



Tools for protecting & restoring riparian areas





Today's fare....

- **Welcome & Introductions** *Chet Arnold, UConn CLEAR*
- **Overview (and new tools)** *Dave Dickson, UConn CLEAR*
- **Status of riparian protections** *Zbig Grabowski, UConn CLEAR*
- **The Gateway experience** *Alan Ponanski, CT River Gateway Commission*
- **Legislative update** *Alicea Charamut, Rivers Alliance of CT*
- **Q&A; discussion** *All*

Overview of Riparian Areas & Importance



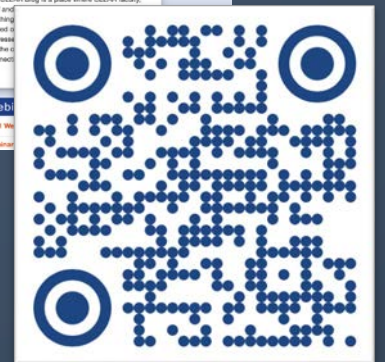


provides research, tools, training, information, and assistance to community decision makers and other audiences in support of:

- better land use decisions
- healthier natural resources
- more resilient communities



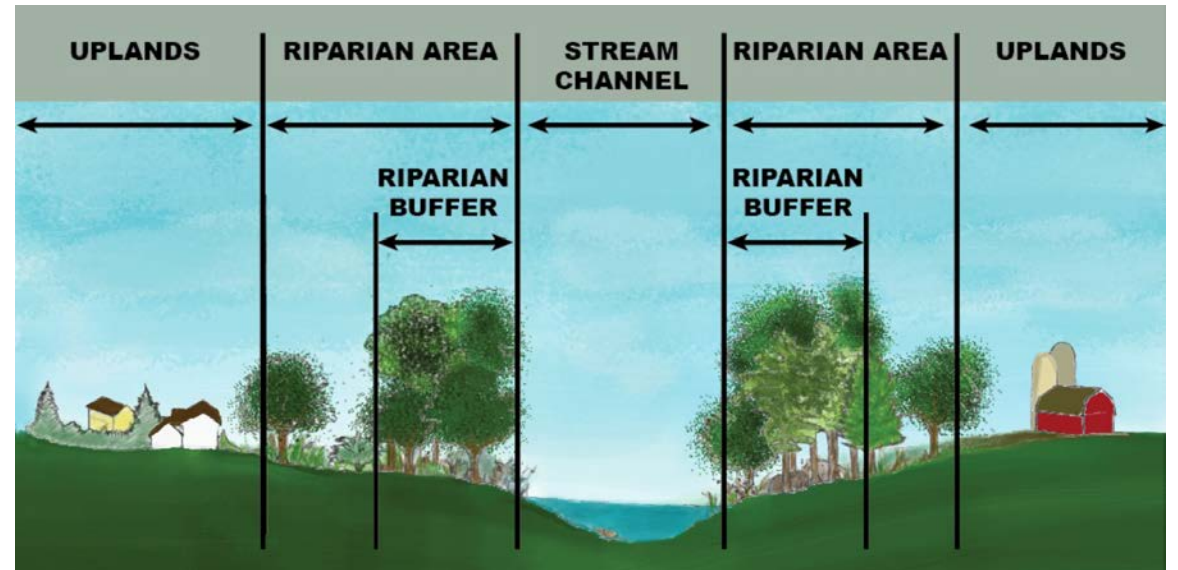
Center for Land Use Education and Research (CLEAR)



<https://clear.uconn.edu>

Defining the Terms

- “**Riparian**” refers to the area by the banks of a river, stream, or other body of water.
- “**Riparian Corridor**” refers to a designated zone or strip of land of a specified width along the border of an area
- “**Riparian Buffer**” is the natural vegetation *and soil* cover adjacent to a river, stream, or other body of water.



