

The Streamside Forest Buffer

Importance of buffers for wildlife habitat



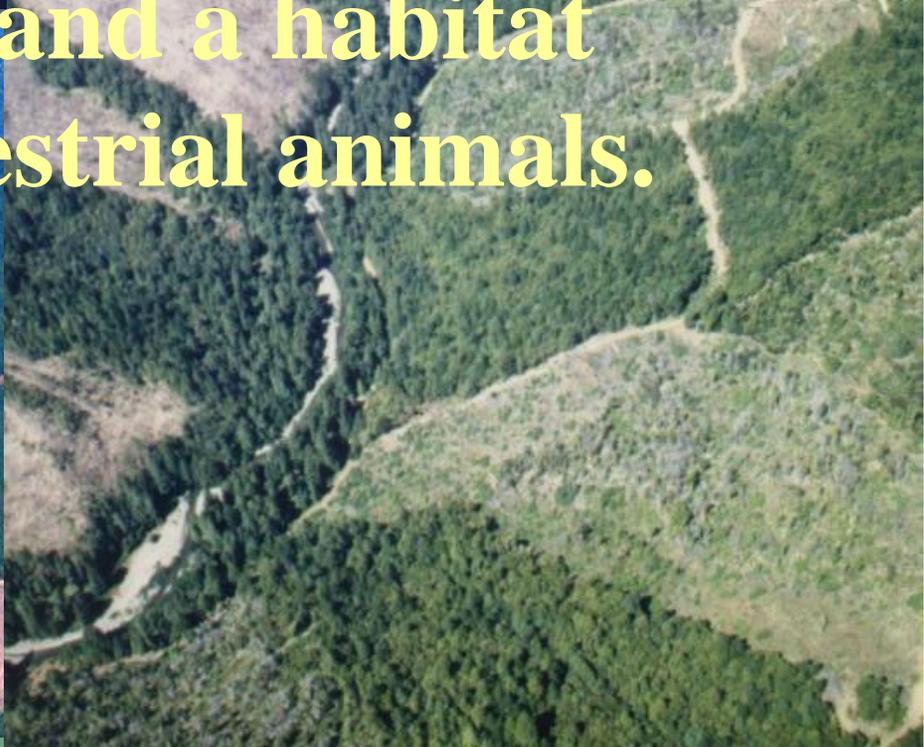
	20'	60'	15'		15'	20'	60'	
	ZONE 3	ZONE 2	ZONE 1	STREAMBOTTOM	ZONE 1	ZONE 2	ZONE 3	PASTURE
CROPLAND	RUNOFF CONTROL	MANAGED FOREST	UNDISTURBED FOREST		UNDISTURBED FOREST	MANAGED FOREST	RUNOFF CONTROL	
Sediment, fertilizer and pesticides are carefully managed.	Concentrated flows are converted to dispersed flows by water bars or spreaders, facilitating ground contact and infiltration.	Filtration, deposition, plant uptake, anaerobic denitrification and other natural processes remove sediment and nutrients from runoff and subsurface flows.	Maturing trees provide detritus to the stream and help maintain lower water temperature vital for stream life.	Debris, logs, field stubs and processing equipment provide cover and cooling shade for fish and other stream dwellers.	Tree removal is not permitted in this zone.	Periodic harvesting is necessary in Zone 2 to remove nutrients sequestered in tree stems and branches and to maintain nutrient uptake from the soil.	Controlled grazing or haying can be permitted in Zone 3 under certain conditions.	Watering facilities and livestock are kept out of the Riparian Zone insofar as practicable.

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riparian buffer - A vegetated protective area next to a water body serving as a barrier against polluted runoff and a habitat corridor for terrestrial animals.





Buffer Functions for Biodiversity:

- Travel corridors – restore connectivity
- Increase habitat area
 - Nesting habitat
 - Foraging habitat
 - Cover
- Protect sensitive habitats
- Increase access to resources
- Shade wetlands to maintain temperature

Wildlife use of the buffer will be a function of

- **Width**, which might be the most critical factor
- **Vegetative structure within buffer**
 - Overstory composition
 - Understory composition
- **Adjacent habitat/landscape structure**

Numbers of freshwater dependent species with upland requirements in Massachusetts.

	Species with Upland Requirements	Species Without Upland Requirements	Total MA Freshwater WD Species*	% MA Freshwater WD with Upland Requirements
Reptiles	9	1	10	90%
Amphibians	19			95%
Mammals	14			100%
Birds	23			55%
Totals	65			76%



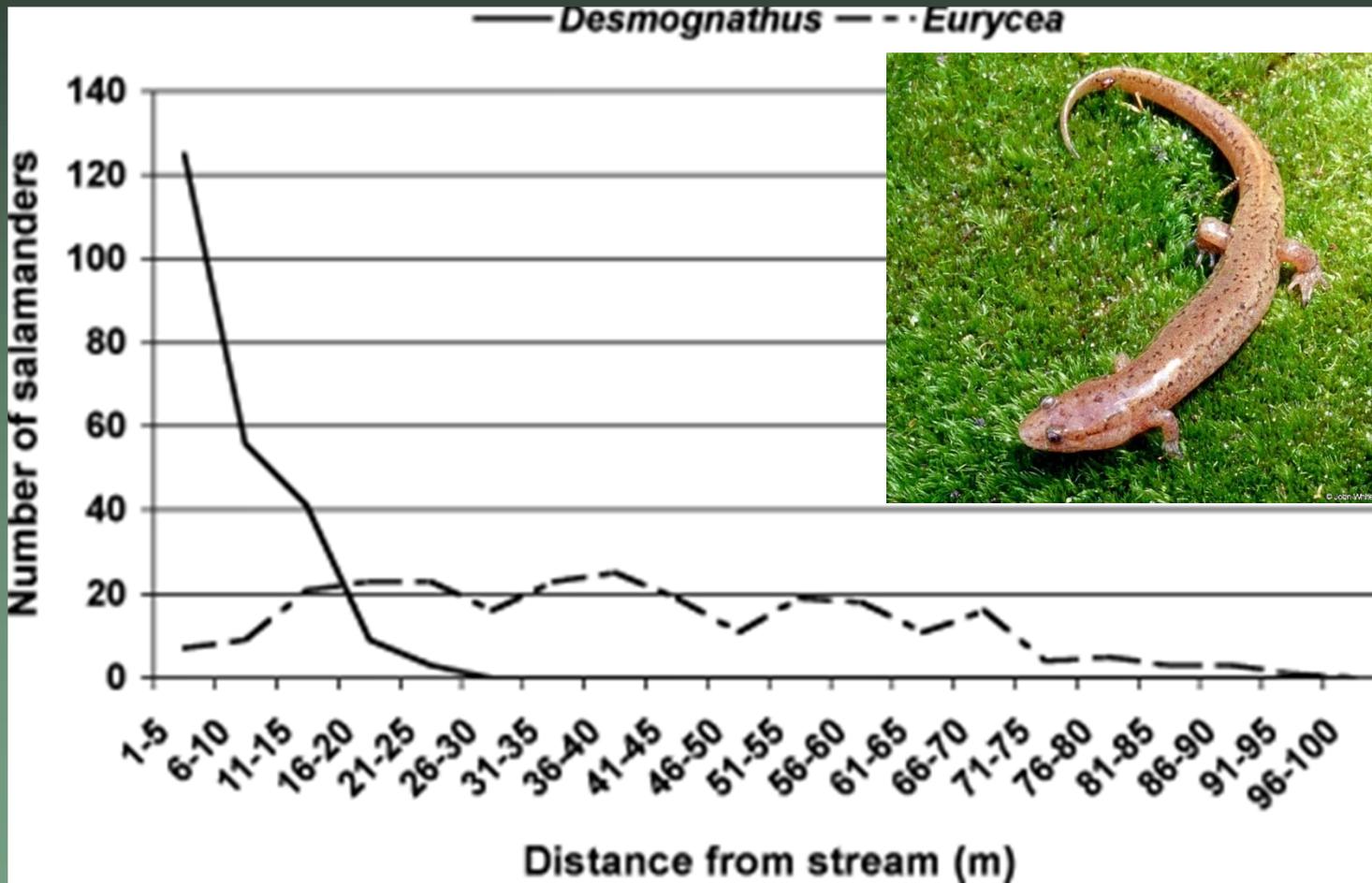
300 ft

Wildlife use of buffers, Boyd 2001

Wetland dependent species use beyond the wetland edge

	Edge to 100 ft.	Edge to 200 ft.	Edge to Beyond 200 ft.	Unknown	Totals
Reptiles	8	6	6	1	9
Amphibians	15	12	11	4	19
Mammals	10	8	8	4	14
Birds	17	12	9	6	23
Totals	50	38	34	15	65

