

Protecting Michigan Herpetofauna through BMPs and Habitat Assessment



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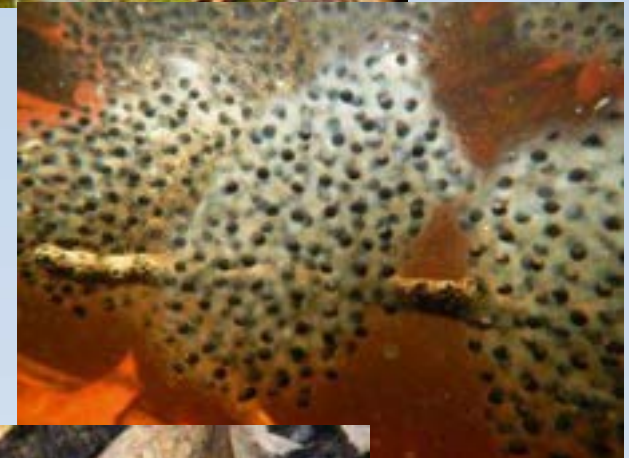
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HERPETOLOGICAL RESOURCE & MANAGEMENT

Michigan Wetlands and Herpetofauna

- Wetlands support a wealth of biodiversity such as the amphibians and reptiles that rely on them for survival.
- Michigan contains expansive areas of wetland including several that are considered unique to this region.
- These habitats are becoming rare due to habitat loss and degradation and require protection and management.
- The presence and distribution of herpetofauna on a landscape can be used as a tool for prioritizing wetland protection as well as monitoring the health of these special Great Lakes ecosystems.



Nearly 60 Species of Herpetofauna in Michigan

- 14 Species of Salamanders
- 14 Species of Frogs and Toads
- 11 Species of Turtles
- 2 Species of Lizards
- 18 Species Snakes



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MORE THAN HALF OF MICHIGAN HERPS ARE SPECIES OF GREATEST CONSERVATION NEED !!!



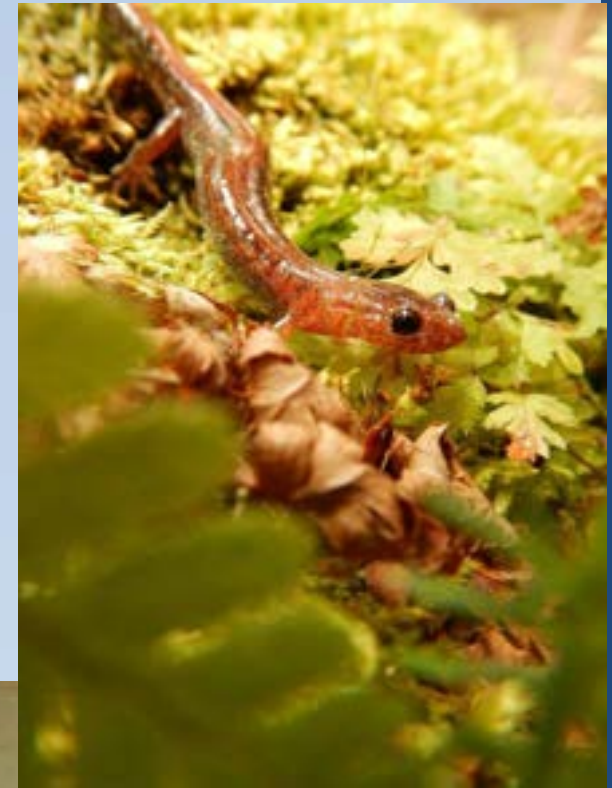
Species of Greatest Conservation Need

No formal legal protection; the intent of the designation is to focus attention on animals of conservation risk, stimulate research on poorly known species, and achieve conservation and recovery of these animals before they meet criteria for listing as threatened or endangered.



Salamander Species & Status

Salamanders Species	State Rank	Wildlife Action Plan
Western Lesser Siren	SC	SGCN
Mudpuppy	SC	SGCN
Blue-spotted Salamander		SGCN
Unisexual Ambystoma		SGCN
Spotted Salamander		SGCN
Marbled Salamander	T	SGCN
Small-mouthed Salamander	E	SGCN
Eastern Tiger Salamander		SGCN
Red-spotted Newt		
Central Newt		
Four-toed Salamander		SGCN
Red-backed Salamander		
Dusky Salamander	SC	SGCN
Two-lined Salamander	SC	SGCN



Frog and Toad Species & Status

Frog and Toad Species	State Rank	Wildlife Action Plan
Eastern American Toad		
Fowler's Toad	SC	SGCN
Green Frog		
Mink Frog		SGCN
Bullfrog		
Pickerel Frog	SC	SGCN
Leopard Frog		SGCN
Wood Frog		
Cope's Gray Treefrog		
Eastern Gray Treefrog		
Blanchard's Cricket Frog	T	SGCN
Northern Spring Peeper		
Western Chorus Frog		SGCN
Boreal Chorus Frog	SC	SGCN



Turtle Species & Status

Turtles Species	State Rank	Wildlife Action Plan
Eastern Snapping Turtle		
Eastern Musk Turtle		SGCN
Western Painted Turtle		
Midland Painted Turtle		
Blanding's Turtle	SC	SGCN
Spotted Turtle	T	SGCN
Wood Turtle	T	SGCN
Eastern Box Turtle	T	SGCN
Red-eared Slider		
Northern Map Turtle		
Eastern Spiny Soft-shell		



Snake Species & Status

Snakes	State Rank	Wildlife Action Plan
Eastern Smooth Green Snake	SC	SGCN
Eastern Milk Snake		
Blue Racer		SGCN
Black Rat Snake	SC	SGCN
Western Fox Snake		SGCN
Eastern Fox Snake	T	SGCN
Eastern Hog-nosed Snake		SGCN
Eastern Massasauga Rattlesnake*	T	SGCN



* Federal Protected Status -Threatened



Snake Species & Status

Snakes	State Rank	Wildlife Action Plan
Kirtland's Snake	E	SGCN
Queen Snake	SC	SGCN
Butler's Garter Snake	SC	SGCN
Eastern Ribbon Snake		SGCN
Eastern Garter Snake		
Copper-bellied Water Snake*	E	SGCN
Northern Water Snake		
Northern Brown Snake		
Northern Red-bellied Snake		
Northern Ring-necked Snake		SGCN



* Federal Protected Status -Threatened



Why are Herps Important to Wetlands?



