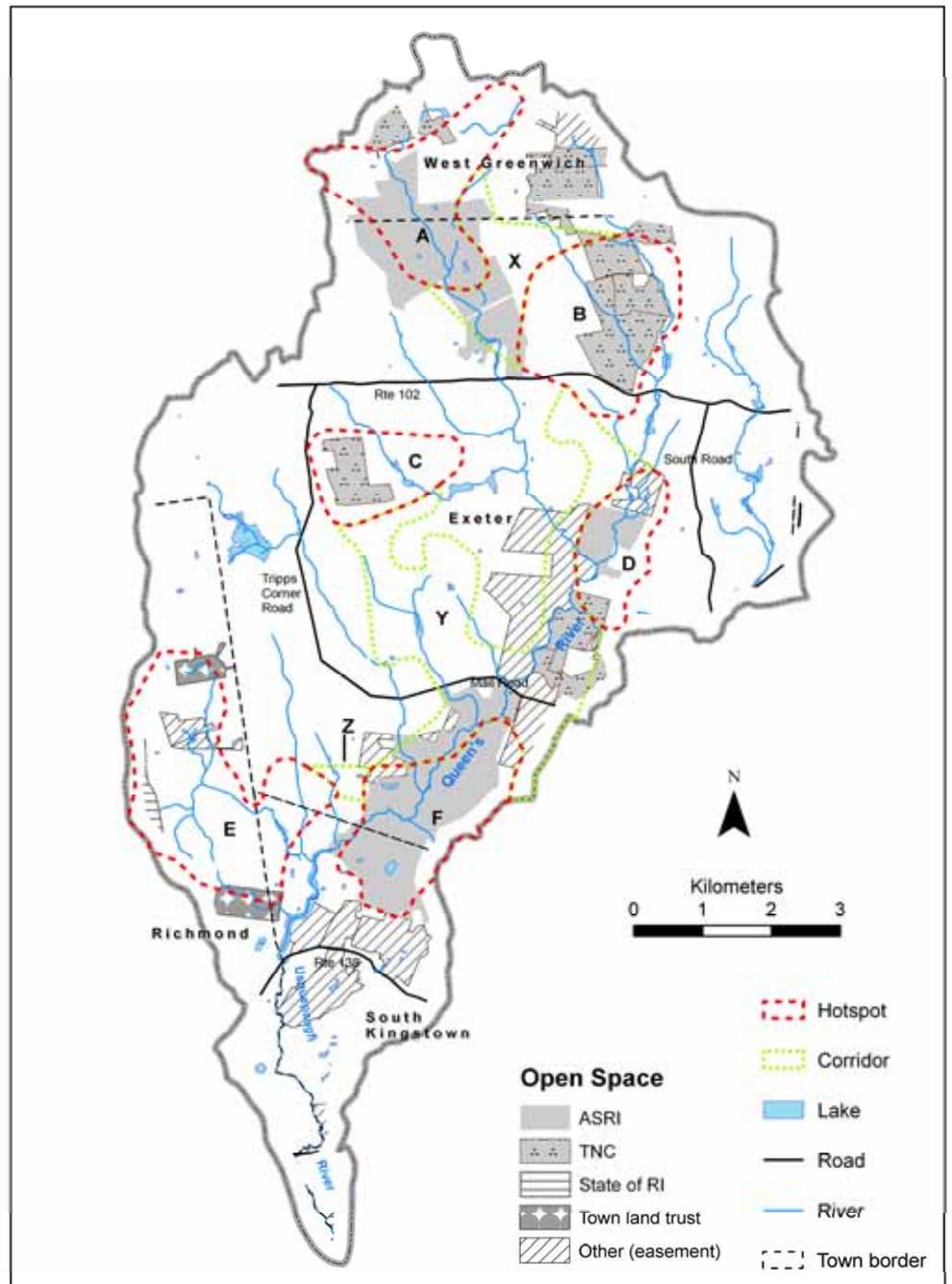
Results: Hydroperiod Class



Results: Pool Ranks



Results: Hotspots & Corridors