Movement of stream salamanders



Crawford and Semlitsch 2006

Vernal Pools: Amphibian biology 101



March

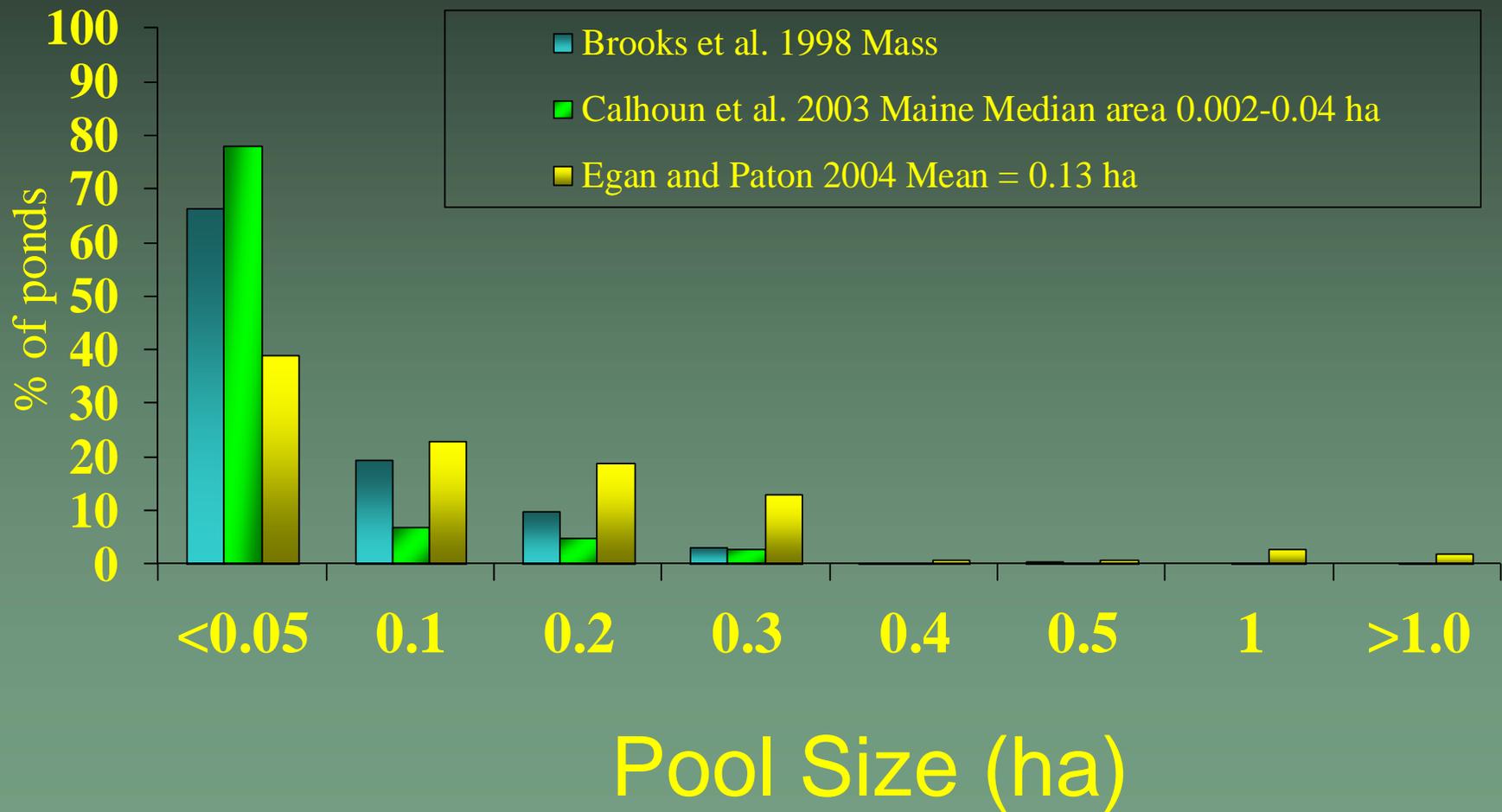


November

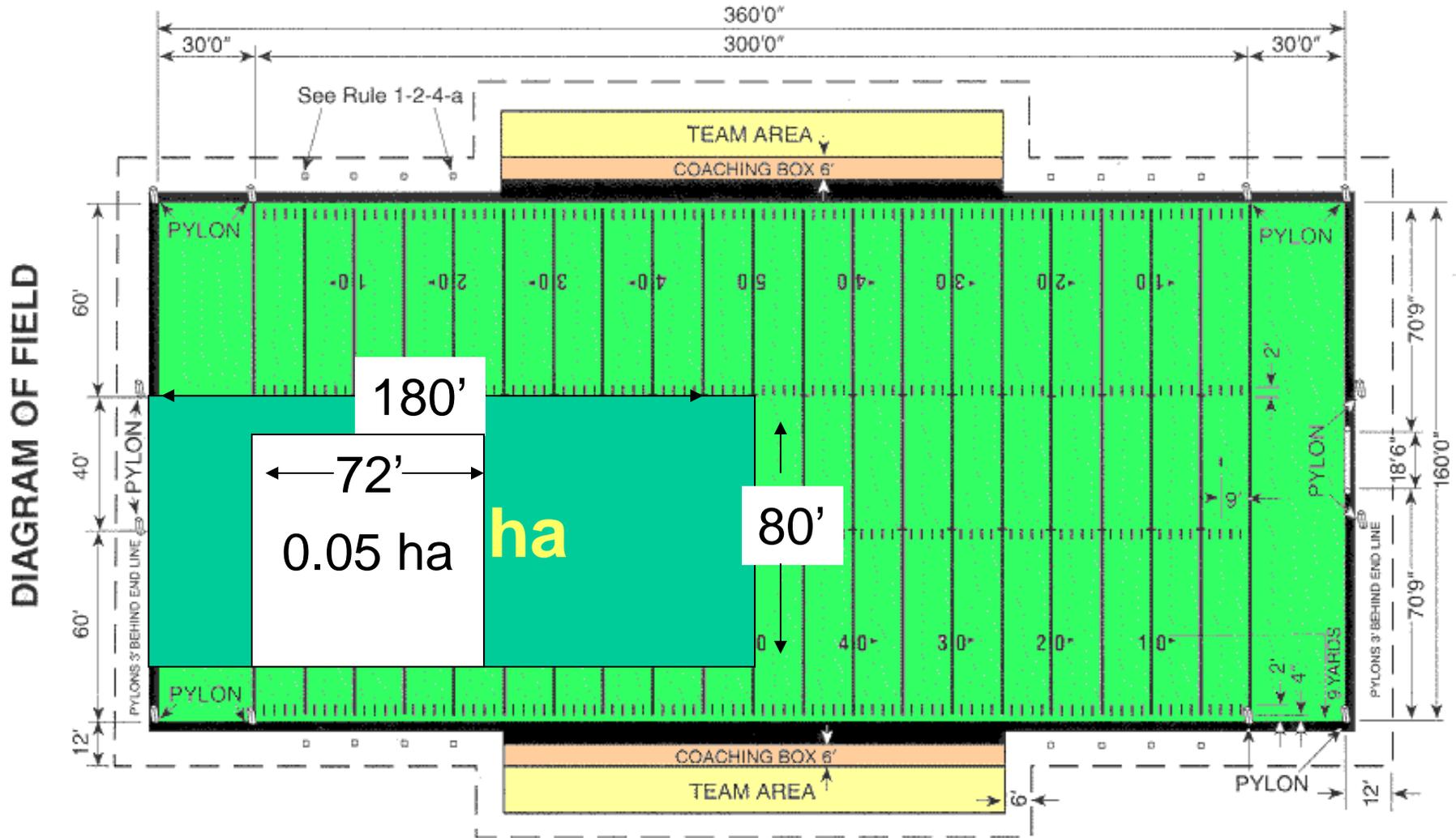
Pools that are seasonally flooded have fewer predators:

- fish
- Invertebrates

In New England, vernal pools are small (<0.05 ha)



Football field = 0.54 ha (1.32 acres)