Conservation: Where are the Herps?

We are only as accurate as our data is current. We can only protect what we know occurs. We only know what occurs, if we take the time to look and document. Many sites get missed in database reviews not because species are not there, but data was not recorded or not entered.



Shifting Baseline



Shifting baseline syndrome (SBS) is a gradual change in the accepted norms for the condition of the natural environment due to lack of past information or lack of experience of past conditions. With ongoing environmental degradation at local, regional, and global scales, people's accepted thresholds for environmental conditions are continually being lowered.

In the absence of past information or experience with historical conditions, members of each new generation accept the situation in which they were raised as being normal. This psychological and sociological phenomenon is increasingly recognized as one of the fundamental obstacles to addressing a wide range of today's global environmental issues.



Herpetofauna focused Databases: Tools for Wetland Conservation



Michigan Herp Atlas and Partners

The Michigan Herp Atlas provides a statewide, publicly accessible, editable database for the state of Michigan. Through the database, citizens can record their own past and present observations to help assess changes in populations over time and measure species health.

ADD RECORD **REGISTER TODAY**

PERSONALIZATION

Species: Frog and Toads Species: Woodhuckers (Skunk Frog)

SPECIES & CONDITIONS

Quantity Observed: 1 Age: Adm Sex: Male Did you receive a permit? No

Body Temperature: °F / °C

TIME & LOCATION

Date: 10/10/2020 Location: 45.8607944227532 Longitude: 84.27200000000004

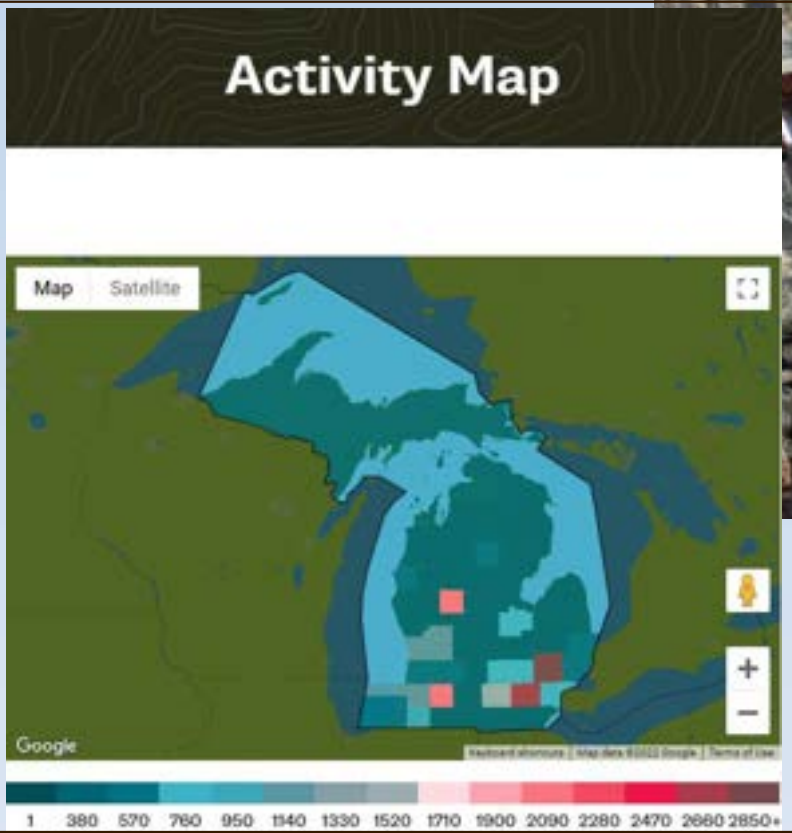
Hour: 10:00 AM County: Charlevoix County

ADDITIONAL DETAILS

Count Method: 100% Method: Hand

WEATHER AND SKY CONDITIONS

Air Temperature: °F / °C Ground Temperature: °F / °C Humidity Level:



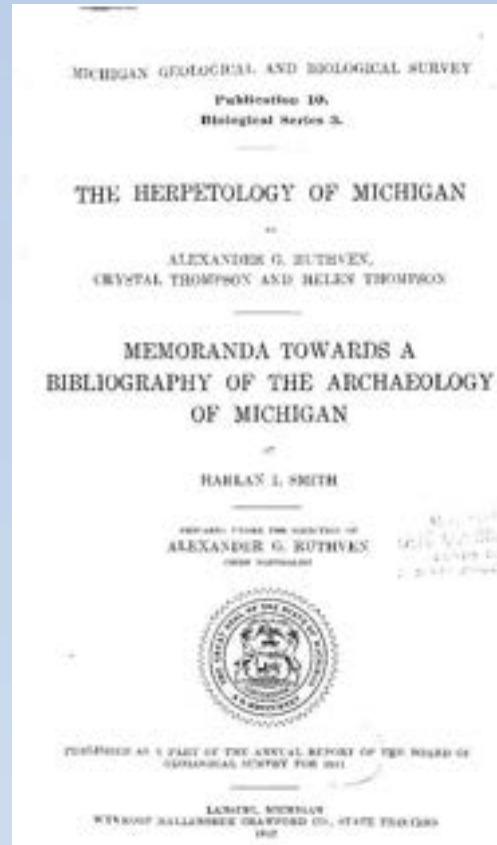
Additional Herp Data Sources

Databases

- Natural Heritage Database
- Herp Mapper
- I-Naturalist
- Museum collections

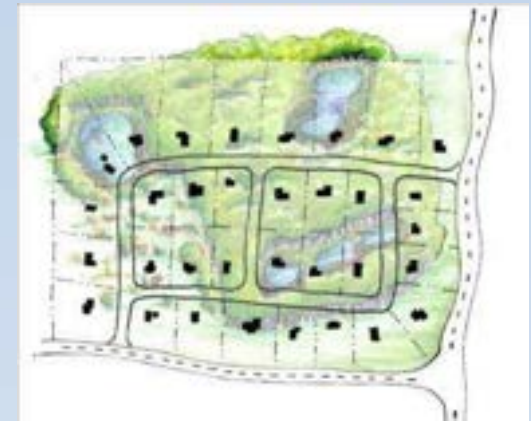
“Untapped” Data

- Oral history
- Field notes
- Technical reports
- Archived and recent research
- Recorded incidental observations and bycatch