Riparian buffer functions

first line of defense against the impacts of development

- slow runoff
- stabilize shorelines & protect from erosion
- aid in flood control (temp storage)
- filter or trap pollutants from runoff
- provide food, habitat, and corridors for invertebrates, fish, and wildlife
- shade waters (temp moderation) for fisheries enhancement



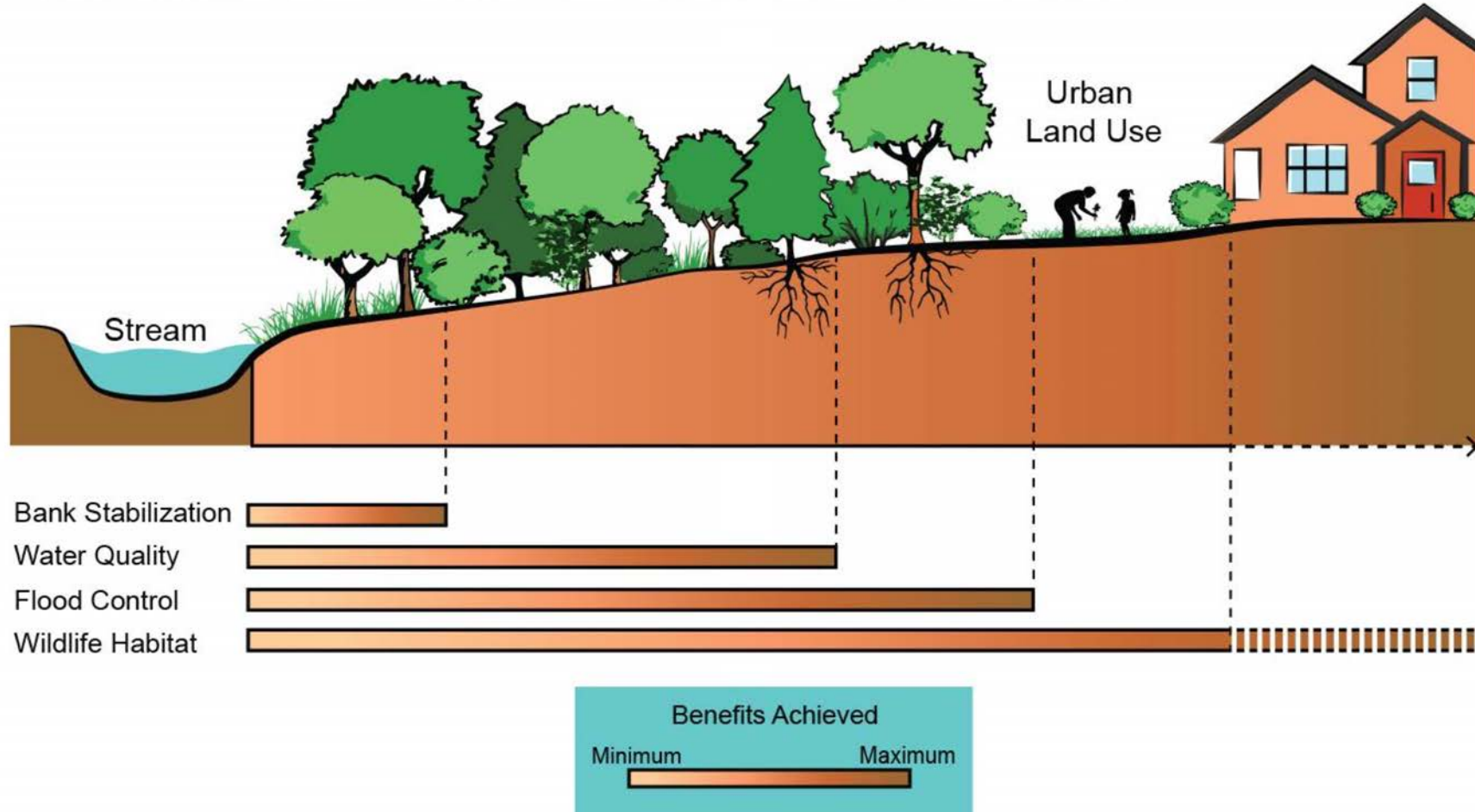
Riparian buffer services/benefits

- Minimize property damage
- Investment in stormwater management, flood control and pollutant removal
- Increased property values
- Reduced land maintenance costs (compared to managed areas)
- Reduced urban heat island
- Recreational opportunities/aesthetics
- Connectivity of green space



