

Functions of Buffers



Presentation focus:
water quality and wildlife habitat

Pond without a buffer



Algal bloom due to over-fertilization in lawns

Vegetation is Key



Sediment and Toxicant Trapping



Snow pile in wetland with road salt

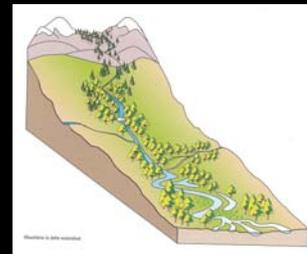
Median Pollutant Removal (%)

Treatment BMP	Total Suspended Solids	Total Phosphorus	Soluble Phosphorus	Total Nitrogen	Nitrate	Copper	Zinc
Stormwater Detention Ponds	47	19	6	25	4	26	26
Stormwater Retention Pond	80	51	66	33	43	57	66
Stormwater Wetlands	76	49	35	30	67	40	44
Water Quality Swales	81	34	8	8	31	51	71
"Vegetated" Buffer (30 feet)	58-95	19-80	---	7-77	19-80	---	---

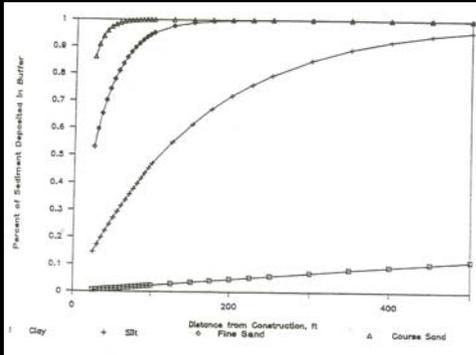
Source for Treatment BMP's: Brown and Schueler 1997
Source for Vegetated Buffer Treatment level: Dillaha et al. 1988

What influences the effectiveness of a given buffer?

- Slope
- Vegetation type
- Activity
- Soil Type



Sediment Trapping & Buffer Width



Source: USDA 1975 In Chase et al. 1995

Nutrient Removal Rates of Plants

Common Name	Scientific Name	Nitrogen (lbs/acre/yr)	Phosphorus (lbs/acre/year)
Maple	<i>Acer spp.</i>	51	5.3
Pine	<i>Pinus spp.</i>	8	0.7
Tall fescue	<i>Festuca arundinacea</i>	89	---
Bordering scrub-shrub wetland	<i>Acer rubrum, Vaccinium corymbosum, Cetebrus albaifolia, Rhododendron viscosum, Ilex glabra</i>	107	---

Source: Dueniueen et al. 1997

Wildlife Habitat



Blanding's turtle – a semi-aquatic species

In Some Cases, Exposed Soil Provides Habitat



Aquatic Wildlife

Buffers:

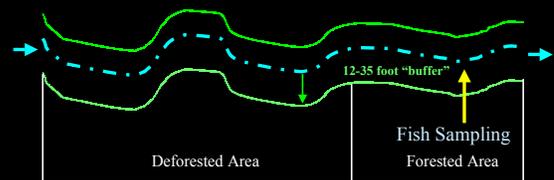
- protect nesting locations by reducing sedimentation
- maintain dissolved oxygen
- reduce pollution
- Can maintain fish diversity and influence community structure



Yellow Perch

Buffer Length vs. Buffer Width

Effects of Riparian Forest Removal on Fish Assemblages

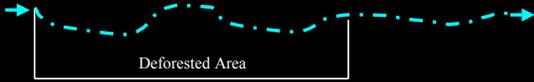


(~ 570 to 5300 feet wide by 0-5.3 km long)

From: Jones et al. 1999

Buffer Length Study – Results

From: Jones et. al 1999



1. < Buffer Length = < Fish Abundance Downstream!
2. < Buffer Length - > sediment tolerant and invasive fish species
3. Instream Habitat Diversity < with > non-forested patch length, esp. at 1 Km

Brings new meaning to:

Wt 302.04 a. (16) cumulative impact that would result if all parties abutting the affected wetland were also permitted alterations....

Additive Predation



cats are major predators of songbirds and small mammals

Light Pollution and Noise



Invasive Species



Travel Corridors



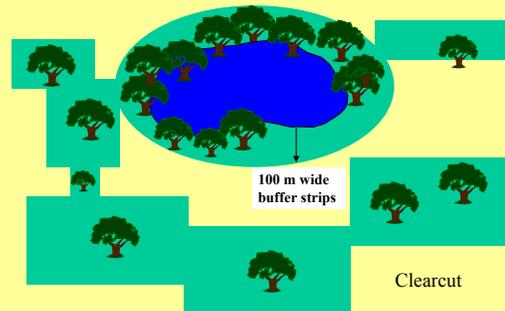
= Contiguous areas of natural vegetation
-May function as wildlife dispersal routes
-Subdivisions designed for safety can fragment corridors