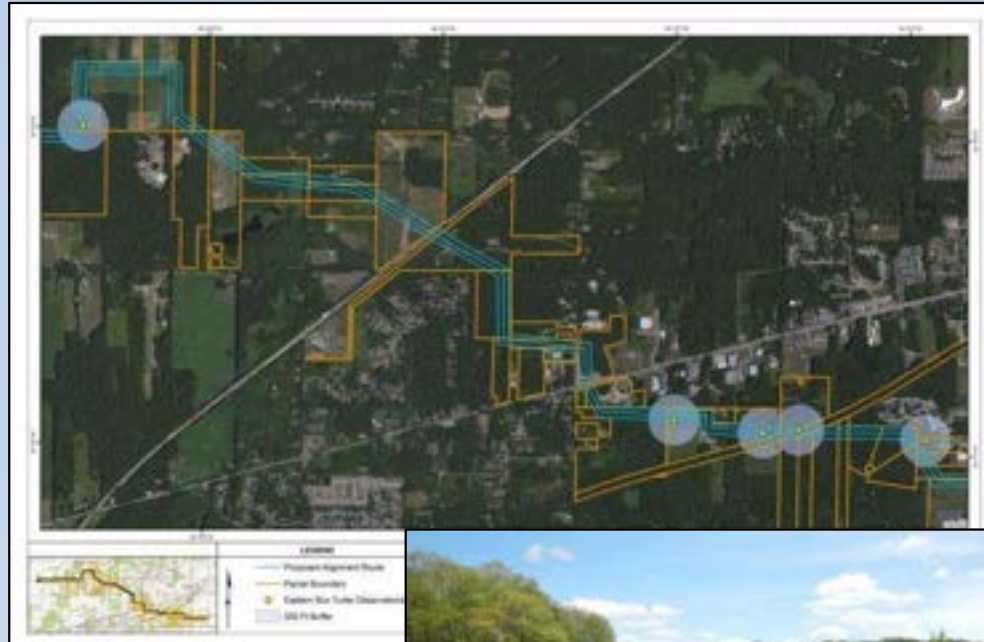
Opportunities for Use

- Integrating data into analyses can:
 - Implement impact minimization and avoidance.
 - Determine potential impacts to wetland systems.
 - Identify locations of vernal pools or other critical habitat.
 - Evaluate potential wetland mitigation or restoration sites.



Opportunities for Use

- Data is key to any effective conservation effort or management plan.
- Integrating data into analyses can:
 - Determine important ecological hotspots and potential corridors.
 - Identify locations of data gaps and population declines.
 - Help evaluate response of invasive species control.
 - Provide innovative tools for assessing wetland condition and health.



Herp HAT Objective



- Develop a biotic metric for Michigan to evaluate the functional value of a wetland with emphasis on herpetofauna
- Utilized by regulators, managers, natural resource professionals (public and private), and land stewards
- The tool is designed to quantify the function of an individual wetland
- This tool will quantitatively rank a habitat, it is not designed to compare different wetland types
 - Two sites can receive the same score while fulfilling different ecological functions
 - Not intended to measure the amount of disturbance a landscape has experienced.
 - Herpetofauna can persist or even thrive on disturbed landscapes.



Metrics and Descriptions

Rarity

Rare species with isolated populations will have a higher score



Eastern Massasauga
Rattlesnakes are Federally
Threatened



Metrics and Descriptions

Rarity

Rare species with isolated populations will have a higher score

Fragmentation Sensitivity

Species that require extensive habitat mosaics to fulfill their life history needs will have a higher score



Blanding's Turtles require a complex mosaic of ponds, fens and prairie



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Specialist or Generalist

Species with more specific life history traits and requirements will receive a higher score



Four-toed Salamanders are habitat specialists in moist woodlands with nearby creeks or bogs



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Fecundity

Lower species fecundity results in a higher score for this category



Mudpuppies have relatively low fecundity, laying 18-140 eggs per season



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Life Expectancy

Greater life expectancy results in a higher score for this category



Wood turtles can live for over 70 years



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Probability of Detection

More cryptic species will receive a higher score for this category



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Species that require longer hydroperiods will receive a higher score



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Probability of Detection

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Required Hydroperiod

Species that require longer hydroperiods as part of life cycles will receive a higher score

Need for Fishless Wetlands

Species that require fishless wetlands will receive a higher score



Frog and Toad C-scores

Scientific Name	Common Name	Final C-score
<i>Acris blanchardii</i>	Blanchard's Cricket Frog	8.50
<i>Bufo (Anaxyrus) americanus</i>	American Toad	2.50
<i>Bufo (Anaxyrus) fowleri</i>	Fowler's Toad	5.50
<i>Hyla chrysoscelis</i>	Cope's Gray Treefrog	5.50
<i>Hyla versicolor</i>	Eastern Gray Treefrog	4.00
<i>Pseudacris maculata</i>	Boreal Chorus Frog	7.00
<i>Pseudacris crucifer crucifer</i>	Spring Peeper	4.00
<i>Pseudacris triseriata</i>	Midland Chorus Frog	5.50
<i>Rana (Lithobates) catesbeiana</i>	Bullfrog	2.50
<i>Rana (Lithobates) clamitans melanota</i>	Green Frog	2.50
<i>Rana (Lithobates) palustris</i>	Pickerel Frog	8.50
<i>Rana (Lithobates) pipiens</i>	Leopard Frog	5.50
<i>Rana (Lithobates) septentrionalis</i>	Mink Frog	7.00
<i>Rana (Lithobates) sylvatica</i>	Wood Frog	5.50



Salamander C-scores

Scientific Name	Common Name	Final C-score
<i>Ambystoma laterale</i>	Blue-spotted Salamander	5.50
<i>Ambystoma laterale</i> complex	Unisexual Salamander	5.50
<i>Ambystoma maculatum</i>	Spotted Salamander	7.00
<i>Ambystoma opacum</i>	Marbled Salamander	10.00
<i>Ambystoma texanum</i>	Small-mouthed Salamander	8.50
<i>Ambystoma tigrinum tigrinum</i>	Eastern Tiger Salamander	7.00
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	8.50
<i>Eurycea cirrigera</i>	Southern Two-lined Salamander	8.50
<i>Hemidactylium suctatum</i>	Four-toed Salamander	8.50
<i>Necturus maculosus</i>	Northern Mudpuppy	5.50
<i>Notophthalmus viridescens louisianensis</i>	Central Newt	5.50
<i>Notophthalmus viridescens viridescens</i>	Red-spotted Newt	5.50
<i>Plethodon cinereus</i>	Red-backed Salamander	2.50
<i>Siren intermedia nettingi</i>	Western Lesser Siren	7.00