Size matters

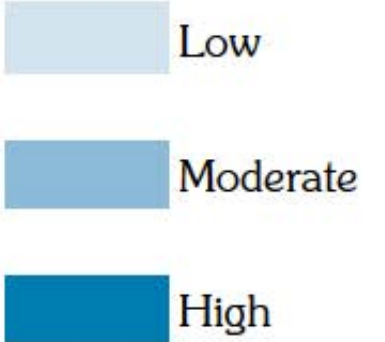
The Wider the Buffer the Greater the Benefits



Content matters

Effectiveness of Different Vegetation Types for Specific Buffer Benefits

BENEFITS	grass	shrubs	trees
stabilize streambank	Low	High	High
filter sediment and the nutrients, pesticides, & pathogens bound to it	High	Moderate	High
filter nutrients, pesticides, and microbes from surface water	Moderate	Low	Moderate
protect groundwater and drinking water supplies	Low	Moderate	High
improve aquatic habitat	Low	Moderate	High
improve wildlife habitat for field animals	High	Moderate	Low
improve wildlife habitat for forest animals	Low	Moderate	High
provide economically valued products	Moderate	Moderate	High
provide visual interest	Low	Moderate	High
protect against flooding	Low	Moderate	High



Disturbances within the Riparian Corridor

- Conversion of natural vegetation to development or lawn
- Dumping of yard waste
- Increased dominance of invasive plants

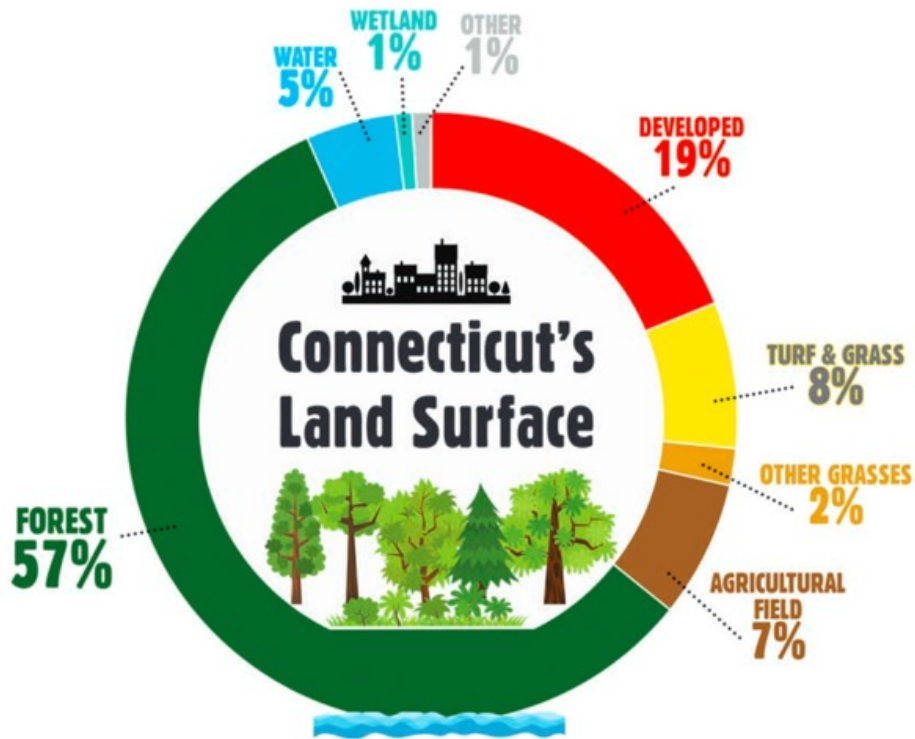
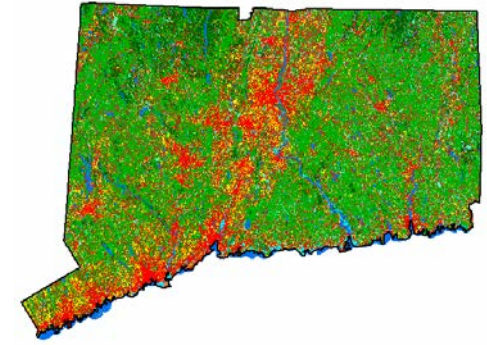