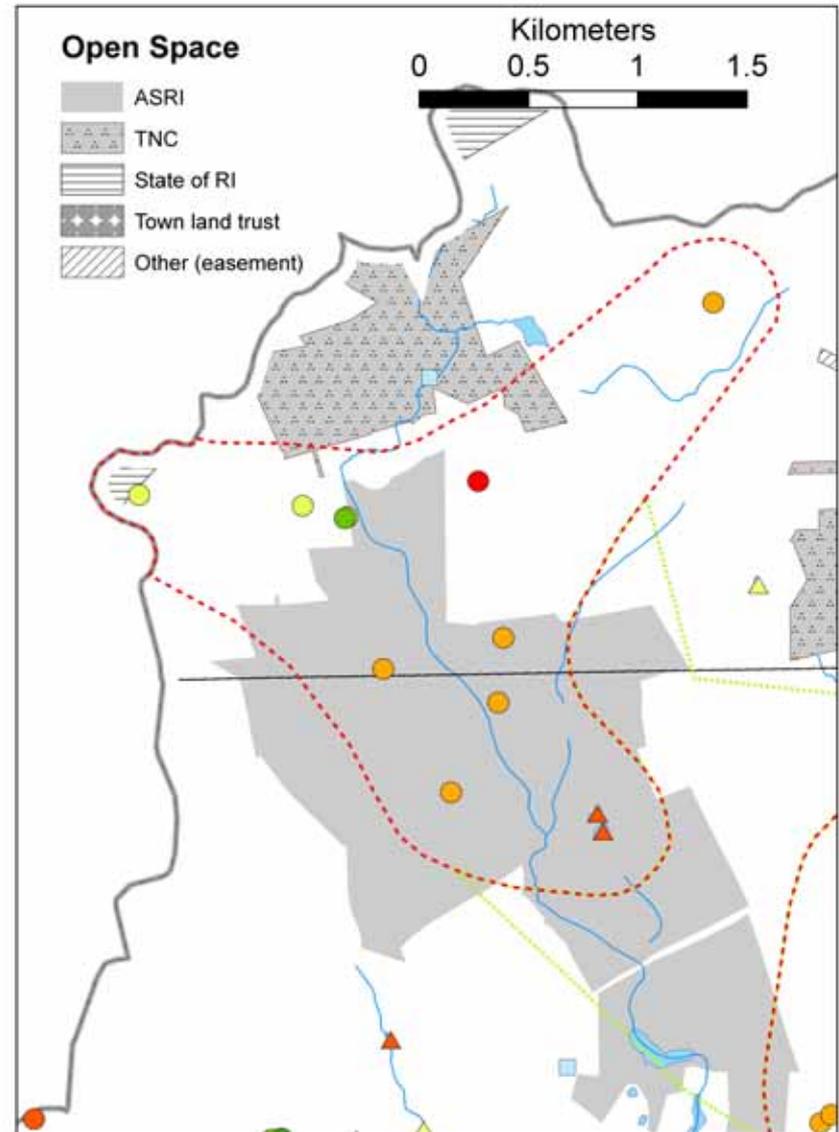
Results: Hotspots

We identified 6 pool-breeding amphibian hotspots:

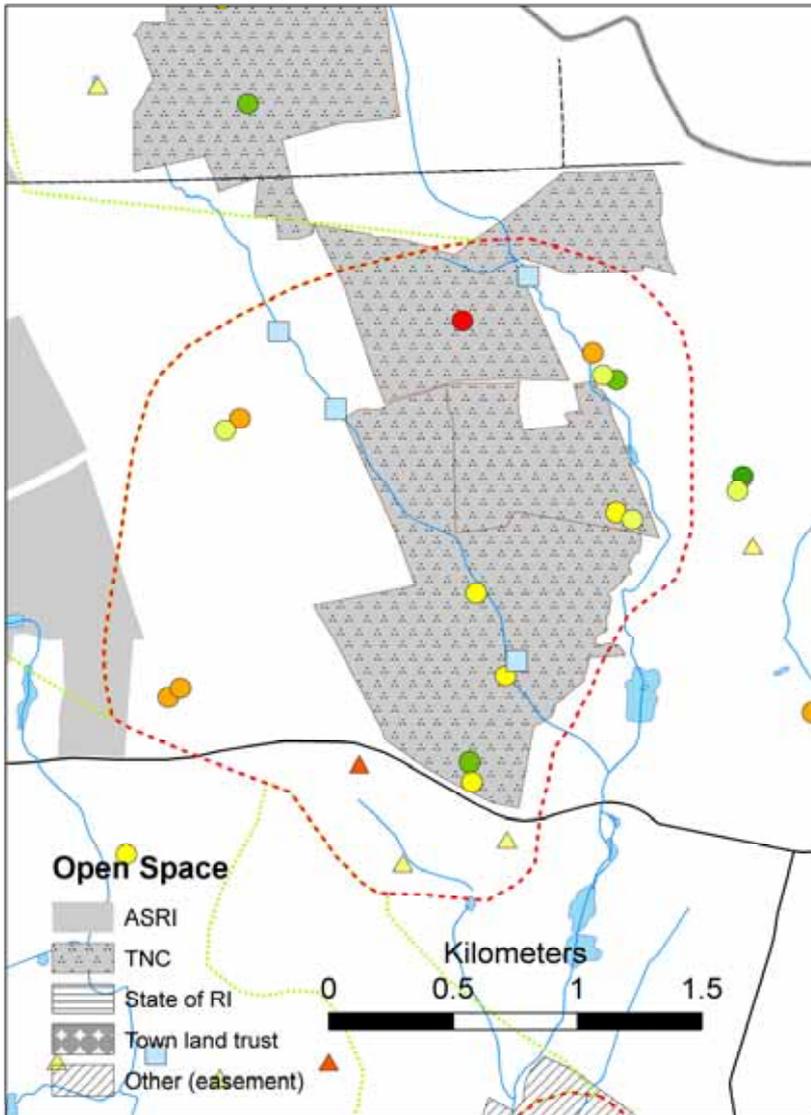
- **Labeled as A through F, from northwest to southeast**
- **Range from 197 ha to 606 ha**
- **Upland forest & wetland cover >85% of every hotspot**
- **Together, comprise 2,300 ha (24% of area in watershed)**
- **44% of total hotspot area is currently protected space**
- **All 6 hotspots encompass almost 40% of original 253 pools**
- **Includes 87% of high ranking pools, 54% of intermediate ranking pools and 28% of low ranking pools**

Results: Hotspot A

- In West Greenwich & Exeter
- North of rte. 102
- 416 ha
- 81% upland forest
- 12 pools, 6 high-ranking
- 2.9 pools / sq km
- 49% protected (mostly Fisherville)