Turtle C-scores

Scientific Name	Common Name	Final C-score
<i>Apalone spinifera spinifera</i>	Eastern Spiny Softshell	7.00
<i>Chelydra serpentina serpentina</i>	Eastern Snapping Turtle	2.50
<i>Chrysemys picta bellii</i>	Western Painted Turtle	4.00
<i>Chrysemys picta marginata</i>	Midland Painted Turtle	4.00
<i>Clemmys guttata</i>	Spotted Turtle	10.00
<i>Emydoidea blandingii</i>	Blanding's Turtle	7.00
<i>Glyptemys insculpta</i>	Wood Turtle	8.50
<i>Graptemys geographica</i>	Northern Map Turtle	5.50
<i>Sternotherus odoratus</i>	Eastern Musk Turtle	5.50
<i>Terrapene carolina</i>	Eastern Box Turtle	8.50
<i>Trachemys scripta elegans</i>	Red-eared Slider	5.50



Lizard C-scores

Scientific Name	Common Name	Final C-score
<i>Aspidoscelis sexlineata viridis</i>	Six-lined Racerunner	5.50
<i>Plestiodon fasciatus</i>	Five-lined Skink	5.50



Snake C-scores

Scientific Name	Common Name	Final C-score
<i>Clonophis kirtlandii</i>	Kirtland's Snake	8.50
<i>Coluber constrictor foxi</i>	Blue Racer	5.50
<i>Diadophis punctatus edwardsi</i>	Northern Ring-necked Snake	5.50
<i>Heterodon platirhinos</i>	Eastern Hog-nosed Snake	7.00
<i>Lampropeltis triangulum triangulum</i>	Eastern Milk Snake	4.00
<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Water Snake	8.50
<i>Nerodia sipedon sipedon</i>	Northern Water Snake	4.00
<i>Opheodrys vernalis</i>	Eastern Smooth Green Snake	5.50
<i>Pantherophis gloydi</i>	Eastern Fox Snake	7.00
<i>Pantherophis spiloides</i>	Gray Rat Snake	7.00
<i>Pantherophis vulpinus</i>	Western Fox Snake	5.50
<i>Regina septemvittata</i>	Queen Snake	8.50
<i>Sistrurus catenatus</i>	Eastern Massasauga Rattlesnake	8.50
<i>Storeria dekayi dekayi</i>	Northern Brown Snake	2.50
<i>Storeria occipitomaculata occipitomaculata</i>	Northern Red-bellied Snake	4.00
<i>Thamnophis butleri</i>	Butler's Garter Snake	7.00
<i>Thamnophis sauritus septentrionalis</i>	Northern Ribbon Snake	5.50
<i>Thamnophis sirtalis sirtalis</i>	Eastern Garter Snake	2.50



How to Calculate HerpHAT Scores

1. Determine species composition of a wetland
2. Record the number of each species observed
3. Multiply the number of individuals by the C-score for each species
4. Sum the subtotal for each species and sum the number of individuals
5. Divide the subtotal sum by the individual sum

Species present in Wetland	# Observed Individuals	Normalized C-score for Species	Species Subtotal
American Toad	15	2.5	$15 * 2.5 = 37.5$
Eastern Gray Treefrog	15	4.0	$15 * 4.0 = 60$
Spring Peeper	20	4.0	$20 * 4.0 = 80$
Sum of Species Subtotals	Sum of Observed Individuals		HerpHAT score
$37.5 + 60 + 80 = 177.5$	$15 + 15 + 20 = 50$		$177.5 / 50 = 3.55$



