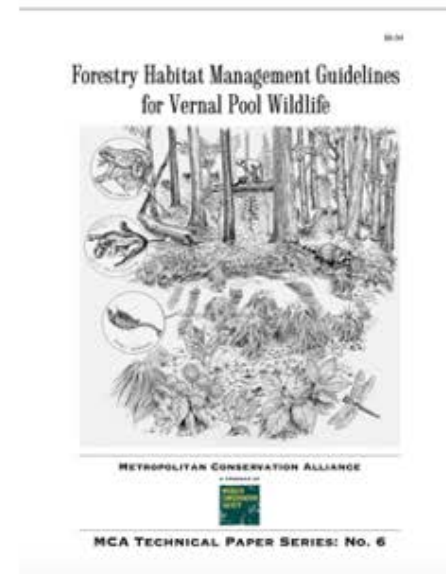


The Forestry Habitat Management Guidelines (HMGs) for Vernal pools

1. What is a vernal pool?
2. Development of the Guidelines
3. Summary of the Management Zones outlined in the guidelines





Pool Characteristics

- **Ephemeral**
- **Small (< 10,000 sq ft)**
- **No Permanent Inlet/Outlet**
- **No breeding fish, green frogs, or bullfrogs**
- **Specialized breeding habitat for wood frogs, salamanders, and fairy shrimp**



In Maine vernal pools are typically small wetlands, often less than 1/10th of an acre in size. They occur naturally in shallow depressions in our glaciated landscape. They hold water for relatively short periods (often drying by summer's end) which limits the establishment of breeding fish populations and other potential predators.



Maine has three amphibians that serve as indicators of vernal pools: the wood frog, blue-spotted salamander, and the spotted salamander. Information on the identification and ecology of each of these species can be found on the Of Pools and People website (vernalpools.me).

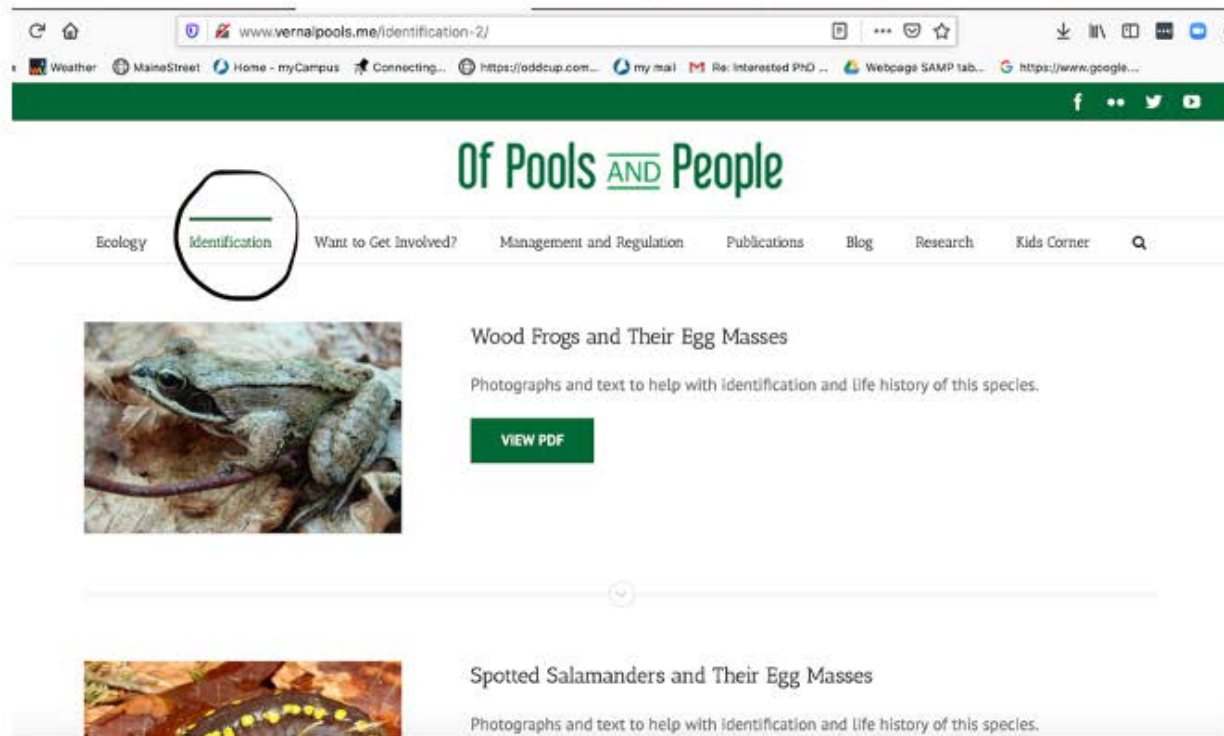


Blue spotted salamander complex.