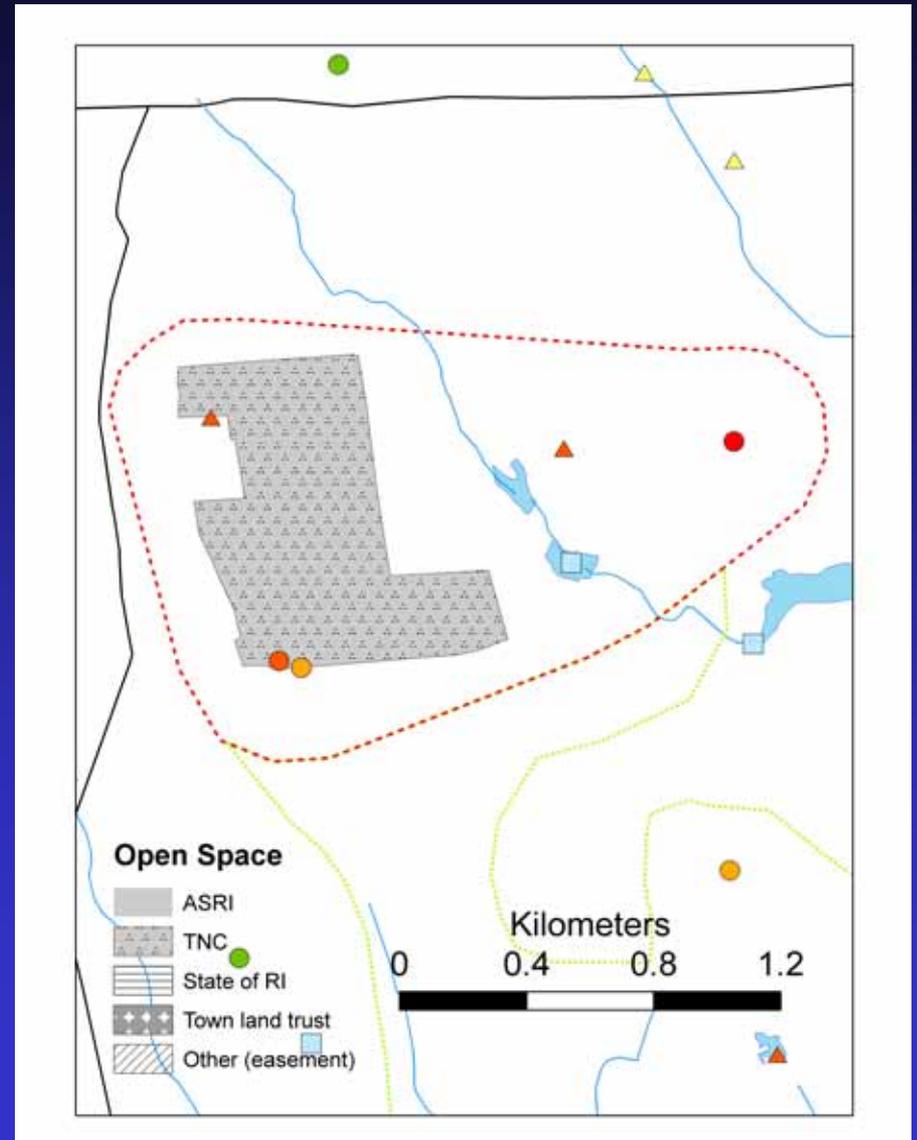
Results: Hotspot B



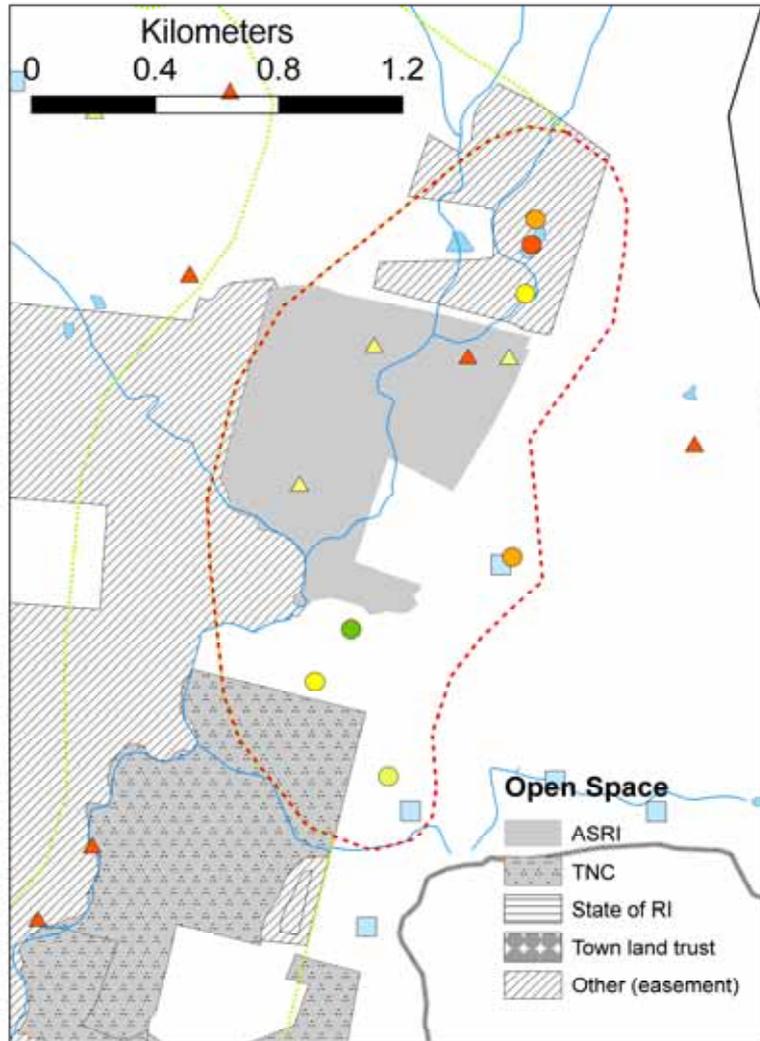
- In Exeter
- Straddles rte. 102, west of South Road
- 464 ha
- 74% upland forest
- 21 pools, 5 high-ranking
- 4.5 pools / sq km
- 42% protected (mostly TNC)