- Tree & woody debris removal
- Trail establishment
- Stormwater erosion
- Fertilizer impacts

Riparian
buffer
importance
has never
been greater

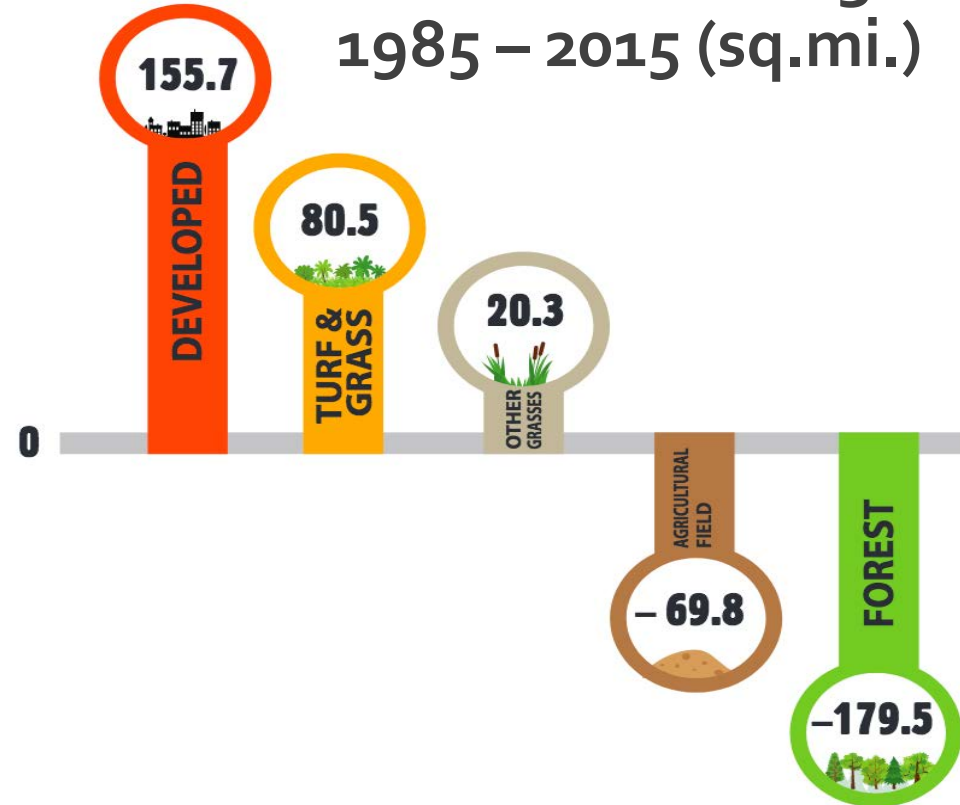


We are an urbanizing state



2015 Land Cover

Land Cover Change 1985 – 2015 (sq.mi.)