Temporal Segregation: Adults to Breeding Pools



Wood frog



Spotted salamander



Red-spotted newt

March



Spring peeper



Am. toad



Pickerel frog

April

**May-
June**



Gray treefrog



Green frog

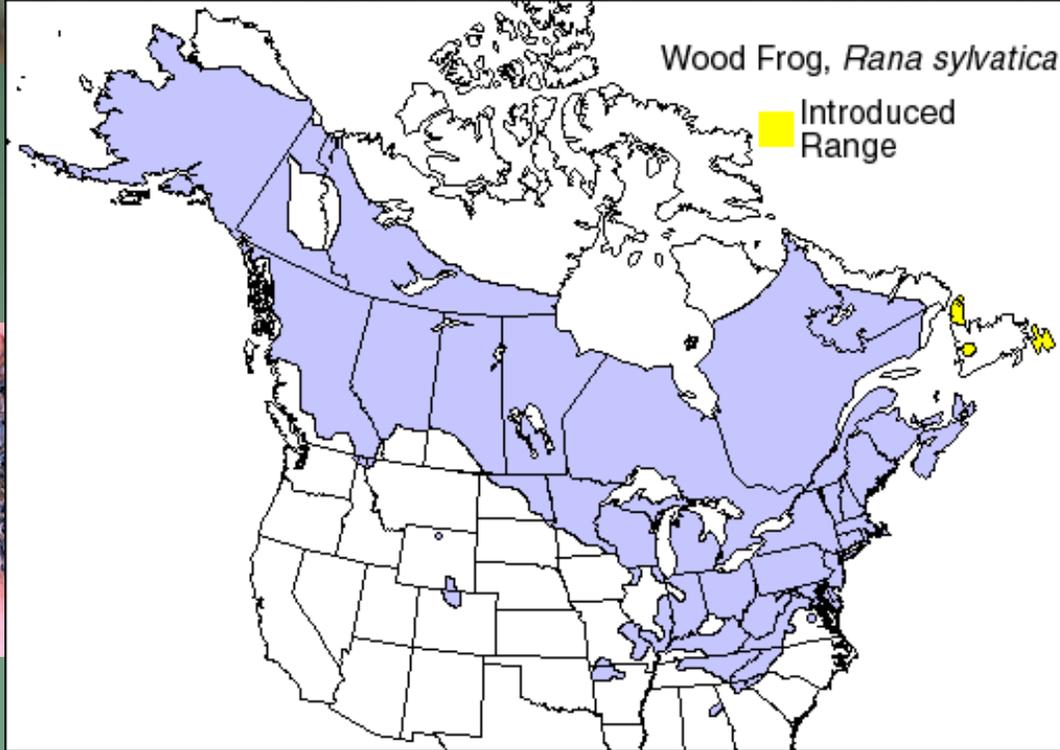


Am. Bullfrog

August



Marbled salamander



Frog
Rana sylvatica



Life cycle of Wood Frog



Emigration chronology for metamorphs at
breeding ponds in Rhode Island

	1st	Median	90%	No. of days
Marbled Salamander	3-Jun	19-Jun	14-Jul	41
Wood Frog	15-Jun	27-Jun	31-Jul	46
Gray Treefrog	6-Jul	24-Jul	2-Aug	27
Spring Peeper	20-Jun	14-Jul	13-Aug	54
American Toad	22-Jun	26-Jul	19-Aug	58
Spotted Salamander	8-Jul	28-Jul	23-Aug	46
Pickerel Frog	18-Jul	5-Aug	26-Aug	39
Green Frog	13-Jun	30-Jul	30-Aug	78
Bullfrog	22-Jul	27-Aug	16-Sep	56
Red-spotted Newt	2-Aug	22-Sep	10-Oct	69

Duration in breeding ponds

Species	Minimum	Maximum
Gray treefrog	66	125
Spring peeper	81	138
Wood frog	112	144
Pickerel frog	103	168
Am Toad	99	174
Spotted Sal.	155	211
R-s Newt	190	255
Marbled Sal.	238	264
Green Frog	411	529
Am. Bullfrog	488	580

Mean maximum dispersal distances of adult amphibians from wetland edge



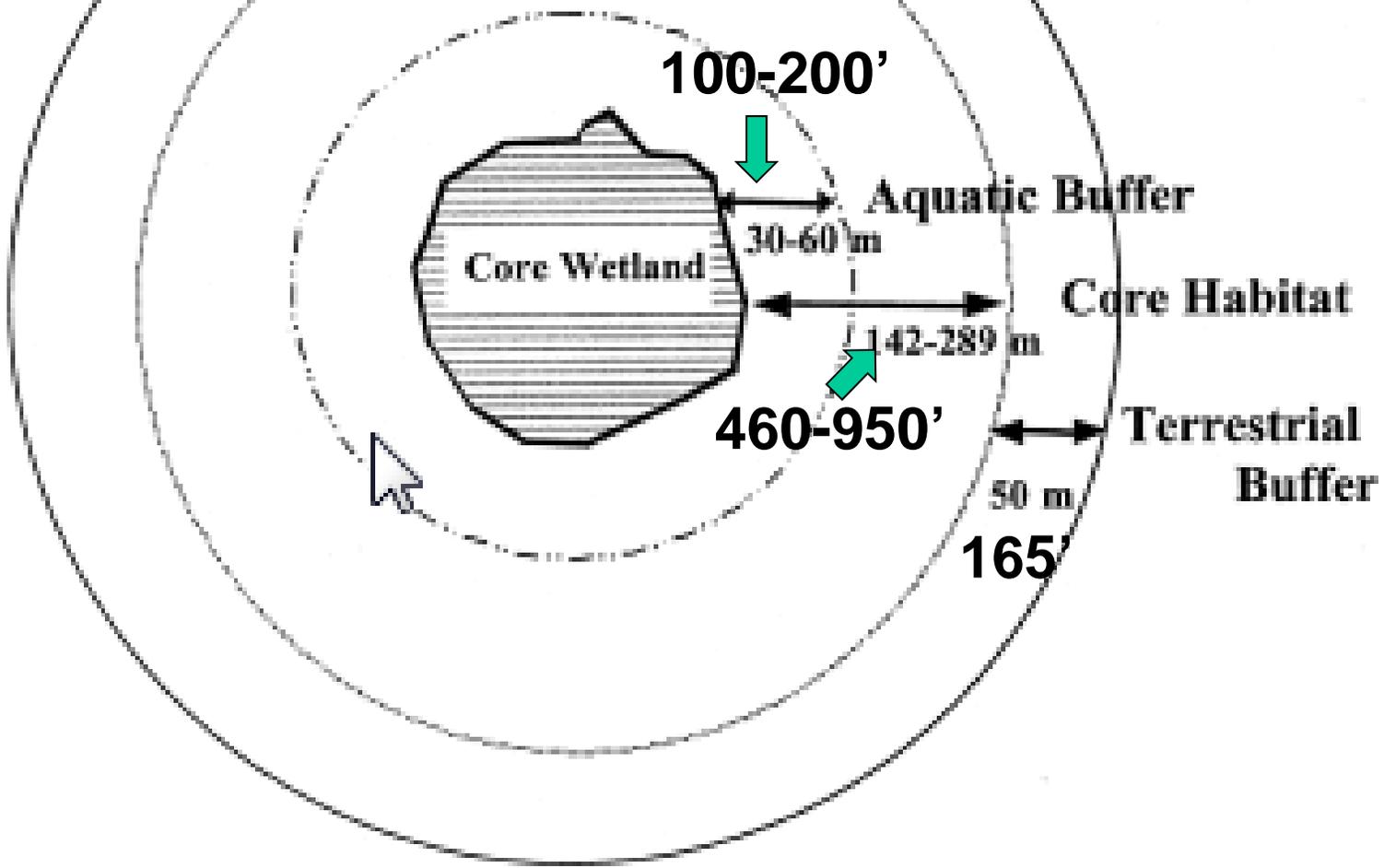
- Mean minimum and maximum dispersal distances
- for amphibians and reptiles.

<i>Group</i>	Mean minimum (m)	Mean maximum (m)
Frogs	205	1207 → 368
Salamanders	117	218
Amphibians	159	290
Snakes	163	304
Turtles	123	287
Reptiles	127	289
Herpetofauna	142	289

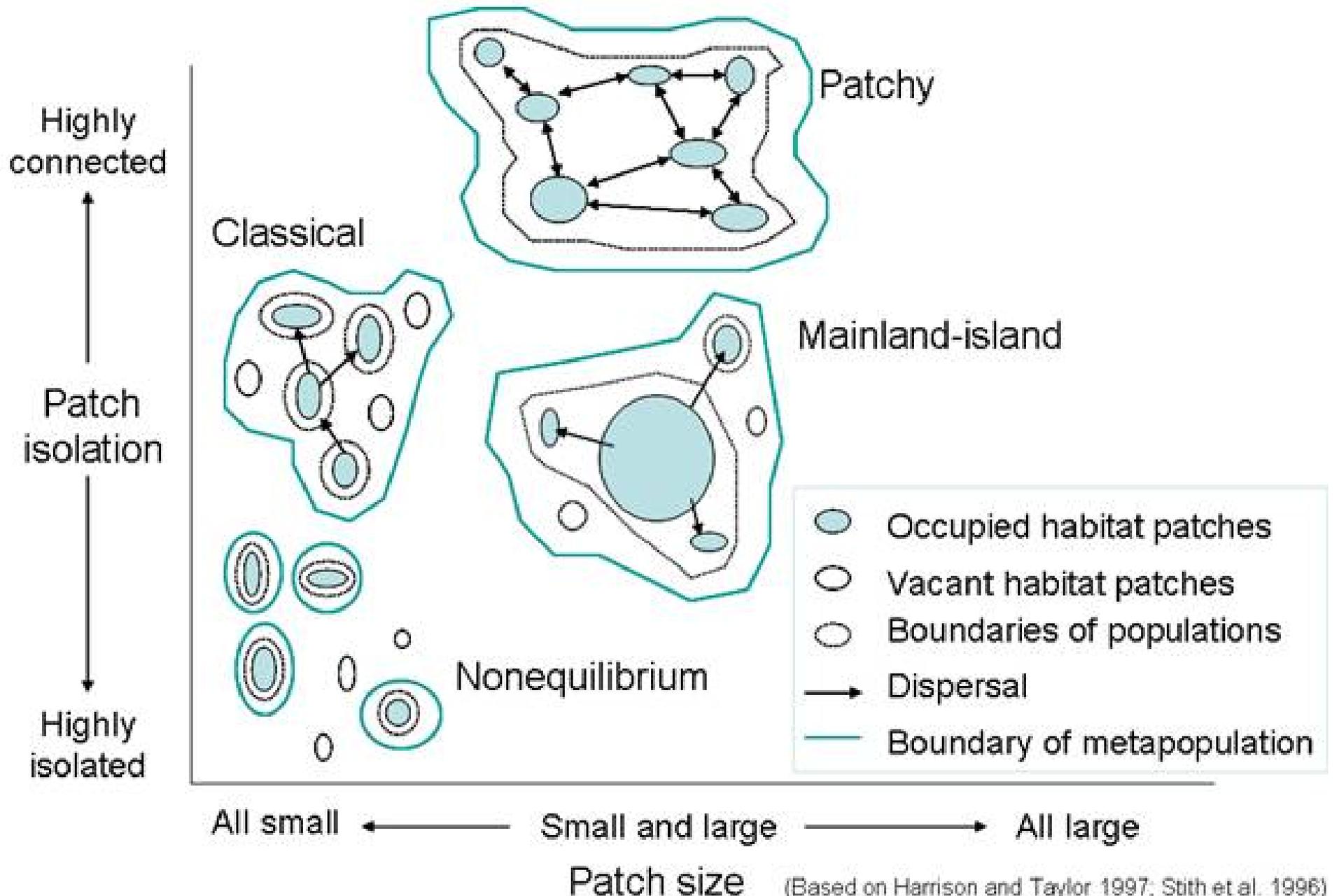
**Values represent mean linear radii extending outward from the edge of aquatic habitats compiled from summary data in Appendices 1 and 2.*