Spotted salamander

Where to find more information on these animals and vernal pools (vernalpools.me)



The screenshot shows a web browser displaying the website [www.vernalpools.me/identification-2/](http://vernalpools.me/identification-2/). The page features a green header with the logo "Of Pools AND People". A navigation menu includes "Ecology", "Identification" (circled in black), "Want to Get Involved?", "Management and Regulation", "Publications", "Blog", "Research", and "Kids Corner". Below the menu, there are two article cards. The first card is titled "Wood Frogs and Their Egg Masses" and includes a photograph of a wood frog and a green "VIEW PDF" button. The second card is titled "Spotted Salamanders and Their Egg Masses" and includes a photograph of a spotted salamander and a description of the content.


www.vernalpools.me/identification-2/


Weather MaineStreet Home - myCampus Connecting... https://oddcup.com... my mail Re: Interested PhD ... Webpage SAMP lab... https://www.google...

f .. t y

Of Pools AND People

Ecology **Identification** Want to Get Involved? Management and Regulation Publications Blog Research Kids Corner

 Wood Frogs and Their Egg Masses
Photographs and text to help with identification and life history of this species.
[VIEW PDF](#)

 Spotted Salamanders and Their Egg Masses
Photographs and text to help with identification and life history of this species.



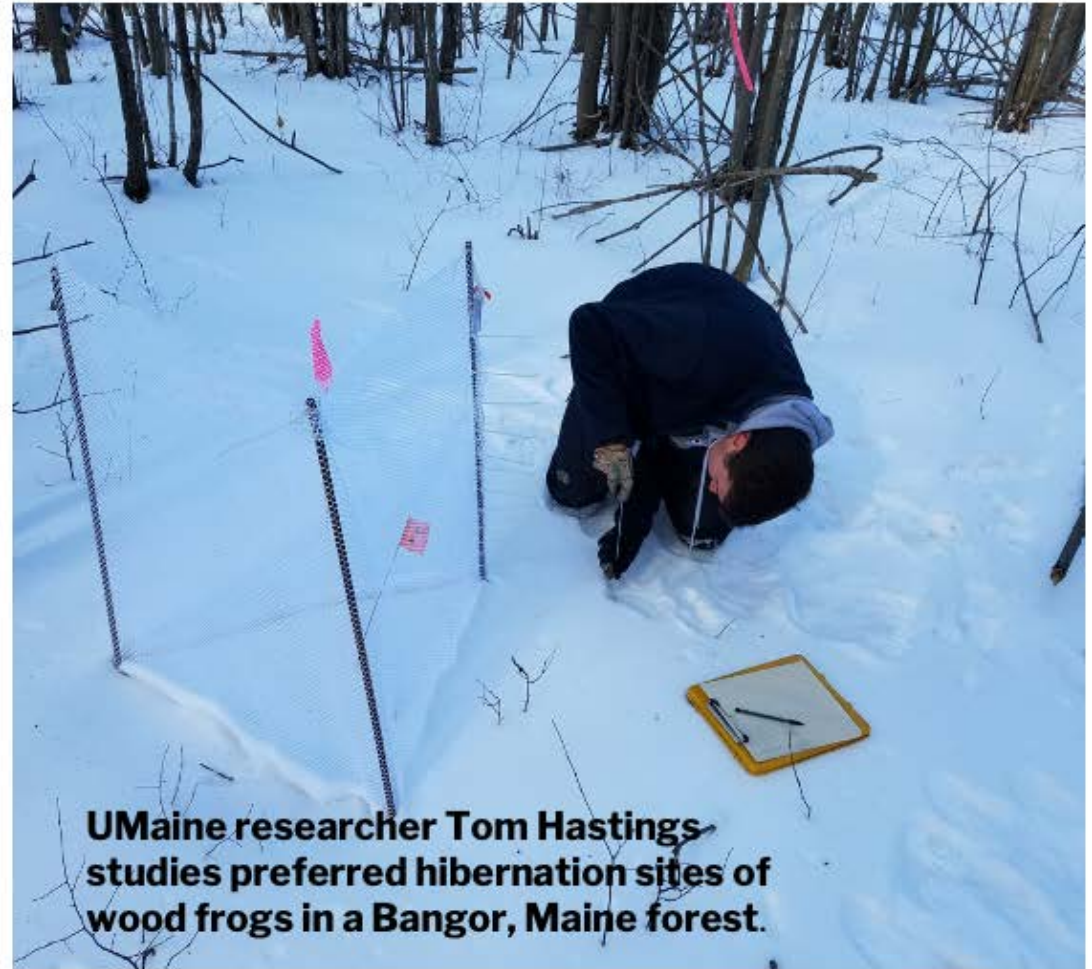
Forestry Habitat Management Guidelines (HMGs) for Vernal Pools