Results: Hotspot C

- In Exeter
- South of rte. 102, east of Tripps Corner Road
- 226 ha
- 83% upland forest
- 6 pools, 3 high-ranking
- 2.7 pools / sq km
- 26% protected (TNC)



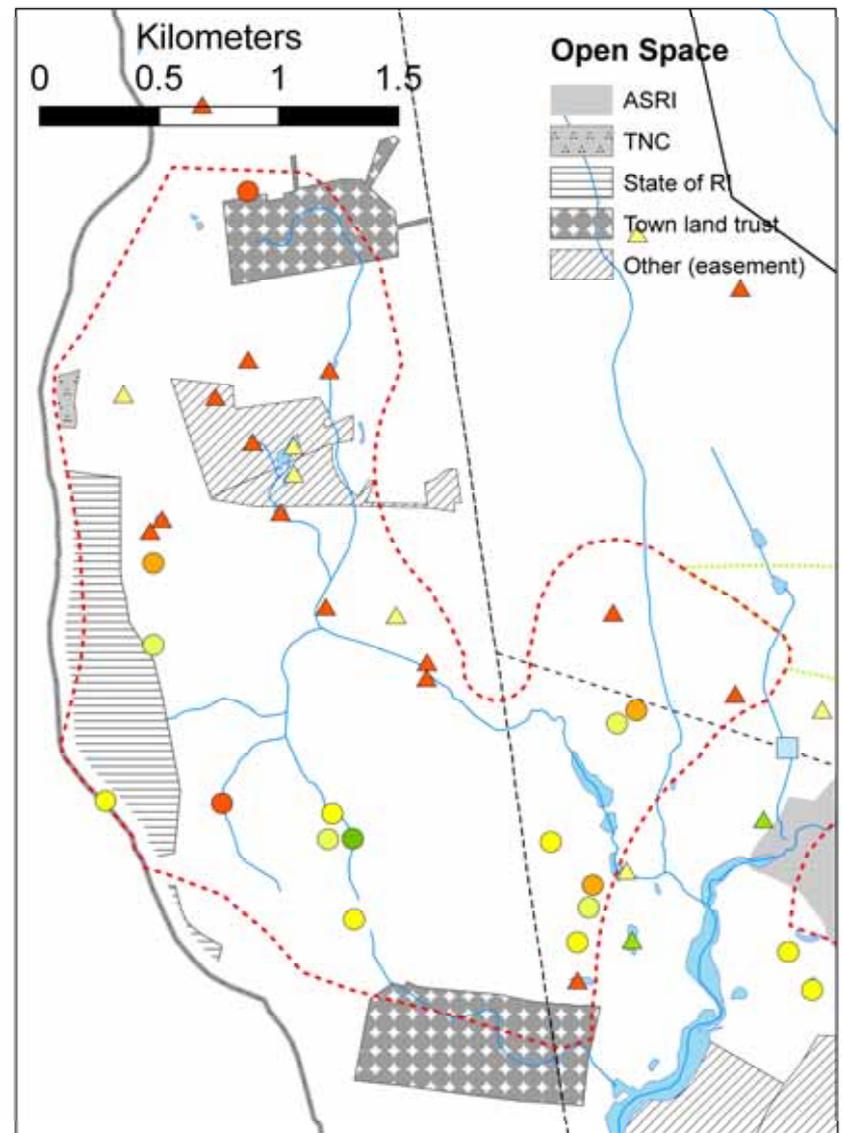
Results: Hotspot D



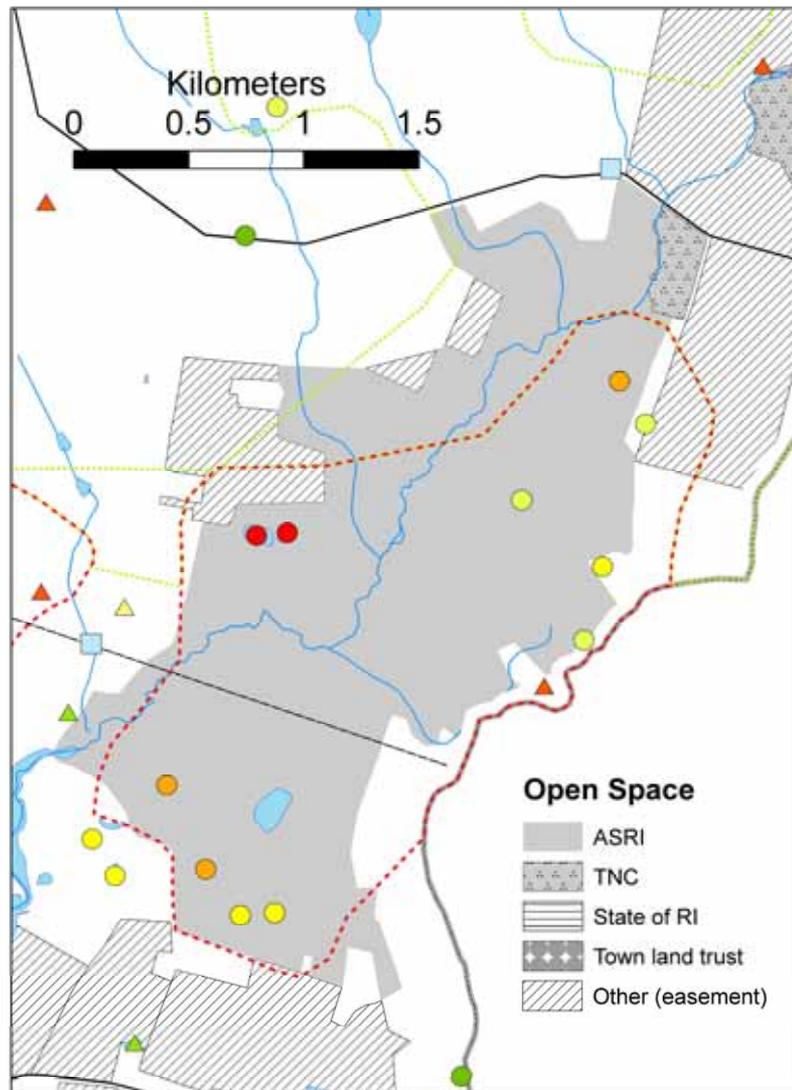
- In Exeter
- North of Mail Road, west of South Road
- 197 ha
- 43% upland forest
- 42% wetland
- 13 pools, 3 high-ranking
- 6.6 pools / sq km
- 57% protected (Eppley)

Results: Hotspot E

- In Richmond, Exeter, & South Kingstown
- Southwestern edge of watershed
- 606 ha
- 70% upland forest
- 32 pools, 5 high-ranking
- 5.3 pools / sq km
- 17% protected