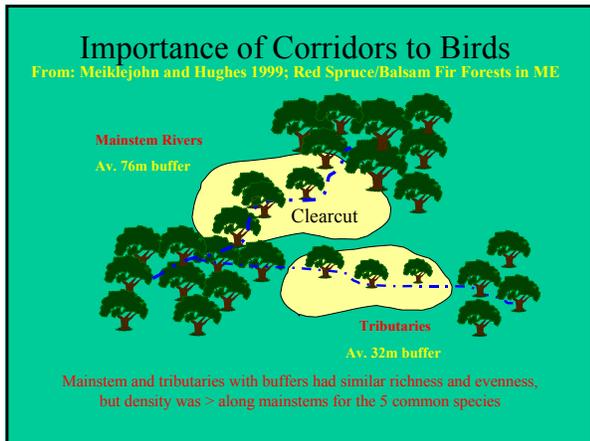
Example of road mortality on Rt 125
(female Blanding's turtle) →



Buffer Strips Enhance Bird Dispersal

Machtans et al. 1996





Example Buffer Widths in NH

- Over 84 towns have wetland buffer requirements ranging from ~25 – 300 ft
- DES mitigation requirements include a 100-foot wetland buffer
- DES Shoreland Protection Standards include requirements for a natural woodland buffer within 150 ft of the reference line of a waterbody
- EPA frequently requests vernal pool buffers as part of projects reviewed by the U.S. Army Corps of Engineers

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Variability in Buffer Recommendations/Requirements

- 50 ft recommendation for vernal pools (NH draft guidance form)
- 750 feet (Calhoun and Klemens 2002) !!!
- 100 ft (Rye)
- 200 ft (Litchfield)

What does a “small” buffer do?

“Small” Buffer
(~ 25 – 50 feet)

- Help to protect water quality
- Provide small scale travel routes
- May provide nesting/basking sites

What does a large buffer do?

- Provides habitat components to more species
- Helps to reduce secondary impacts
- Increased water quality protection
- Provides large scale corridors

Buffers – Quality can be more important than quantity



Spotted Salamander Adult

- Found in uplands most of the year
- requires natural cover on the forest floor and small mammal burrows
- Migrates an average of 400 - 600 feet to and from pools
- 1-40m² home range

Buffer Requirements for Wood Frog

(*Rana sylvatica*)



Adult

- Can migrate up to 1500 ft!
- Most overwinter within 213 ft

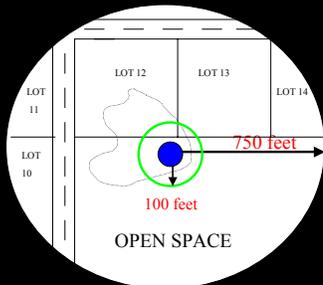


Communal egg mass

- Buffer size more critical
- do not require root/small mammal cavities

750-foot Vernal Pool Buffer Concept

Calhoun and Klemens 2002 recommend:



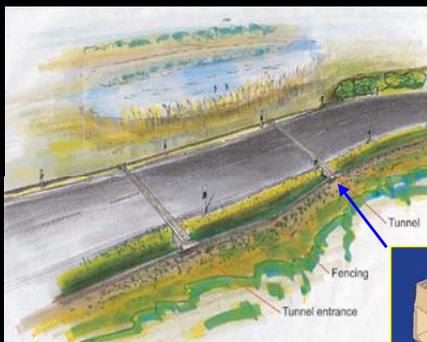
100-foot no-disturbance buffer & 75% natural cover within 750-foot

Minimization Options for Wildlife

When Corridors Aren't Feasible

- Cap Cod-style curbing
- Avoid directing lighting into buffers
- Design snow storage areas carefully
- Education
- Construct amphibian culverts

Wildlife Tunnels



Problem:
Cost!!!



Curbing



- Vertical granite curbing can prevent salamander migrations

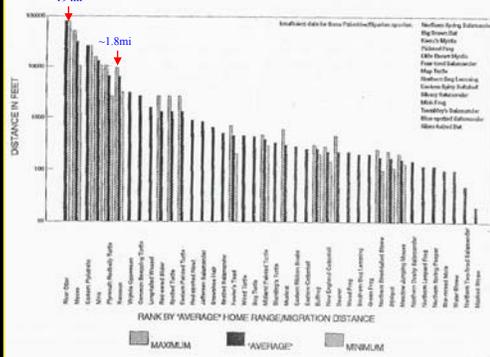


- vertical curbing may be required for stormwater treatment

Buffers Can Not Replace Regional/Local Land Protection



PALUSTRINE/RIPARIAN REPTILES, AMPHIBIANS AND MAMMALS KNOWN TO OCCUR IN NEW ENGLAND



Large Home Ranges



Buffers Do Not Address Attitudes Toward Wildlife



What are some shortcomings of buffer regulations and research?

- Need data on impacts associated with subdivisions
- Knowing dispersal distance is only one part of the puzzle
- Buffer regulations need to identify reasonable activities (setbacks may do little)
- ZBA's may be granting many variances
- Stream-lined buffer regulations often cannot take site conditions into account
- Engineering considerations often demand variable-sized buffers



Shortcomings continued

Attorneys can find loop holes in language (commas matter!)

Buffer description:

Within 100 feet of the edges of all tidal marshes, bays, estuaries, rivers, river tributaries and creeks, as defined by the highest flooding of the ocean tides: the edges of Eel Pond, Burke's Pond, Brown's Pond and East Rye Pond as defined by the high-water mark: the edges of all natural perennial streams, vernal pools and ponds (1 acre or larger in size as defined by the high-water mark; and freshwater marshes, as defined by vegetation.



THE BIG QUESTION

- Should a created depression or disturbed wetland receive the same buffer as a natural system?



Questions?