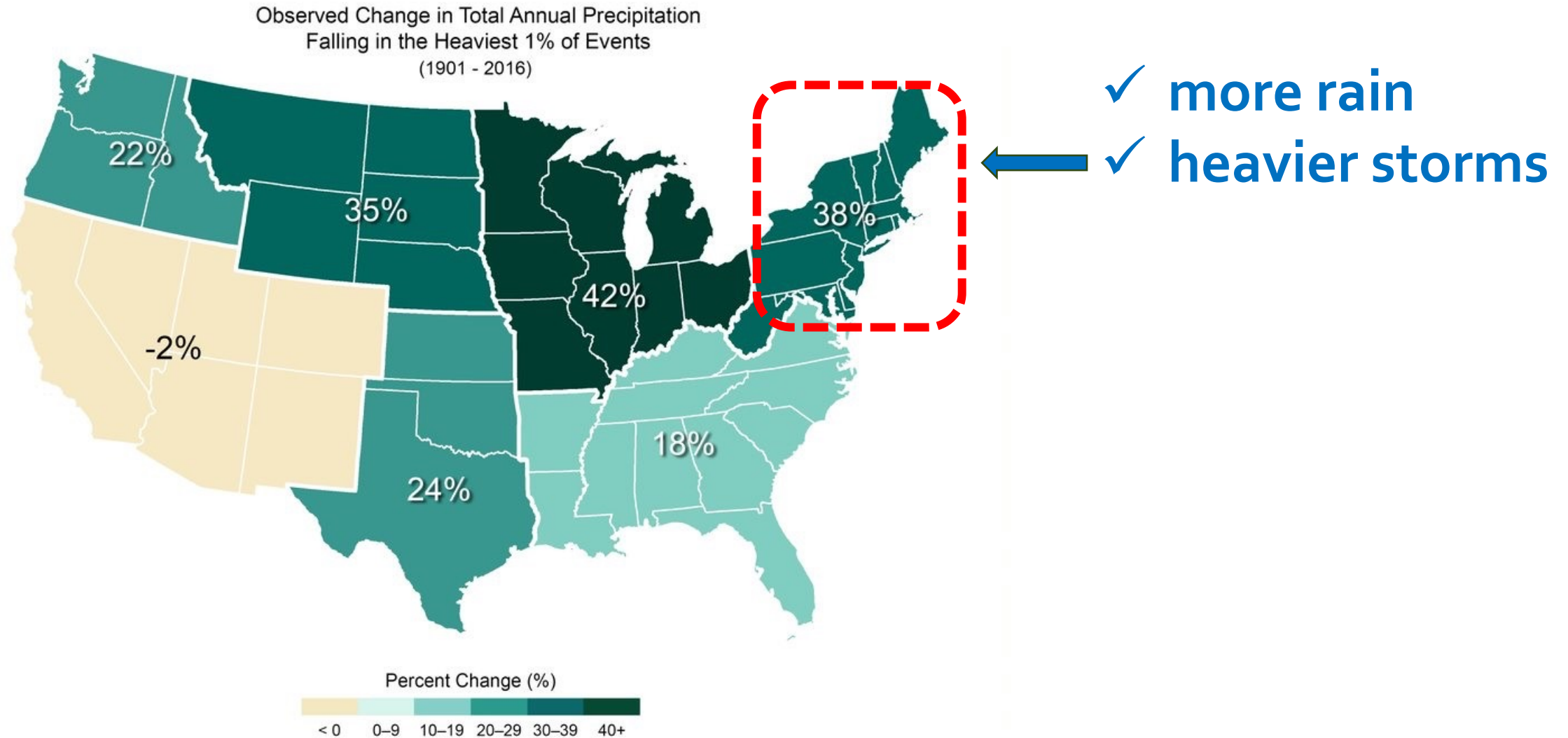


Effects of Urbanization

- Flooding & erosion
- Water pollution
- Changes to stream form & function



And now, to pile on: climate change



from the National Climate Assessment

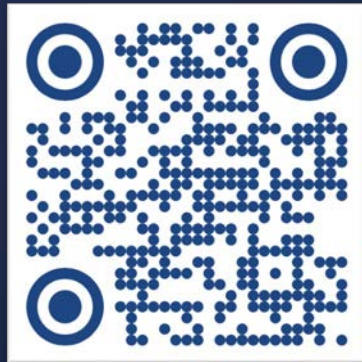
Riparian buffer services/benefits

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New CLEAR info & tools



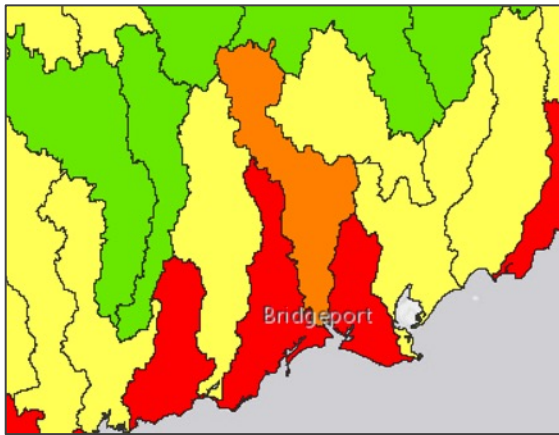
<https://clear.uconn.edu>

Land cover indicators of watershed health

The literature points to the critical role that various land cover factors have in watershed health