These guidelines were developed for conserving vernal pools on public lands or to implement as Best Management Practices in commercial forestry or small woodlot management. Following these guidelines will ensure the long-term vitality of both the vernal pool ecosystem and the forests in which they are embedded.

Development of Guidelines

Guidelines were developed with leaders in the commercial forest industry, state agencies, small woodlot owners, and ecologists.

Publications supporting this work are under the publications tab at Of Pools and People website.

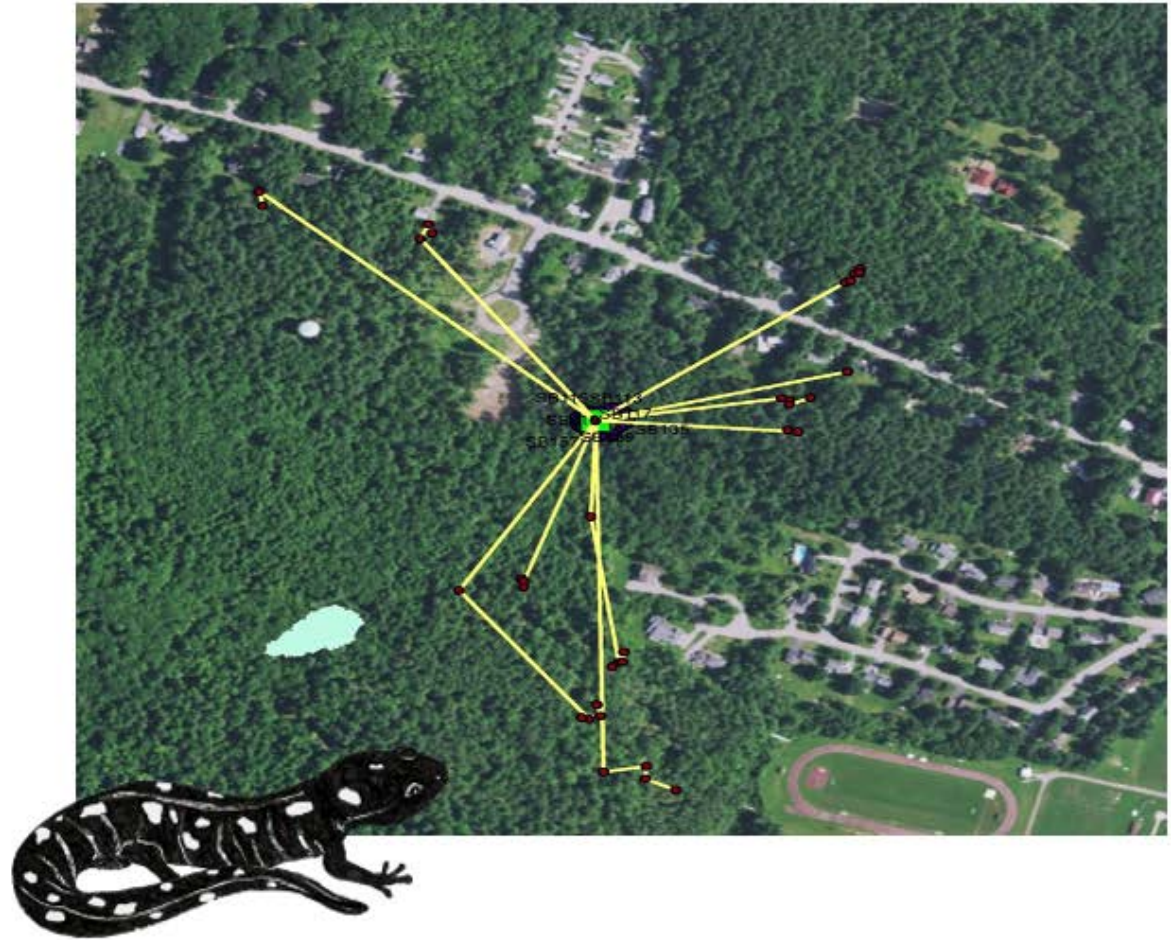


UMaine researcher Tom Hastings studies preferred hibernation sites of wood frogs in a Bangor, Maine forest.

**Management
Zones** were based
on data on
amphibian
movements
tracked by
radiotelemetry



For example, blue spotted salamander movements from the pool in the center (green square) to summer habitat in the adjacent forest (yellow lines) were tracked to see how far the adult salamanders travel and to document habitat preferences