Semlitsch's 95% "Life Zone"

As far as 1,309 feet



Metapopulation structure



(Based on Harrison and Taylor 1997; Stith et al. 1996)

Spotted Salamander

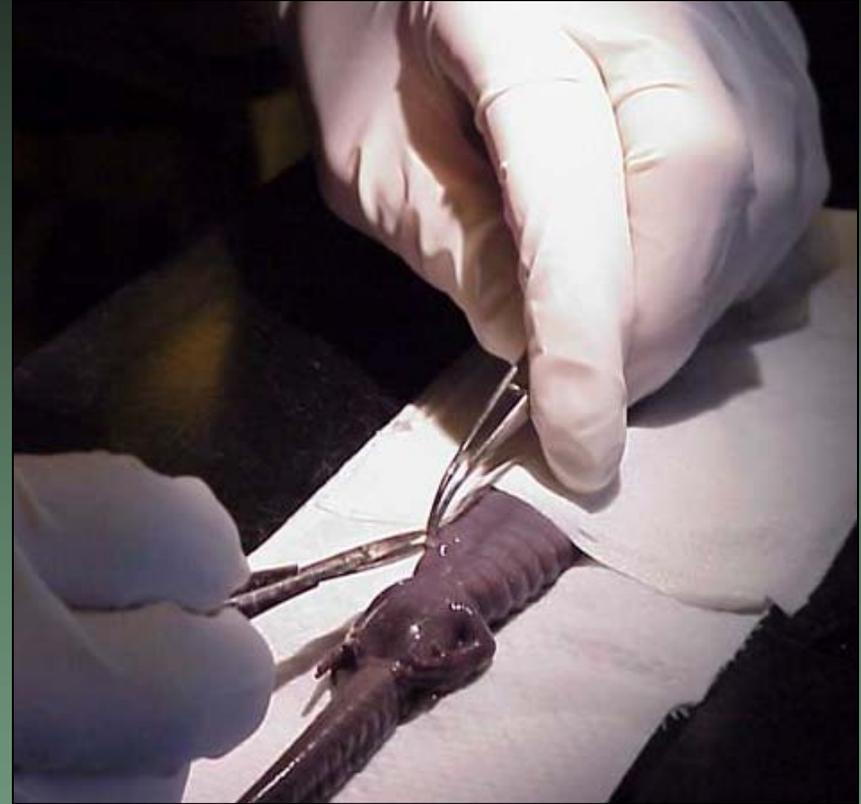
Ambystoma maculatum

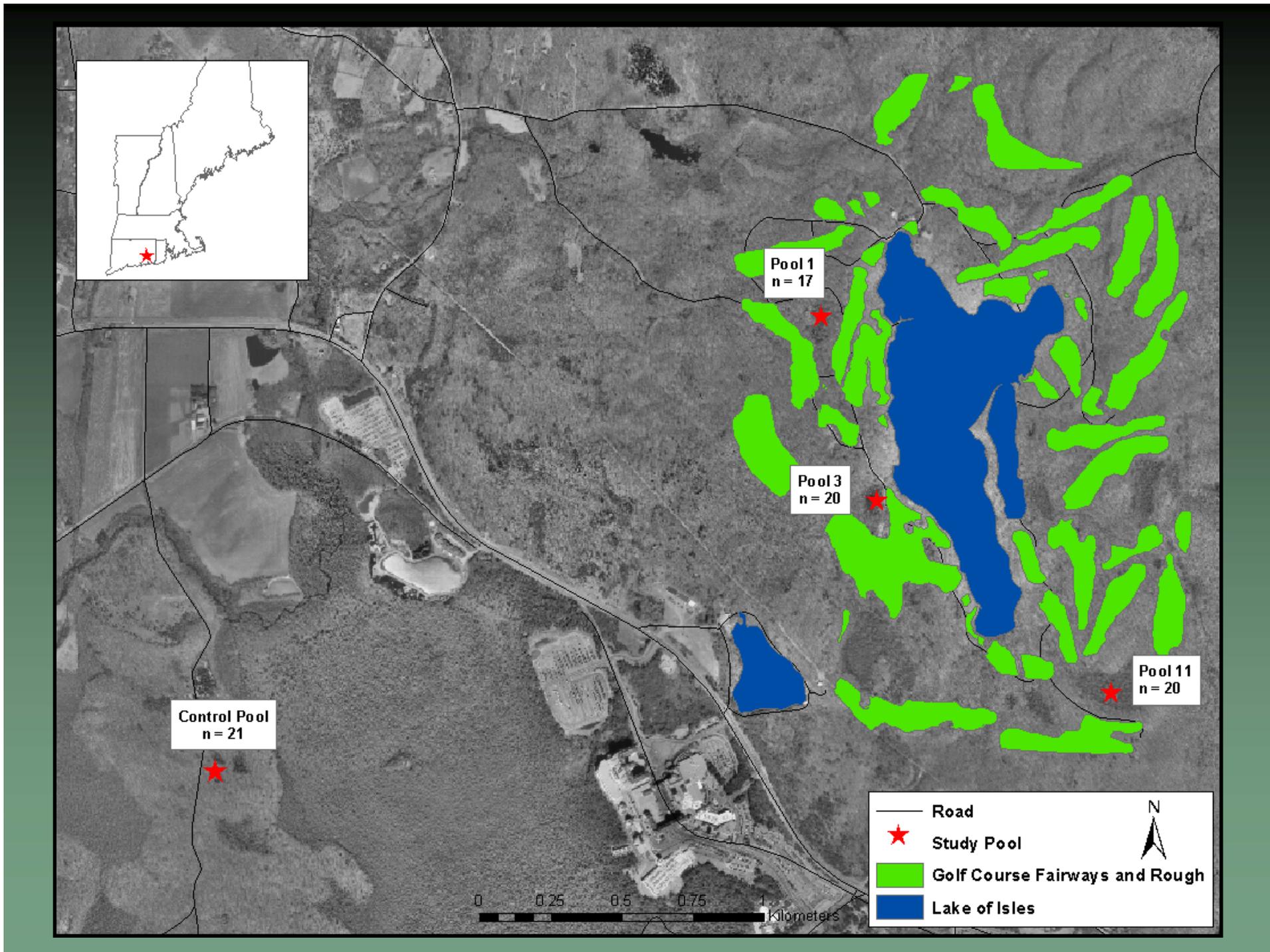
- Bi-phasic life history; mid-March to April in breeding ponds, most of year in terrestrial habitats
- Adults are fossorial
- Commonly found in small mammal burrows



Radio Transmitters

- Each weigh 1.7 g
- $\bar{x} = 8.79\%$ of body mass
- Battery life of 5 months





Maximum Distance Traveled

- Study Ponds
- Golf Course Fairway
- Upland
- Lake of Isles
- Hydric Soil
- Animal Release Site
- Maximum Distance Traveled