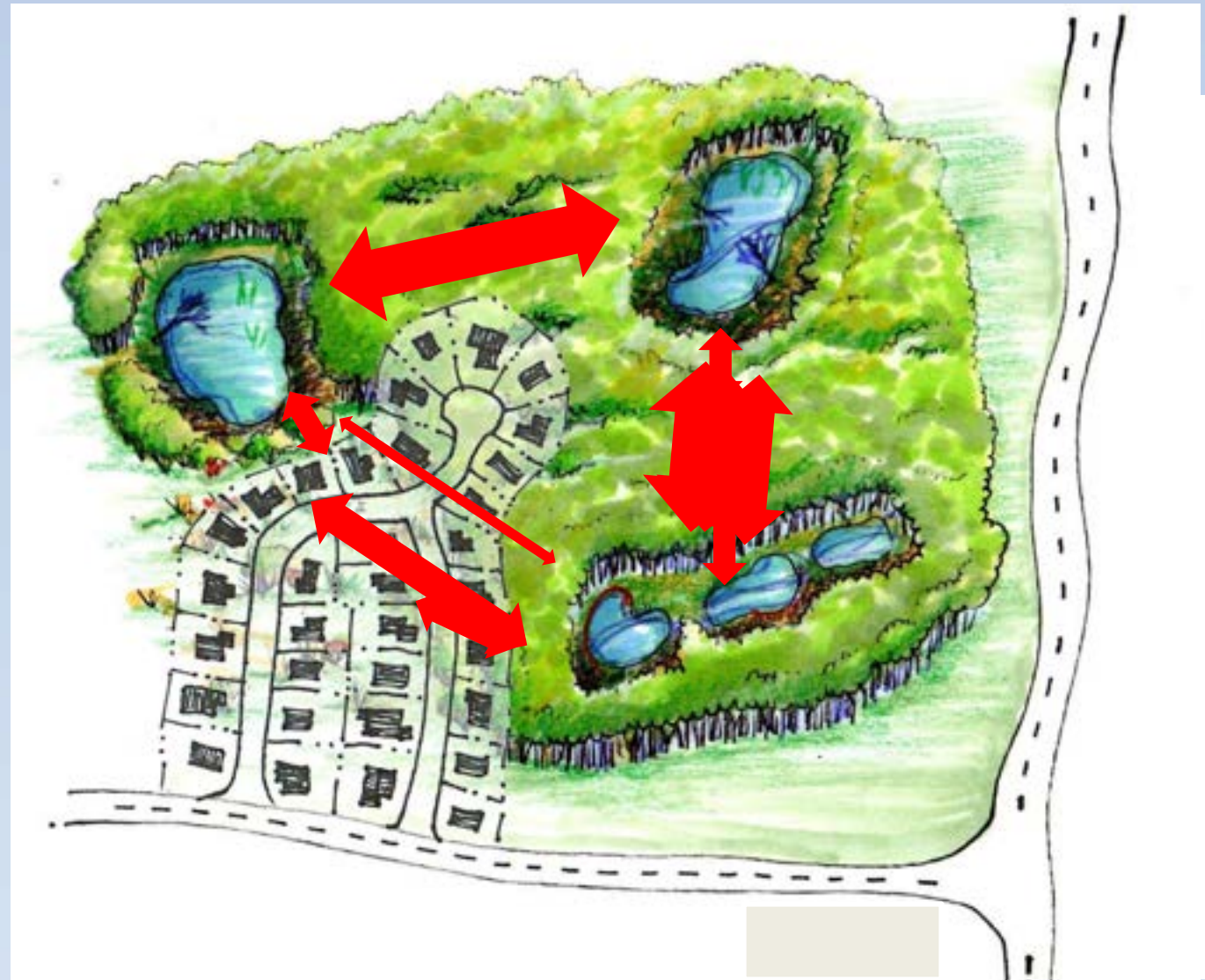
BEST MANAGEMENT AND GOOD STEWARDSHIP

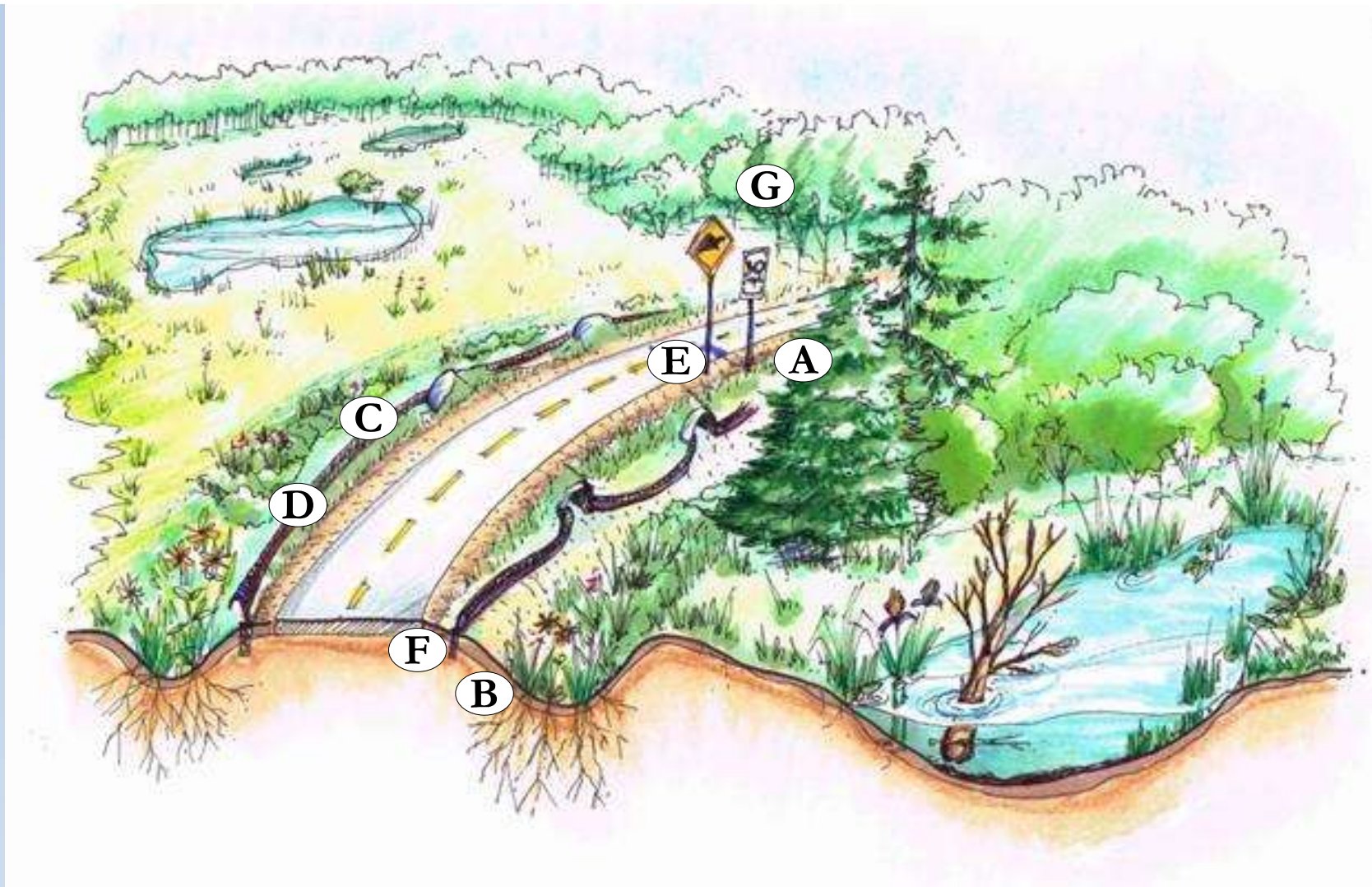
Getting Involved in Amphibian and Reptile Conservation in Michigan



Maintain Connectivity

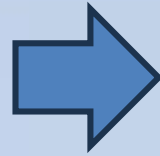
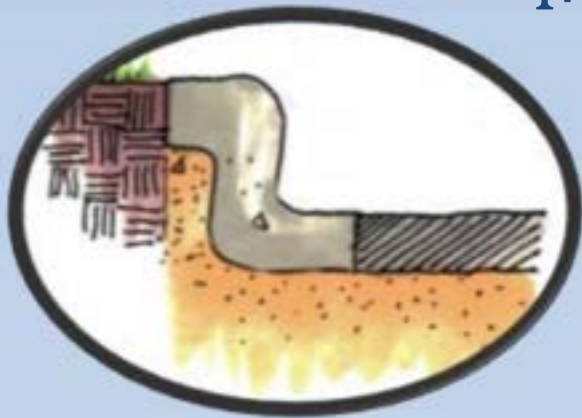
- Know the species you are trying to protect.
- Incorporate best management practices including culverts, corridors, and protection of critical zones.
- Effective and well-planned site and community development plans.