Generally, these indicators are more accurate at smaller watershed sizes

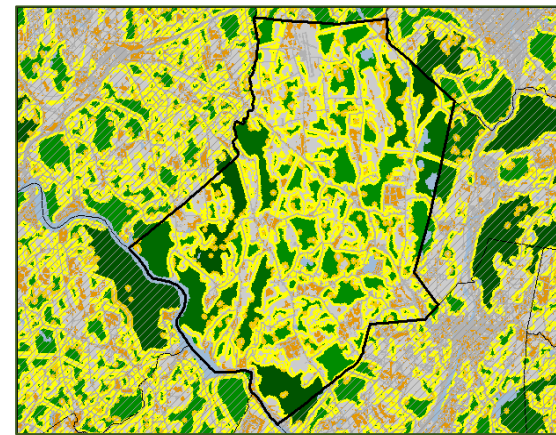
IMPERVIOUS COVER



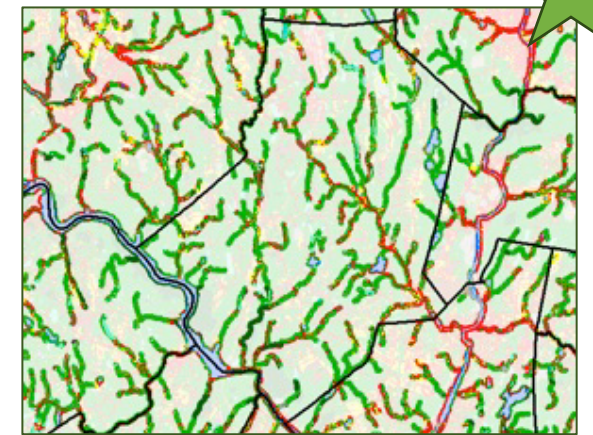
FOREST COVER



CORE FOREST