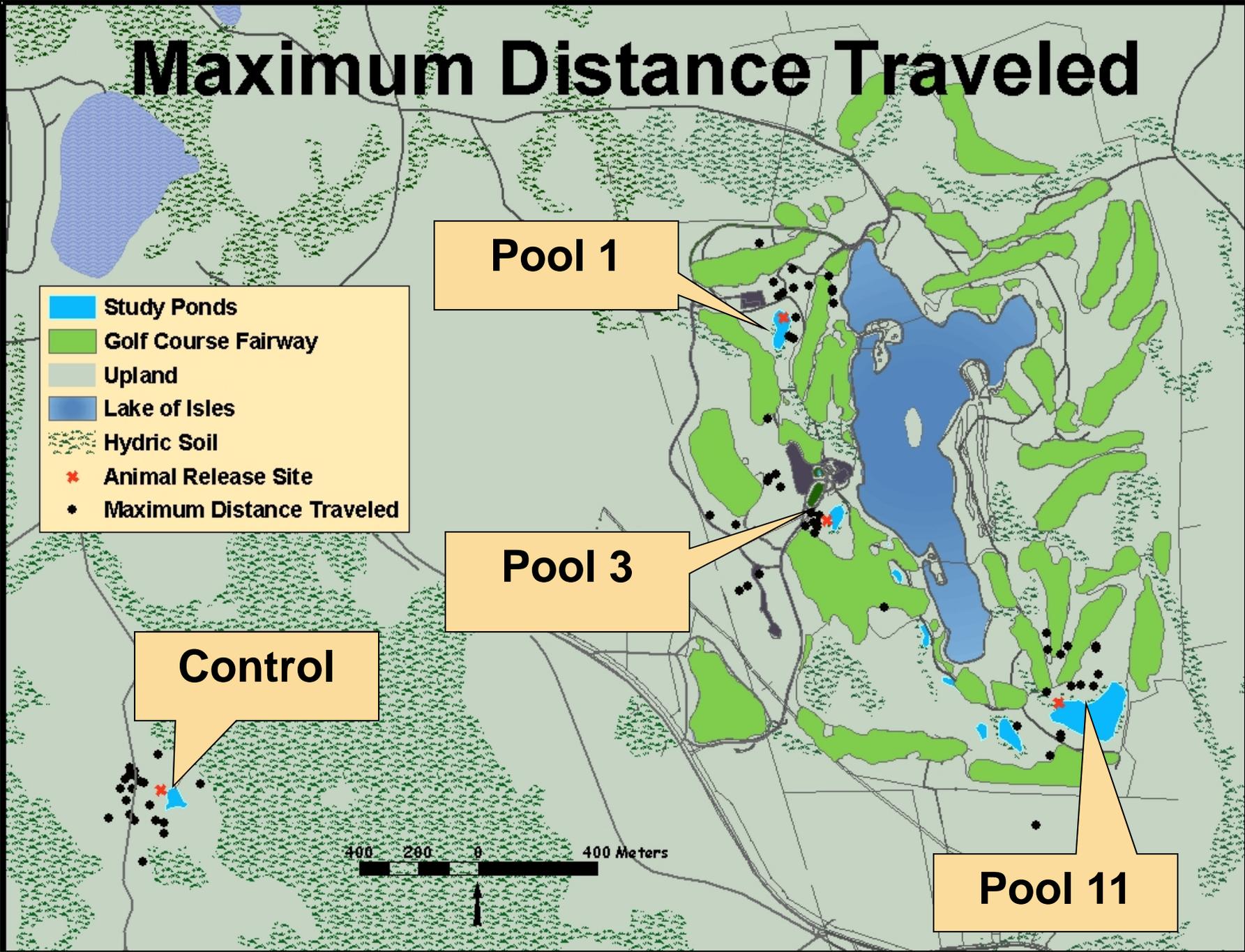
Pool 1

Pool 3

Control

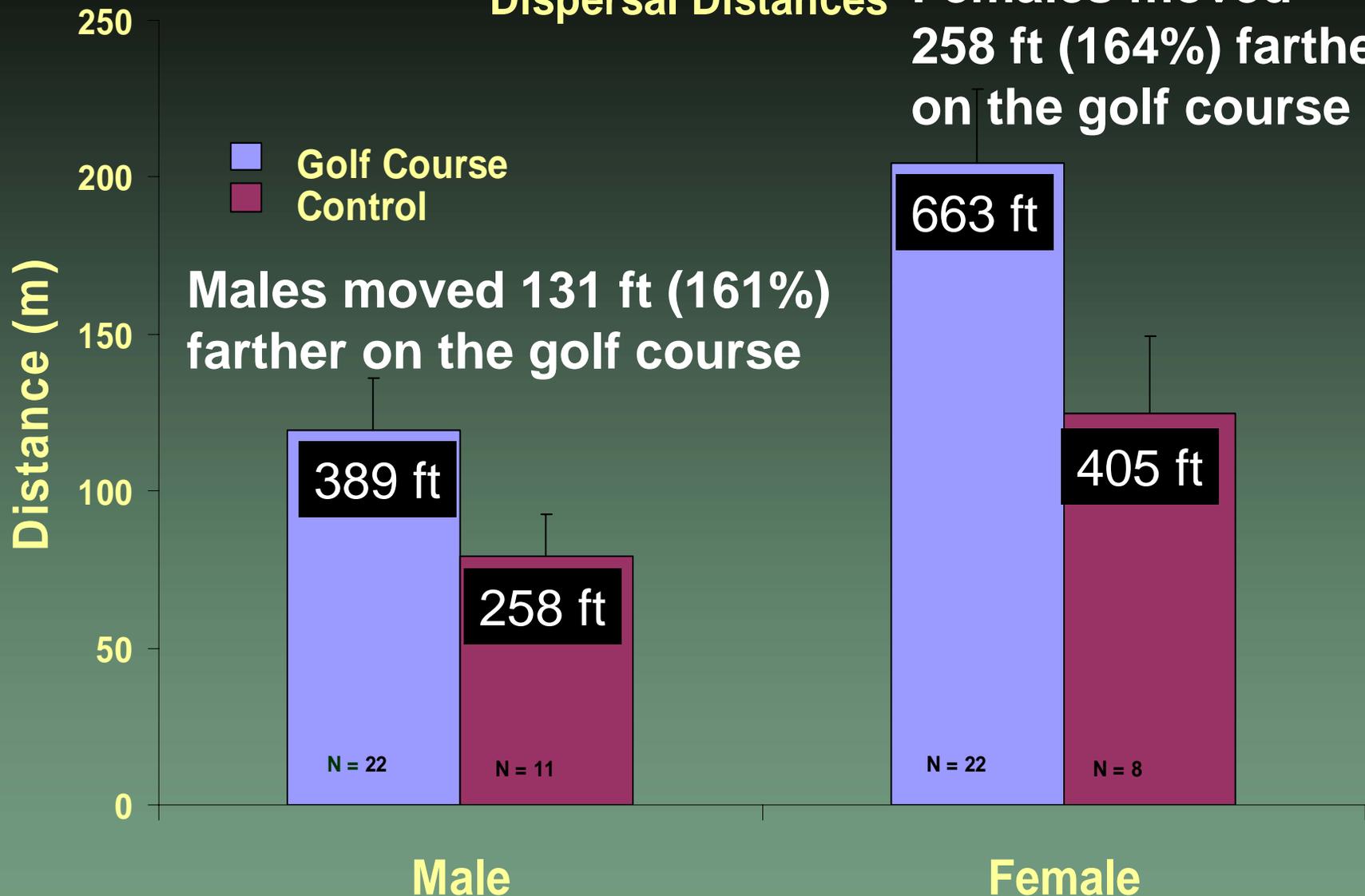
Pool 11

400 200 0 400 Meters



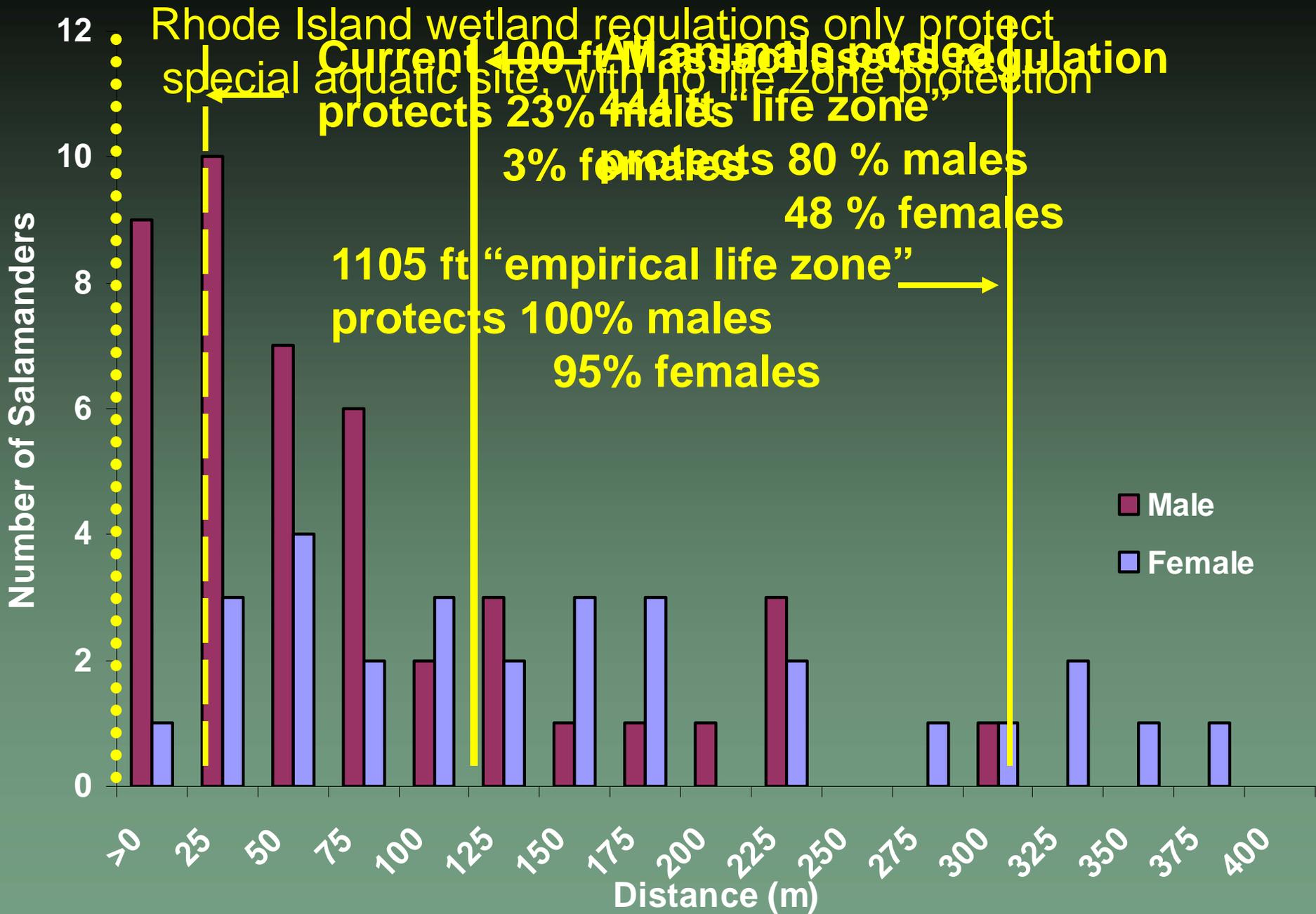
Dispersal Distances

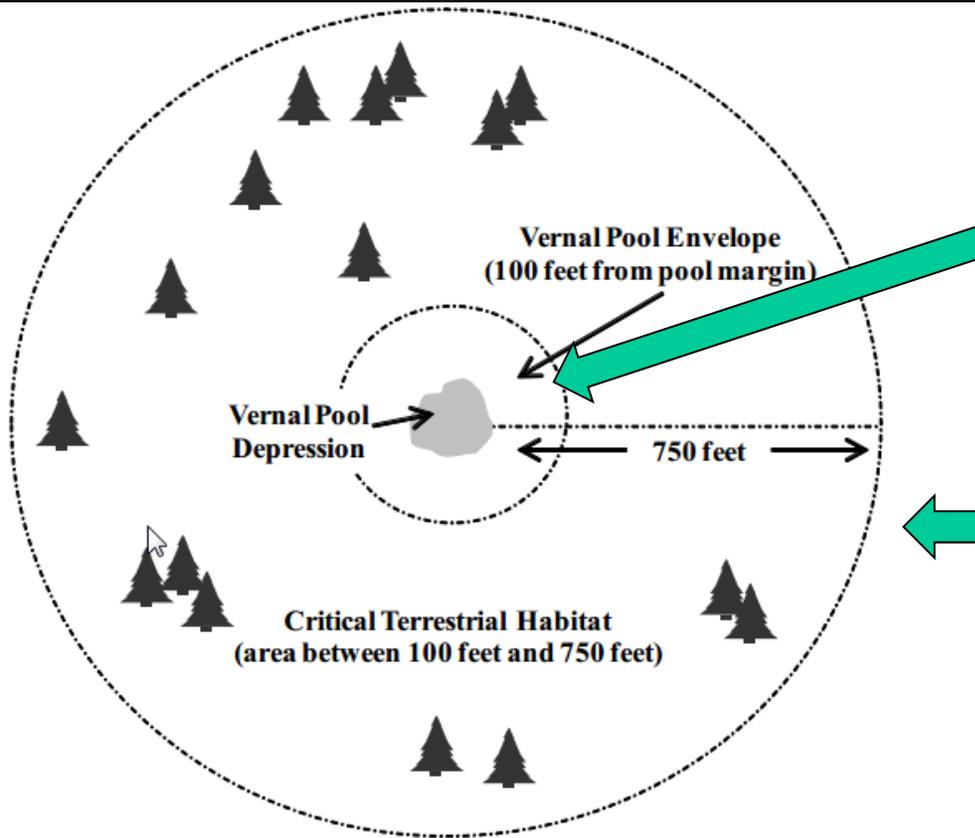
Females moved
258 ft (164%) farther
on the golf course



Males moved 131 ft (161%)
farther on the golf course

golf course vs. control, $p = 0.003$