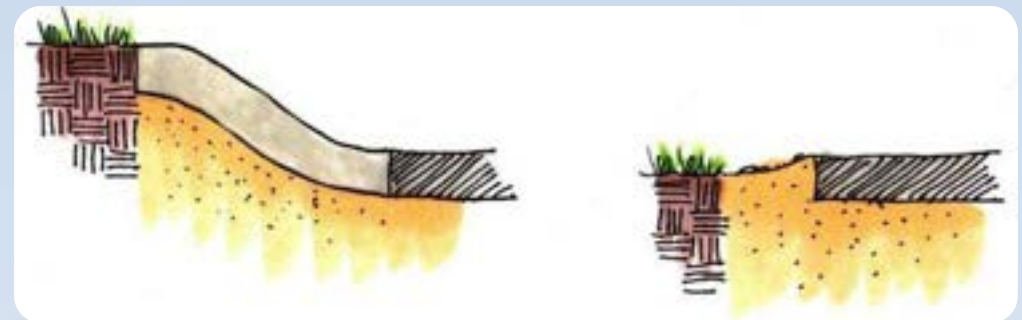


- A. Vegetation planted to block salt spray
- B. Pollution catching vegetated buffers
- C. No mow zone along the shoulder in the spring during turtle nesting season
- D. No curb and gutter system to trap amphibians and reptiles on the road
- E. Road crossing structures maintain connectivity between herpetofauna habitat
- F. An embedded barrier with curved top directs animals toward crossing structures
- G. Wildlife crossing signs and lower speed limits at kill zones raise driver awareness and reduce road mortality

Modified Curbs and Gutters



The Solution!!!

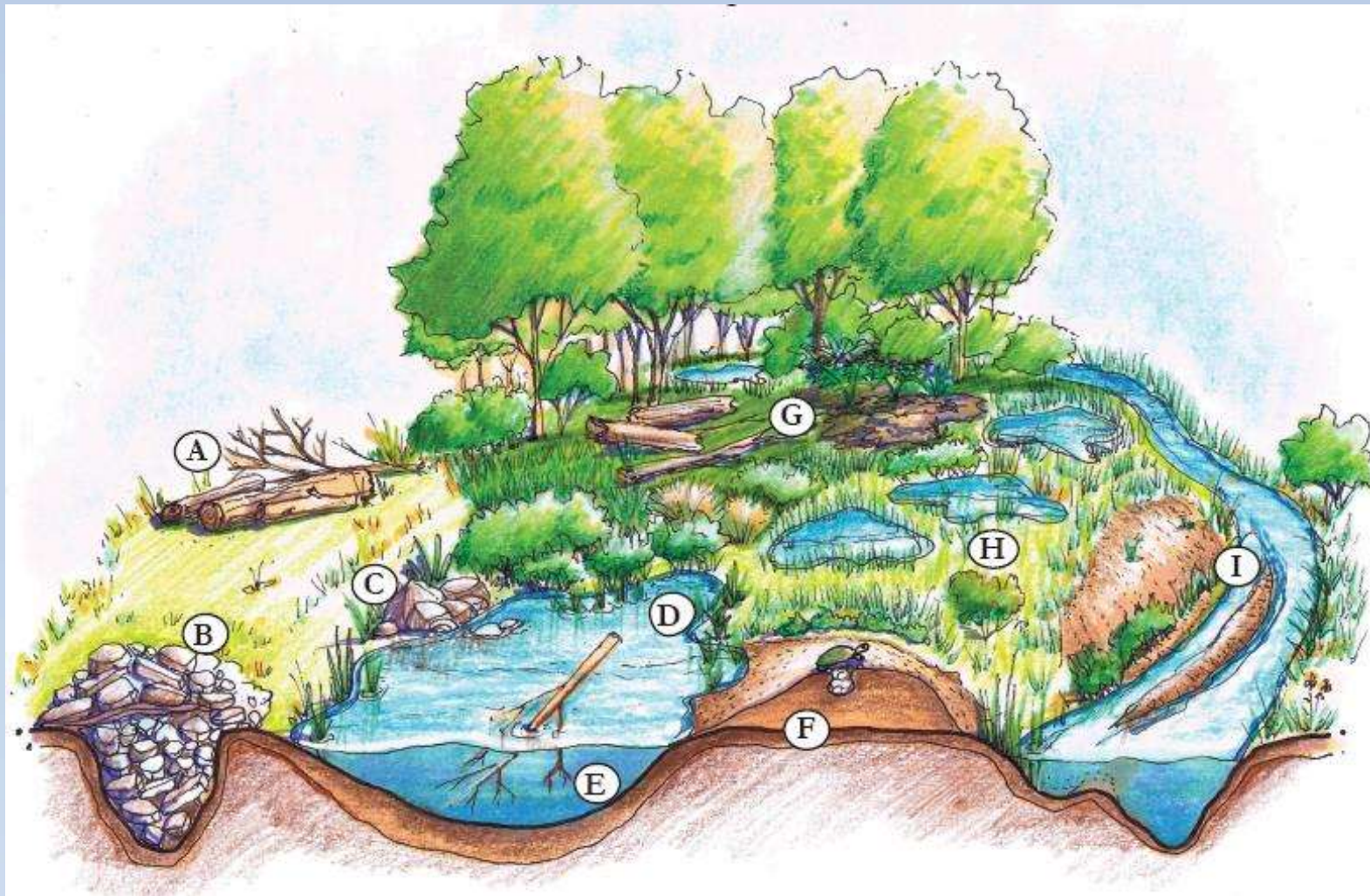


Tunnels and Fences



Wildlife Culvert Systems





- A. Logs in a sunny location for cover, basking, nesting, hibernation
- B. Depression filled with rocks for reptile basking and hibernation
- C. Rocks along shoreline: shelter and basking
- D. Emergent/submergent vegetation for basking and foraging