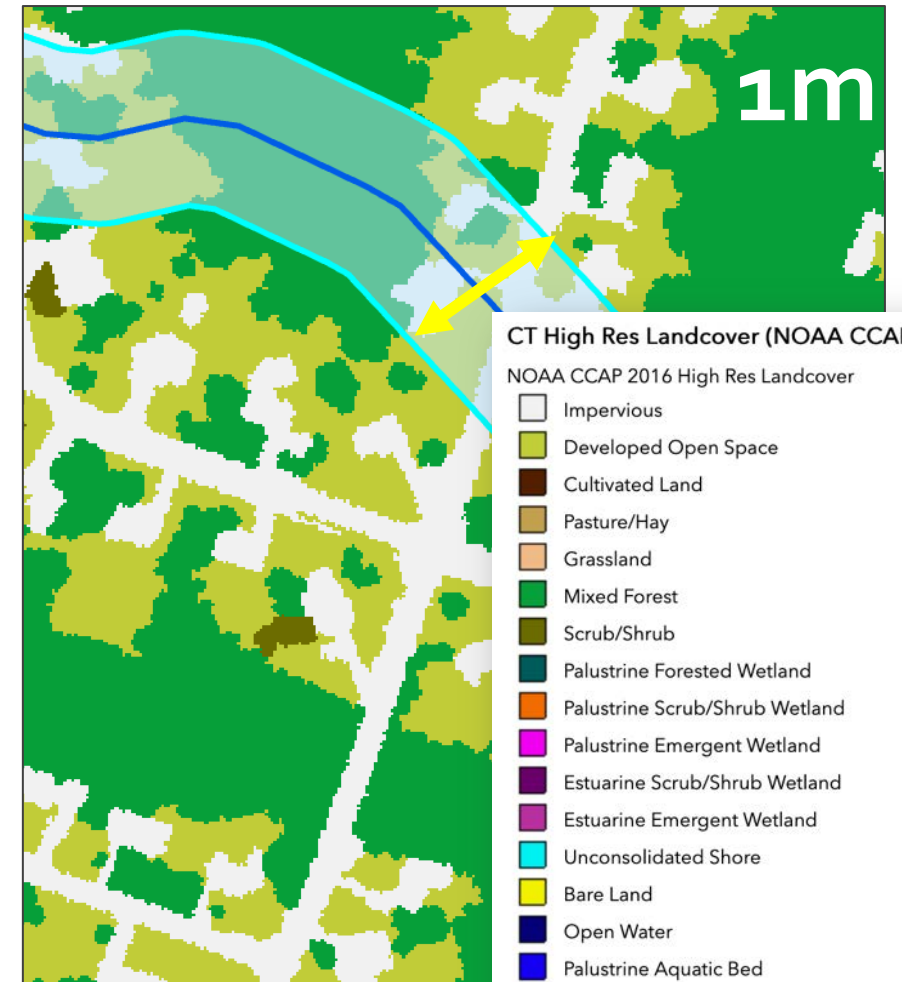
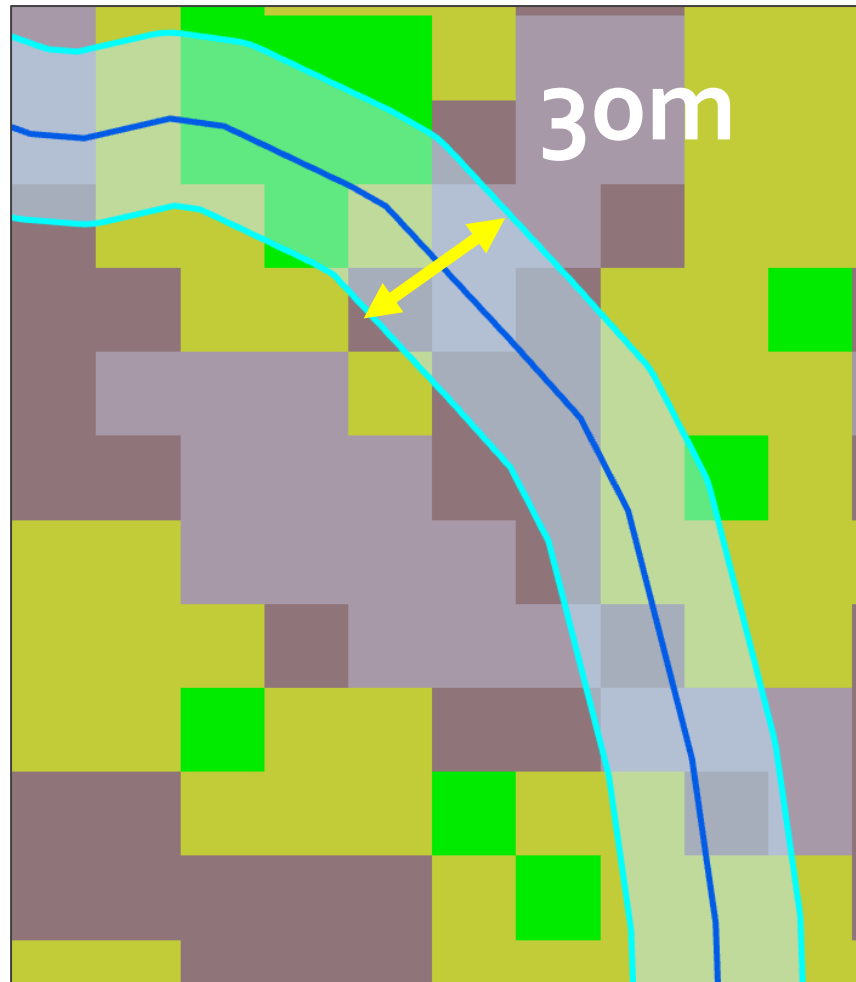


RIPARIAN CORRIDORS



2020: a leap in land cover resolution

New **1m resolution** NOAA C-CAP land cover dataset (based on 2016 imagery)