females vs. males, $p = 0.003$





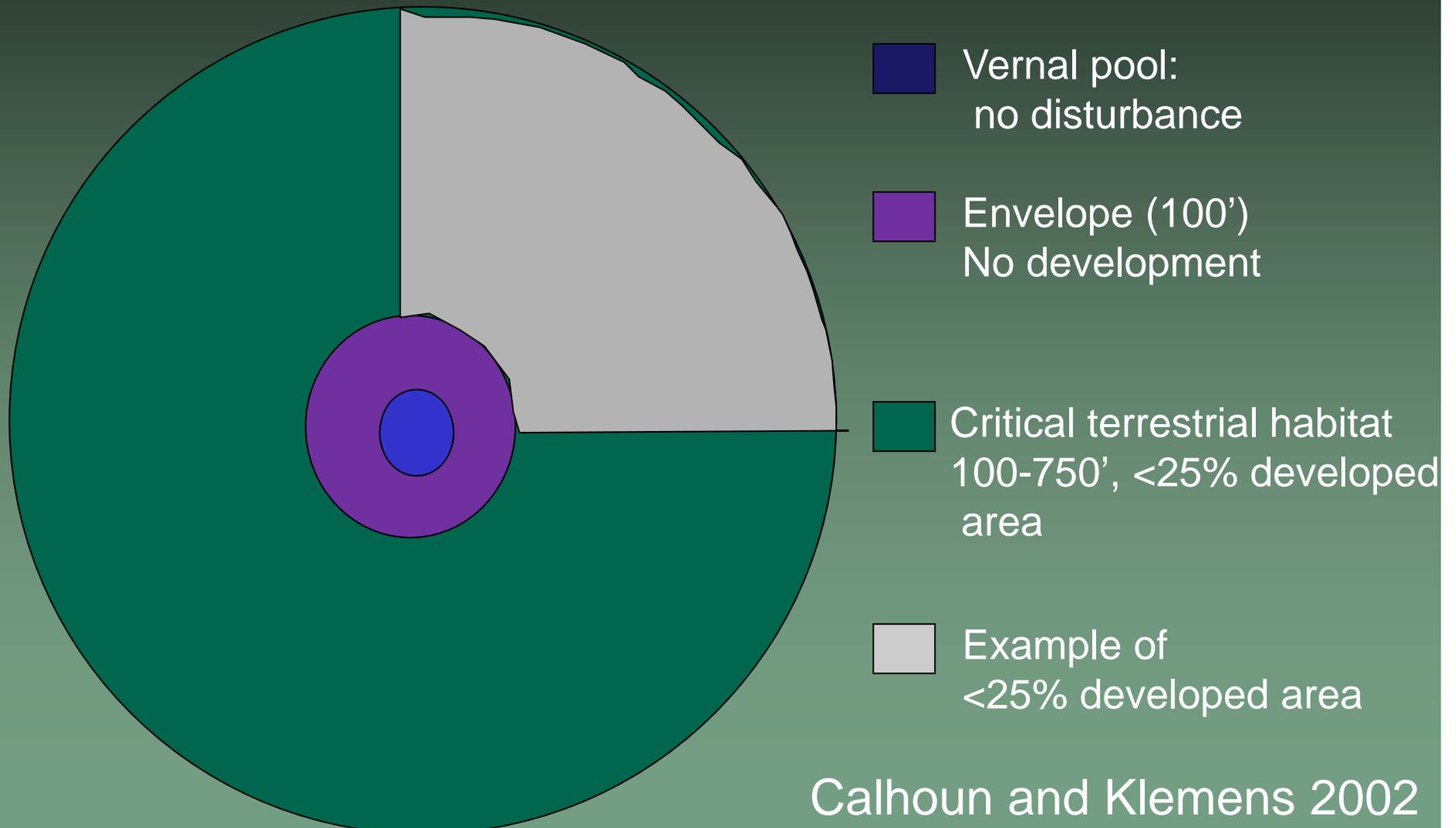
No activities
Within 100' VPE

>75% of CTH
Remains intact

Figure 1: ACOE Vernal Pool Management Area is made up of the depression itself, the vernal pool envelope (area within 100 feet of the pool margin), and the critical terrestrial habitat (area between 100 and 750 feet from the pool margin).