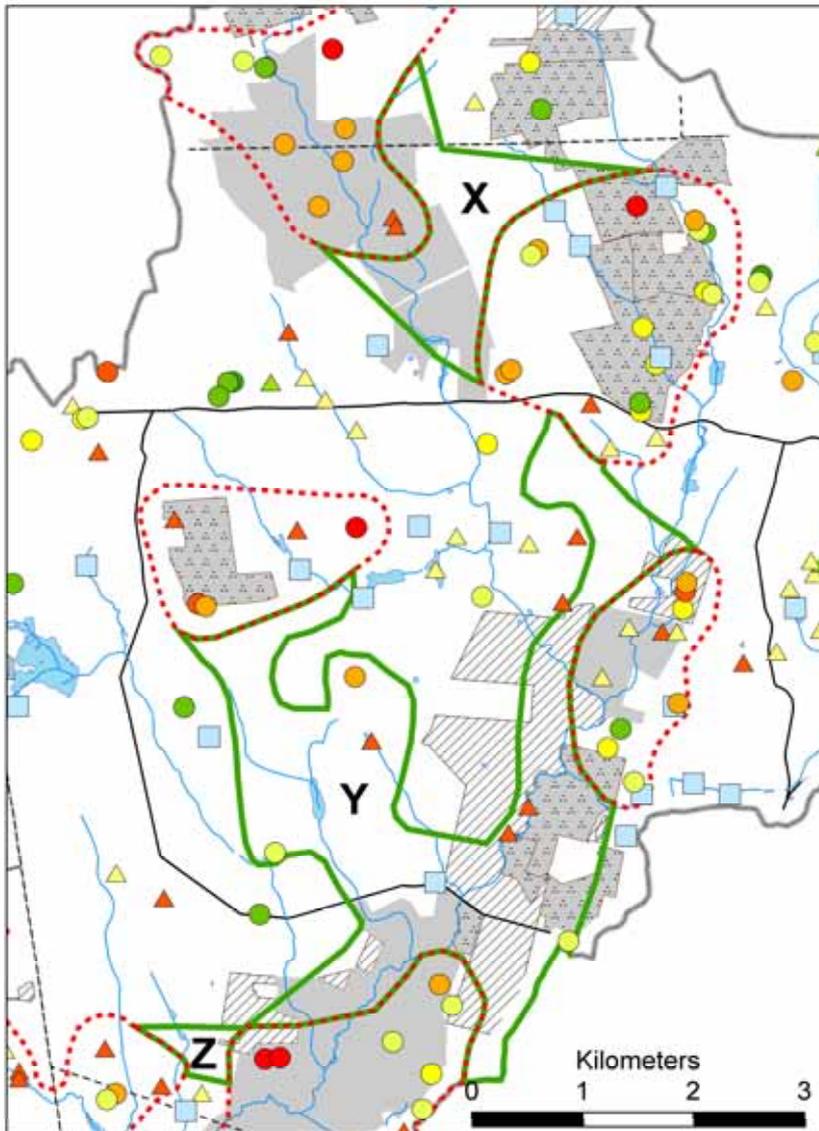


Results: Hotspot F



- In South Kingstown & Exeter
- North of rte. 138, south of Mail road
- 398 ha
- 57% upland forest
- 37% wetland
- 12 pools, 5 high-ranking
- 3.0 pools / sq km
- 88% protected (mostly Eppley)

Results: Corridors



Identified 3 corridors

- Corridor X connects A & B
 - contains no pools
 - 228 ha, mostly forest
 - 48% protected
- Corridor Y connects B, C, D & F
 - contains 7 pools
 - 856 ha
 - 40% protected
- Corridor Z connects E & F
 - contains no pools
 - 26 ha
 - mostly upland forest and agricultural land

Table

<u>Land cover</u> (%)	All hotspots	All corridors	Not corr./ hotspot	Queen R. Watershed	Pawc. R. Watershed	Rhode Island
residential	3	2	16	12	13	28
upland forest	71	80	51	59	57	43
water	<1	1	1	1	3	5
wetland	21	14	13	15	16	13
open land	4	3	18	13	11	11
<u>Protected space</u>	46	41	13	24	30	17
<u>Number of pools</u>						
not visited	29	3	86	118		
visited	67	4	64	135		
Total	96	7	150	253		

Discussion: High-Quality Watershed

- **Our results show that Queen's River watershed contains relatively high quality habitat for pool-breeding amphibians because of:**
 - high forest cover
 - abundance of wetlands
 - limited development
- **81% of visited pools ranked high or intermediate in their potential to support large and diverse amphibian populations**
- **Hotspots identified here encompass 24% of land in the watershed, but they encompass 87% of high ranking pools and 40% of all pools identified in this study.**

Discussion: Continuing Good Efforts

- **Quality of habitat in watershed is due, in part, to well-planned efforts of many organizations**
- **44% of land in hotspots is currently protected, as opposed to 24% of land in the entire watershed**
- **The findings of this study, based on the biology of pool-breeding amphibians, can be used in a gap analysis to locate unprotected areas that should be targeted for future conservation efforts**

Discussion: Hotspot Prioritization

- **First priority should be unprotected areas within hotspots**
- **Within a hotspot, individual pool ranks may be useful**
- **Prioritization might also consider:**
 - imminent threat of development
 - proportion of high-ranking pools in a hotspot
 - proportion of protected vs. unprotected land in a hotspot
 - pool density in a hotspot

Discussion: Corridors and Beyond

- Corridors for dispersal, “stepping stones”
- Possibly appropriate areas for creation of pools
- Don't forget pools outside hotspots and corridors!
- May help to identify areas for restoration of upland habitat
- Identify areas for BMP if no other options

Comments, Questions, Discussion?



Thank you.