Travel Distances documented in recent research

Wood Frog
Median: 435'
Max: 3018'



Blue-spotted Hybrid
Median: 561'
Max: 1165'



Spotted Salamander
Max: 817'



Note: $\frac{1}{4}$ mile = 1320 ft, $\frac{1}{2}$ mile = 2640 ft

These are some distances of adult travel documented in Maine and New England.

\$8.00

Forestry Habitat Management Guidelines for Vernal Pool Wildlife



METROPOLITAN CONSERVATION ALLIANCE



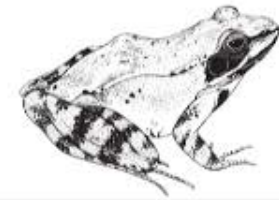
MCA TECHNICAL PAPER SERIES: No. 6

Summary of HMGs

*Calhoun and deMaynadier, 2004,
Forestry Habitat Management
Guidelines*

Vernal Pool Amphibian Indicator Species

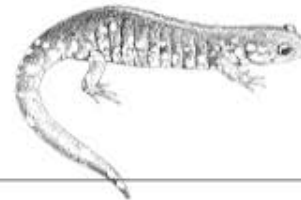
Amphibians and Reptiles of Maine's Vernal Pools INDICATOR SPECIES



Wood Frog
(Rana sylvatica)



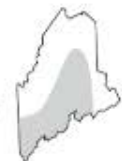
Spotted Salamander
(Ambystoma maculatum)



Blue-spotted Salamander
(Ambystoma laterale)