Maine regulations

Best Management Practices for Vernal Pool Amphibians



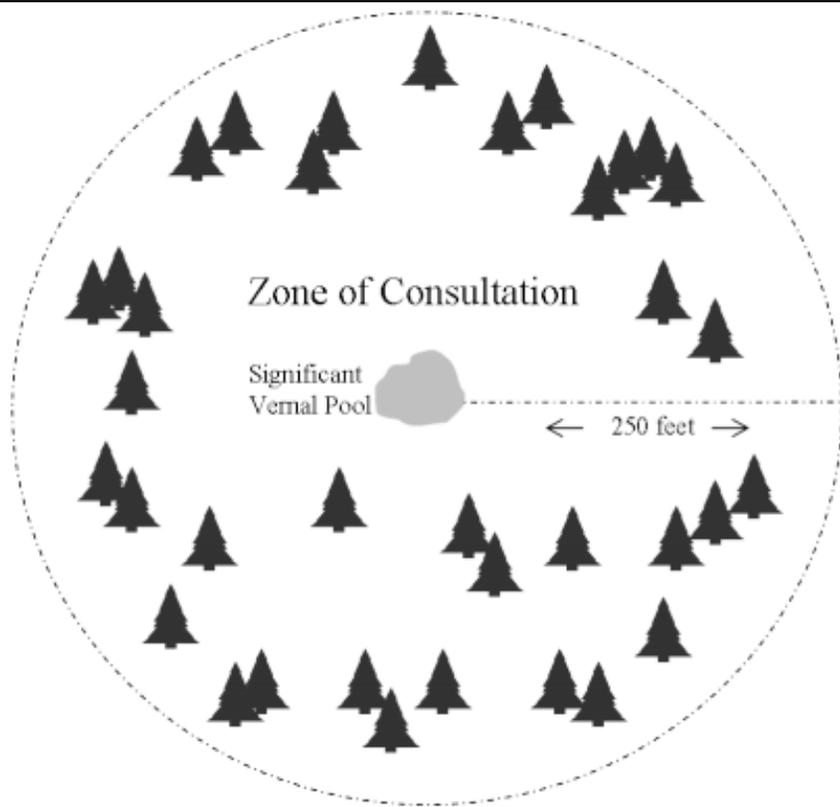


Figure 4: Regulated *Zone of Consultation* within 250 feet of a Significant Vernal Pool.

Vernal Pool: presence of
Fairy shrimp
Blue-spotted Salamander-10
Spotted Salamander-20
Wood Frog-40*
*# of egg masses to be
Classified as Significant

In Maine, no unreasonable impacts to significant Vernal pool habitat* within Zone of Consultation

State	Pool size	Hydroperiod	Other	Buffer
Mass	¼ acre	2 continuous months with 6" depth	Free of fish	100'
Maine	Presence of fairy shrimp. Blue or spotted salamanders, wood frogs			100' for VPE and 750' critical terrestrial habitat

Habitat management within buffers

Let the natural form dominate

Diversity

Horizontal structure

Vertical structure

Go native and think seasonal

Leave snags

Leave woody debris

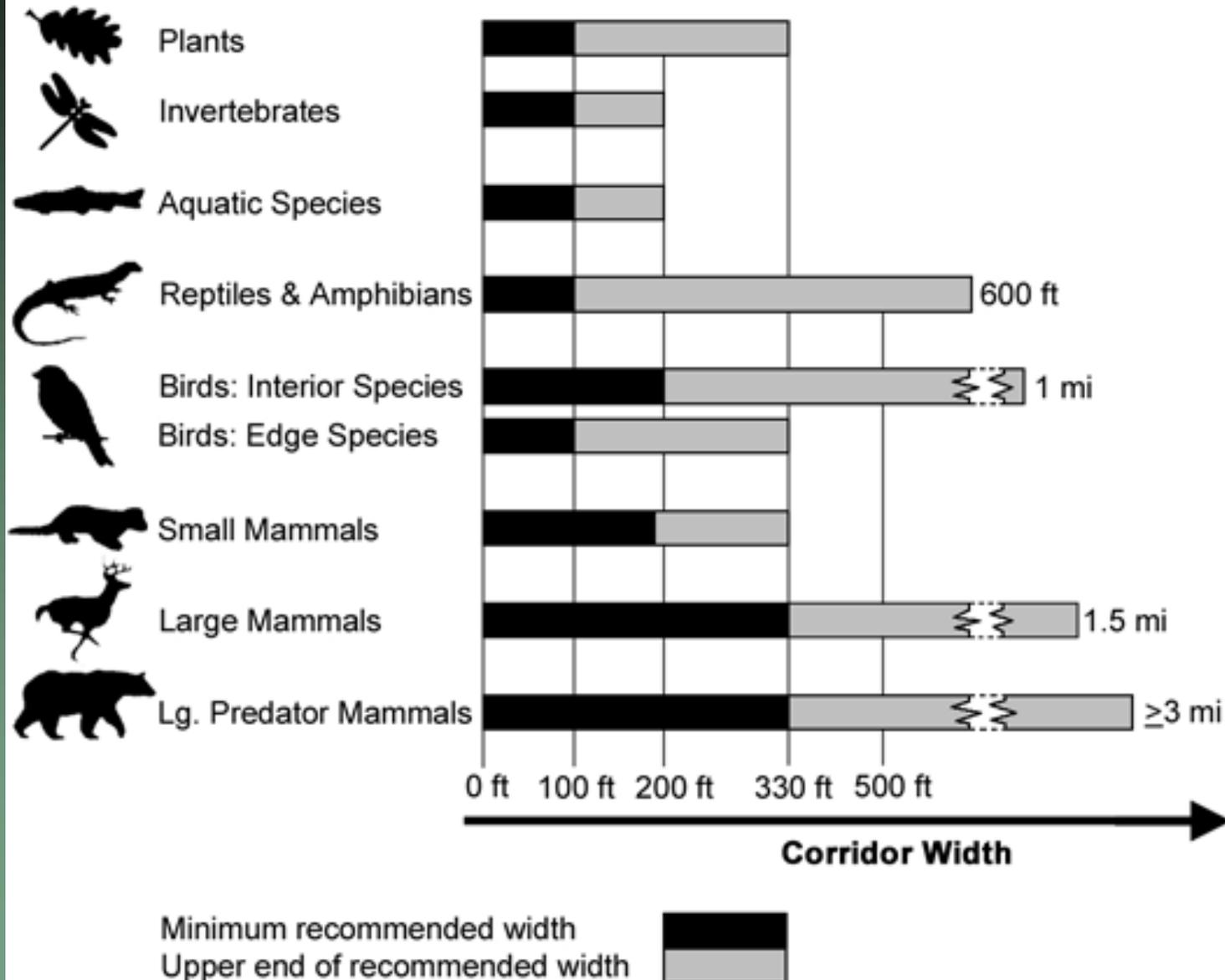
Have fun with border (curves, shrubs)

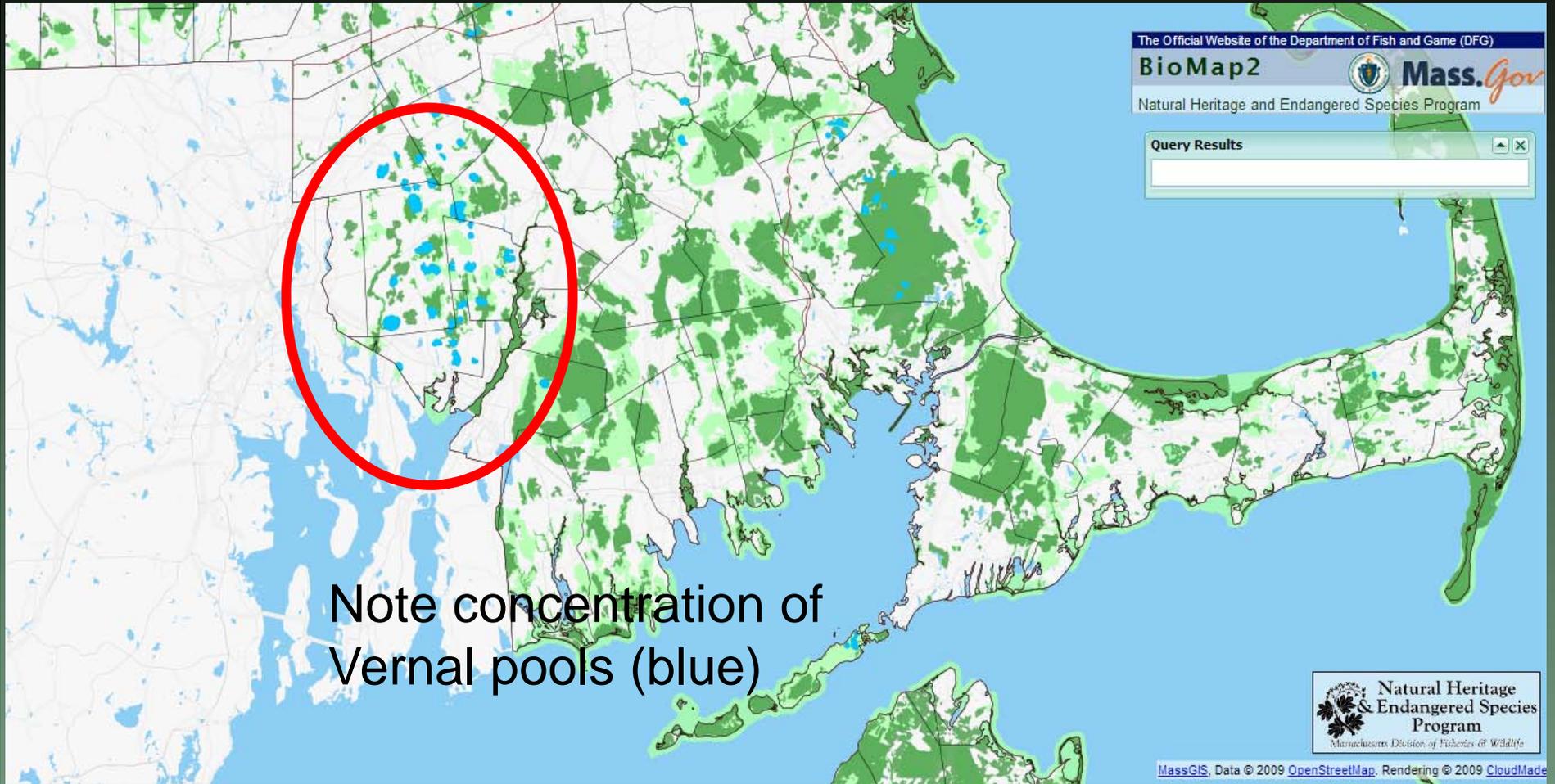
Supply rocks and stones



Bentrup. 2008. Conservation Buffers. USFS Gen Tech Rep.