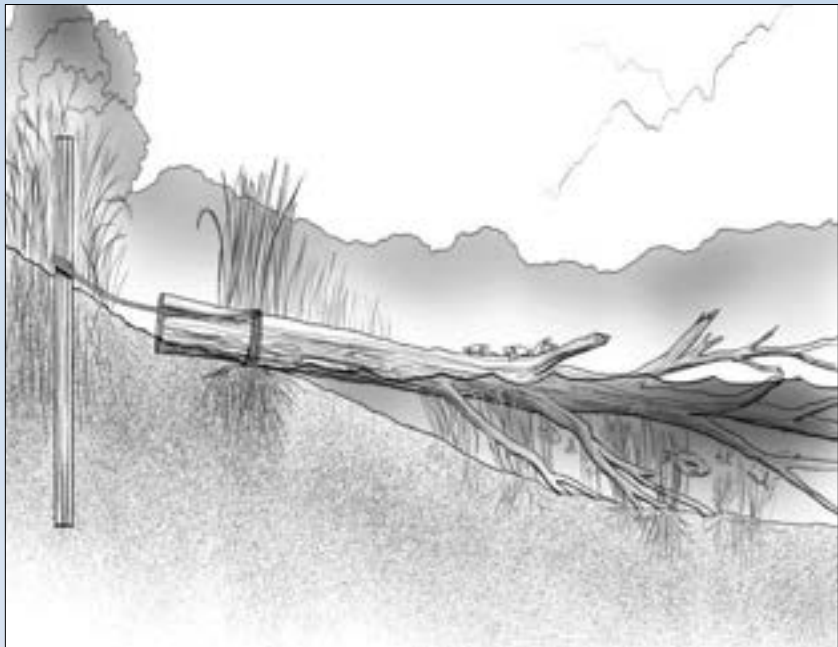
- E. Fine brush for amphibian egg attachment
- F. Sunny areas of loose, well-drained soil for turtle basking/nesting
- G. Log & leaf litter for salamander cover, nesting, foraging and hibernation
- H. A variety of wetland types provided
- I. Sandy banks and sand bar for turtle nesting and reptile basking



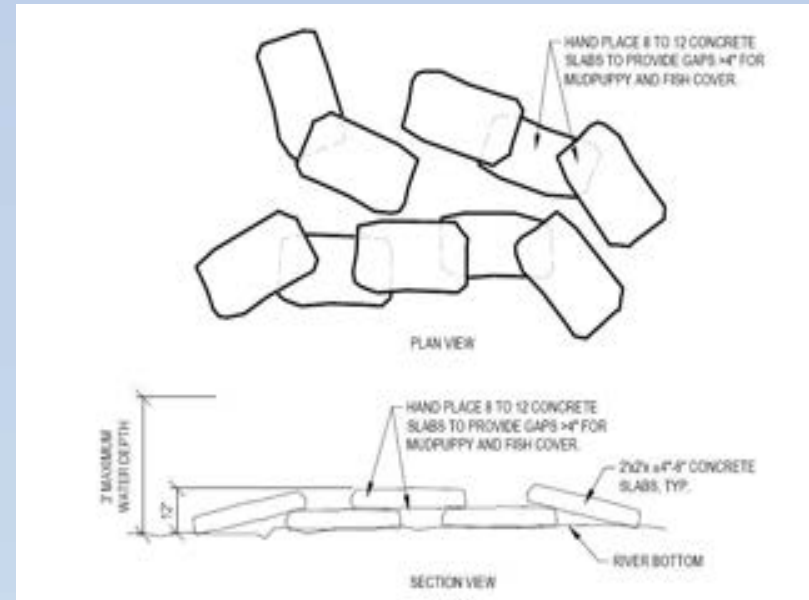
Wildlife Culvert Systems



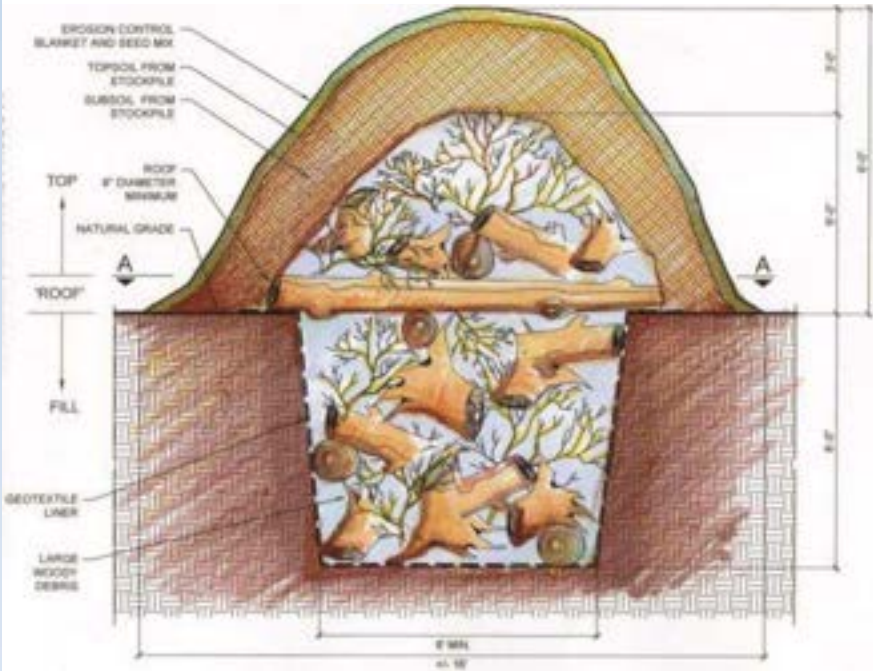
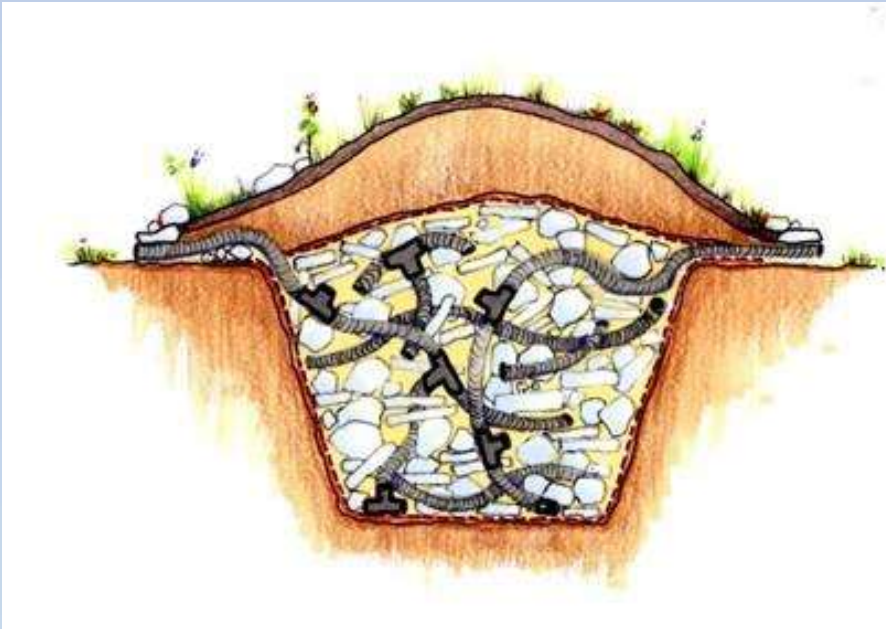
Basking, Nesting, and Shelter Logs