Four-toed Salamander
(Hemidactylum scutatum)
Status: State Special Concern



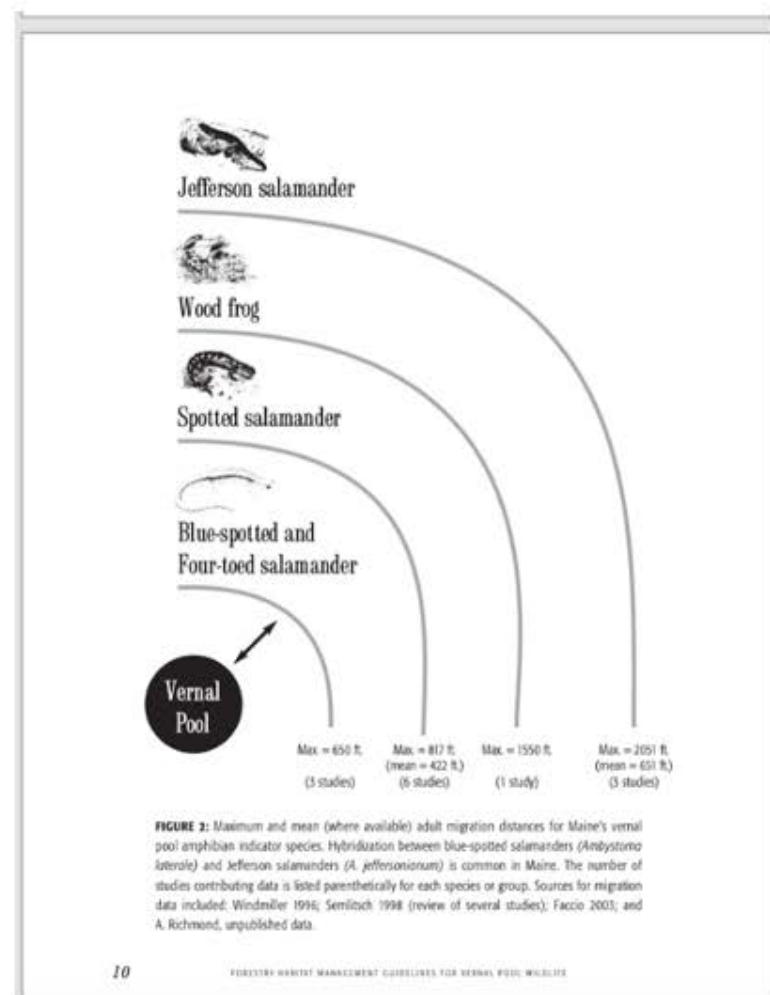
Maine regulations recognize three amphibian species (wood frog, spotted salamander, and blue-spotted) and one crustacean, the fairy shrimp. Four-toed salamanders are also strongly associated with pools but they lay eggs in adjacent sphagnum and to prevent disturbance of the sphagnum for documentation, they are not used as an indicator species for regulatory purposes.

Reptiles associated with vernal pools

Amphibians and Reptiles of Maine's Vernal Pools		
RARE SPECIES		
	Ribbon Snake <i>(Thamnophis sauritus)</i> Status: State Special Concern	
	Wood Turtle <i>(Clemmys insculpta)</i> Status: State Special Concern	
	Spotted Turtle <i>(Clemmys guttata)</i> Status: State Threatened	
	Blanding's Turtle <i>(Emydoidea blandingii)</i> Status: State Endangered	

Listed reptiles use vernal pools for parts of their life cycle. Many papers on this are included under publications on the website.

Travel distances of adult amphibians from vernal pools published at the time of development of the HMGs



The habitat management guidelines were based on these published distances when creating this document in 2004.

Management Zones

1. Vernal pool depression
2. Vernal pool protection zone (100 ft)
3. Vernal pool life zone (400 ft)

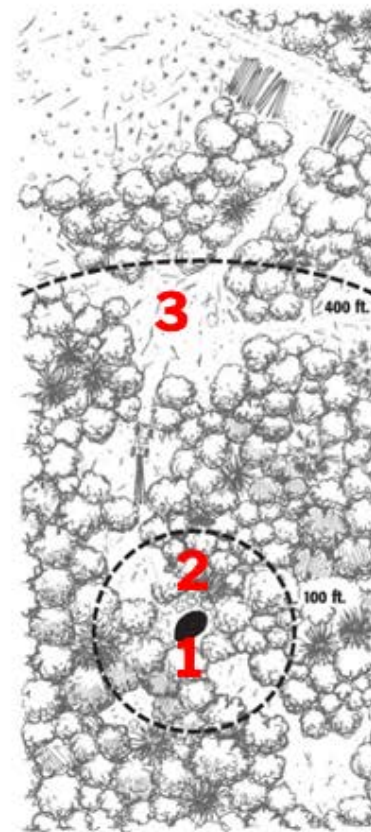


FIGURE 3: Ecologically sensitive forest management activity around a vernal pool (dark oval at bottom center) located in a mature mixed forest. Note that implementation of the vernal pool Habitat Management Guidelines (HMGs) calls for decreasing timber harvest intensity with increasing proximity to those pools with breeding evidence of amphibian indicator species. HMG zones are drawn to scale. (M. McColough)

FORESTRY HABITAT MANAGEMENT GUIDELINES FOR VERNAL POOL WILDLIFE

15

Note the 100ft no disturbance zone and light forestry for next 400 ft. This conserves the breeding habitat, overwintering juveniles, and adults hibernating near the breeding pools. The intact forest also provides the necessary shade and woody debris to make the pool ideal breeding habitat: cool , relatively dark pools with limited algae and ample attachment sites from fallen branches in the pool and hiding refugia provided by downed woody material in the 100 -oot zone.