Corridor Width Summary





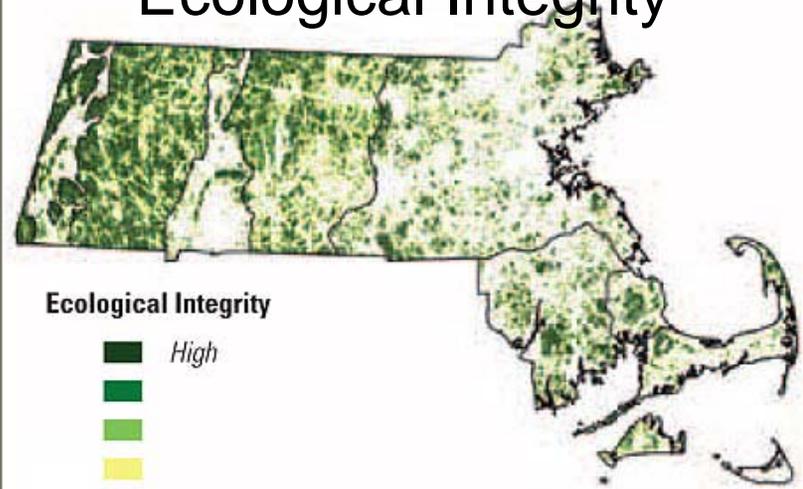
Note concentration of
Vernal pools (blue)

Forest Cover



a

Ecological Integrity

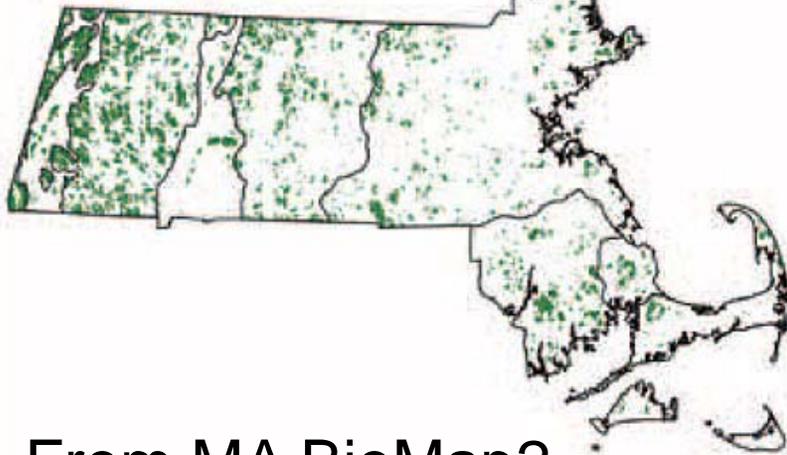


Ecological Integrity



b

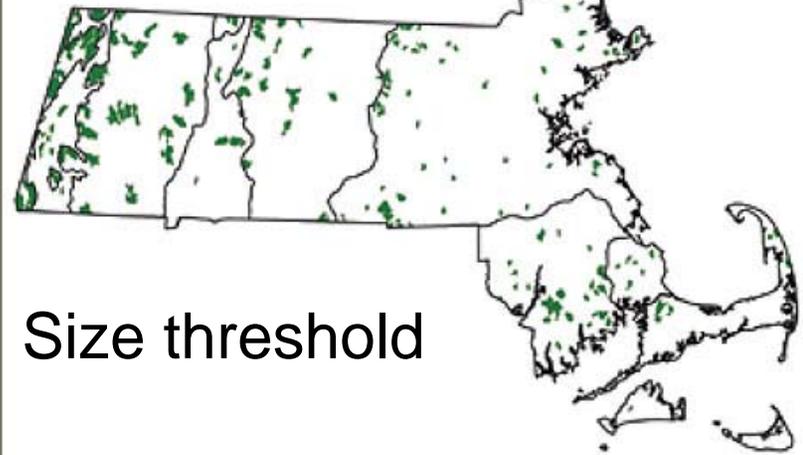
Ecological Integrity-highest



From MA BioMap2

c

Ecological Integrity-highest



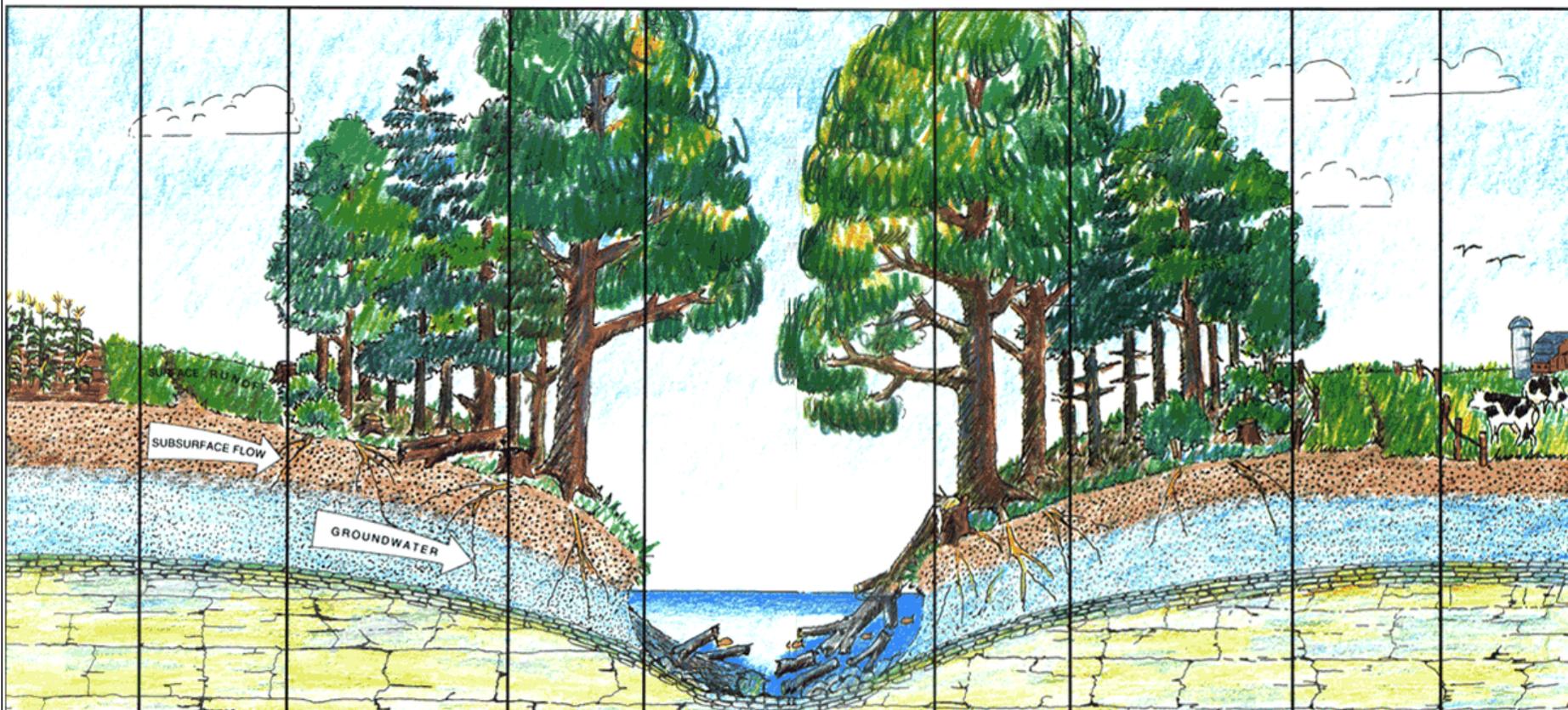
Size threshold

d

Example Ranges of Minimum Patch Area

Taxa	Patch Area
 Plants	5 to \geq 250 ac
 Invertebrates	50 sq ft to \geq 2.5 ac
 Reptiles and Amphibians	3 to \geq 35 ac
 Grassland Birds	12 to \geq 135 ac
 Waterfowl	\geq 12 ac
 Forest Birds	5 to \geq 95 ac
 Small Mammals	2.5 to \geq 25 ac
 Large Mammals	40 ac to \geq 2 sq mi
 Large Predator Mammals	3.5 to \geq 850 sq mi

THE STREAMSIDE FOREST BUFFER



← 20' →
← 60' →
← 15' →
← 15' →
← 60' →
← 20' →

CROPLAND	ZONE 3 RUNOFF CONTROL	ZONE 2 MANAGED FOREST	ZONE 1 UNDISTURBED FOREST	STREAM BOTTOM	ZONE 1 UNDISTURBED FOREST	ZONE 2 MANAGED FOREST	ZONE 3 RUNOFF CONTROL	PASTURE
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Questions?