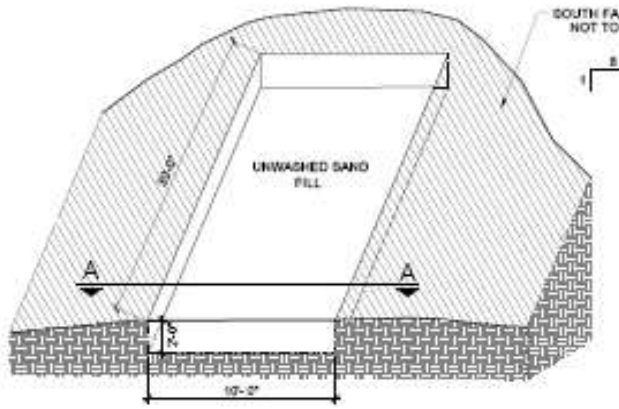
Aquatic Salamander Structure



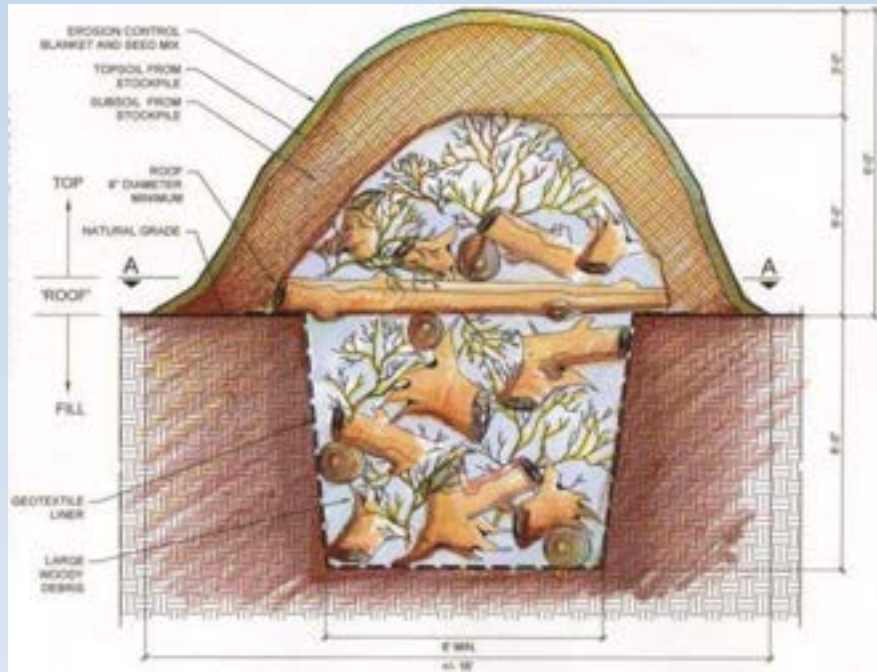
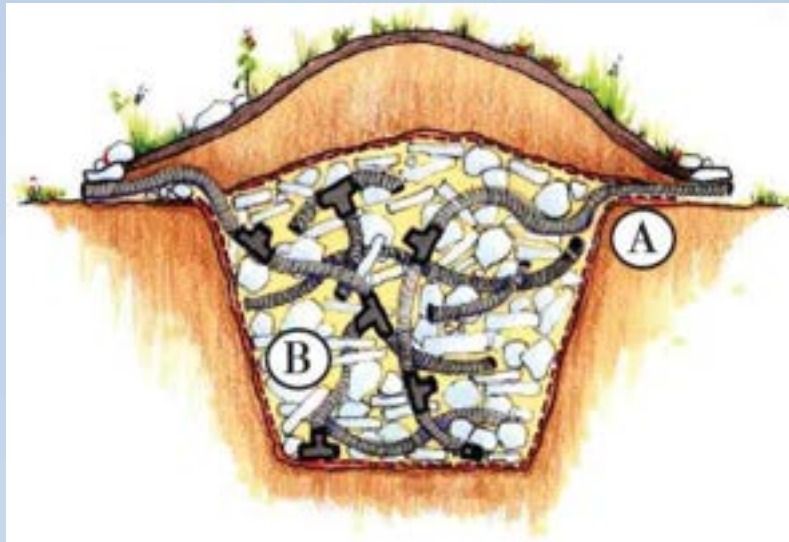
Hibernacula Creation



Turtle Nesting Site



Hibernacula Creation



Appendix A: Management and Development Action Timeline

Management or Development Action	January	February	March	April	May	June	July	August	September	October	November	December
Road maintenance												
Herbicide, insecticide, and pesticide application												
Dredging contaminants												
Aquatic weed harvest												
Drawdowns												
Inundations												
Electrofishing												
Lampricide application												
Mowing												
Off-road vehicle and heavy machinery use												
Clearcutting and vegetation harvest												
Fire												
Construction												
Site grading												
Stream mitigation and dam removal												
Create habitat structures												
Relocation and translocation												



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Amphibian & Reptile Best Management Practices for Michigan



Michigan Amphibian & Reptile Best Management Practices

Second Edition

A Complete Guide to the Conservation of Michigan Herpetofauna

Herpetological Resource and Management, LLC



Content to Include

- Natural History of Herpetofauna in Michigan
- Threats to Amphibians and Reptiles
- Conservation Efforts
- Management & Development Planning
- Ecological Restoration, Mitigation & Habitat Design
- Management Techniques
- Development Techniques

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Questions?

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