Activities appropriate for each HMG zone



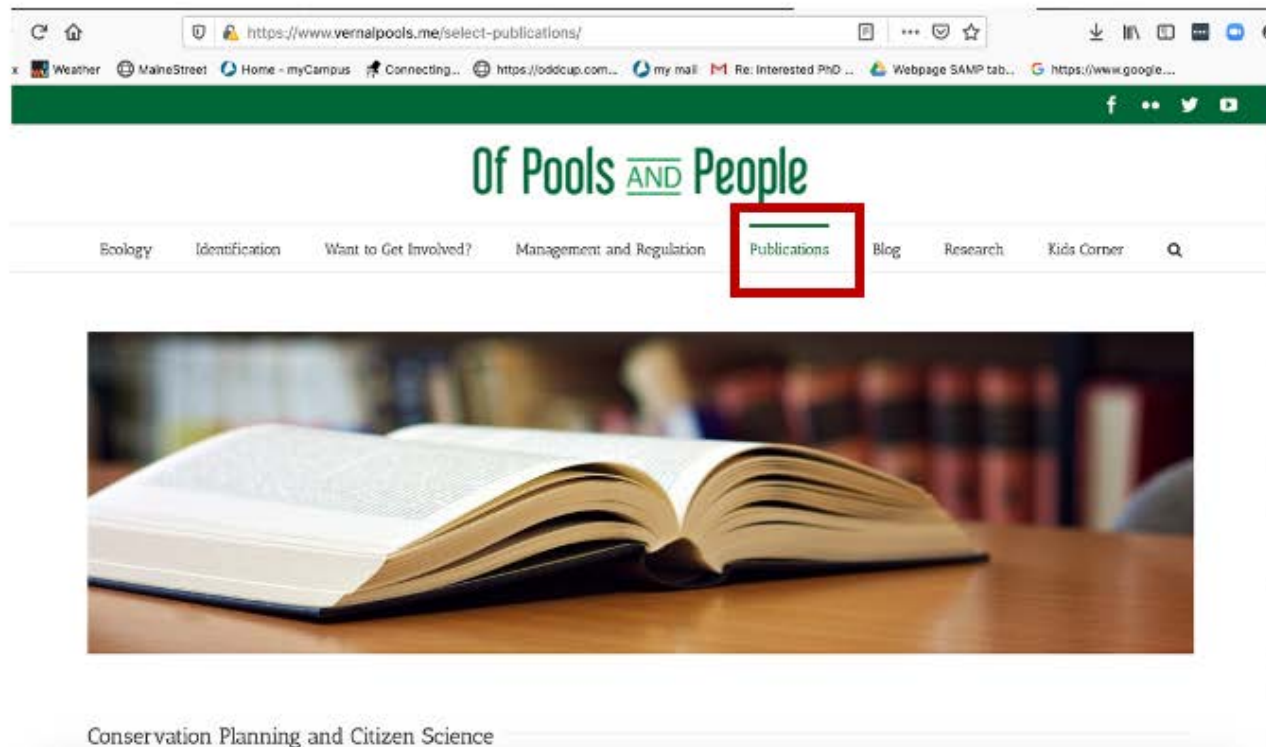
TABLE 1

Summary of the Recommended Guidelines for conserving vernal pool wildlife during forest harvest operations.

Management Zone (Radial Distance)	Managed Zone ¹	Primary Wildlife Habitat Values	Desired Management Outcomes	Recommended Guidelines
Vernal Pool Depression (0 ft)	0.2 acres	Breeding pool; egg attachment sites.	Good water quality and water-holding capacity; undisturbed basin and marginal vegetation.	No Disturbance
Vernal Pool Protection Zone (100 ft)	1.4 acres	Shade and organic inputs to pool; upland staging habitat for juvenile amphibians.	Heavily shaded forest floor with deep, moist, uncompacted litter and abundant coarse woody debris.	Limited Harvest <ul style="list-style-type: none"> • >75% canopy cover • Frozen or dry soil conditions • Minimize heavy machinery use • Abundant coarse woody debris
Amphibian Life Zone (400 ft)	13.0 acres	Upland habitat for pool- breeding amphibians.	Partially shaded forest floor with deep, moist uncompacted litter and abundant coarse woody debris.	Partial Harvest <ul style="list-style-type: none"> • >50% canopy cover • Openings <1 acre • Frozen or dry soil conditions • Abundant coarse woody debris

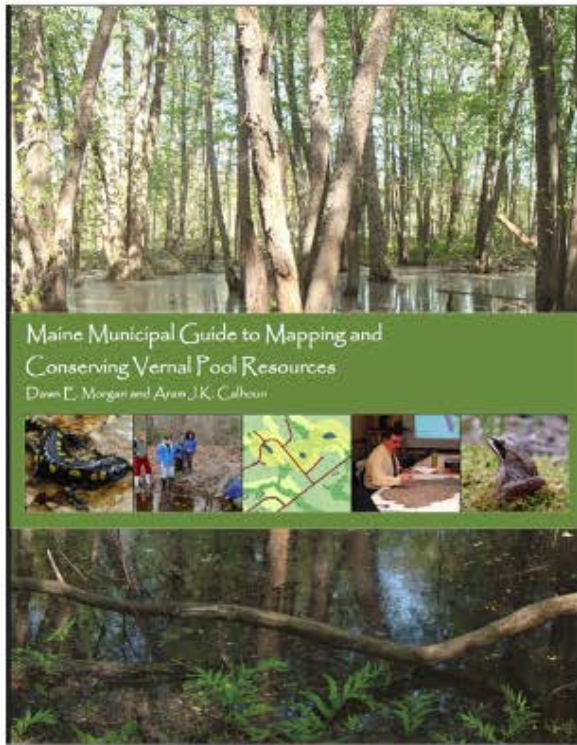
¹ Acreage estimates based on a pool with a 100 ft. diameter, or approximately 0.2 acres

Vernal pool habitat management guidelines *on the website: click Publications*

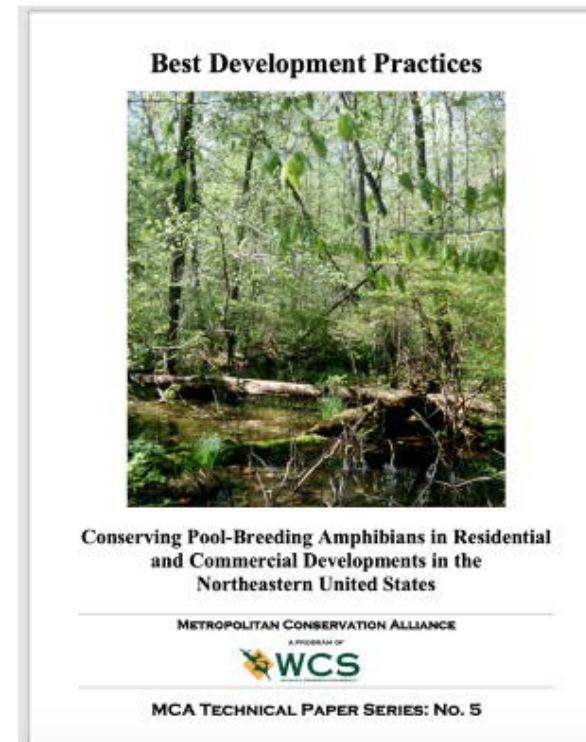


The screenshot shows a web browser window with the URL <https://www.vernalpools.me/select-publications/>. The website header features the logo "Of Pools AND People" in green. Below the logo is a navigation menu with the following items: Ecology, Identification, Want to Get Involved?, Management and Regulation, Publications, Blog, Research, Kids Corner, and a search icon. The "Publications" item is highlighted with a red rectangular box. Below the navigation menu is a large image of an open book on a wooden table, with a blurred bookshelf in the background. At the bottom of the page, the text "Conservation Planning and Citizen Science" is visible.

Other vernal pool management guidelines...



Morgan and Calhoun, 2009



Calhoun and Klemens, 2002