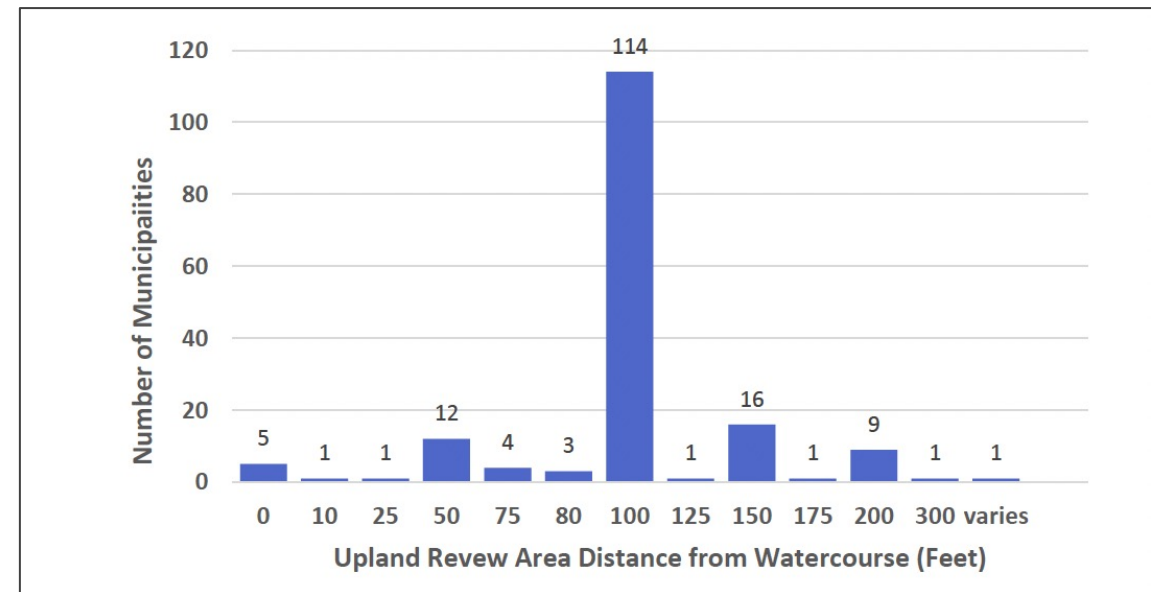
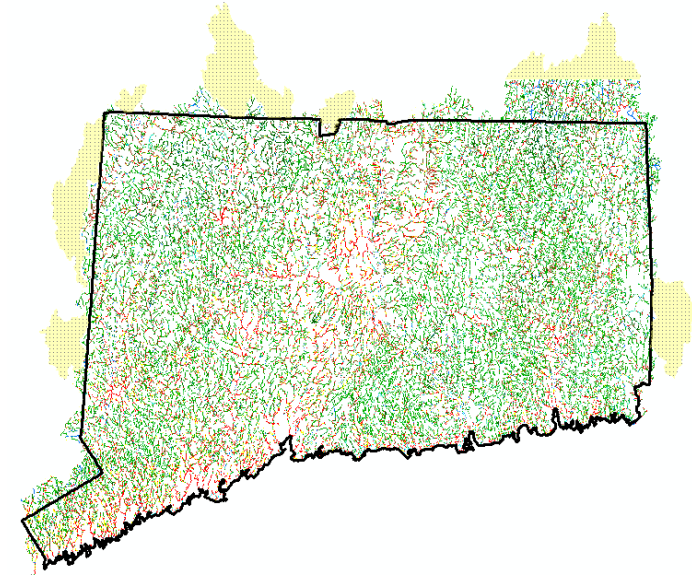


- CT High Res Landcover (NOAA CCAP)
- NOAA CCAP 2016 High Res Landcover
- Impervious
 - Developed Open Space
 - Cultivated Land
 - Pasture/Hay
 - Grassland
 - Mixed Forest
 - Scrub/Shrub
 - Palustrine Forested Wetland
 - Palustrine Scrub/Shrub Wetland
 - Palustrine Emergent Wetland
 - Estuarine Scrub/Shrub Wetland
 - Estuarine Emergent Wetland
 - Unconsolidated Shore
 - Bare Land
 - Open Water
 - Palustrine Aquatic Bed
 - Estuarine Aquatic Bed



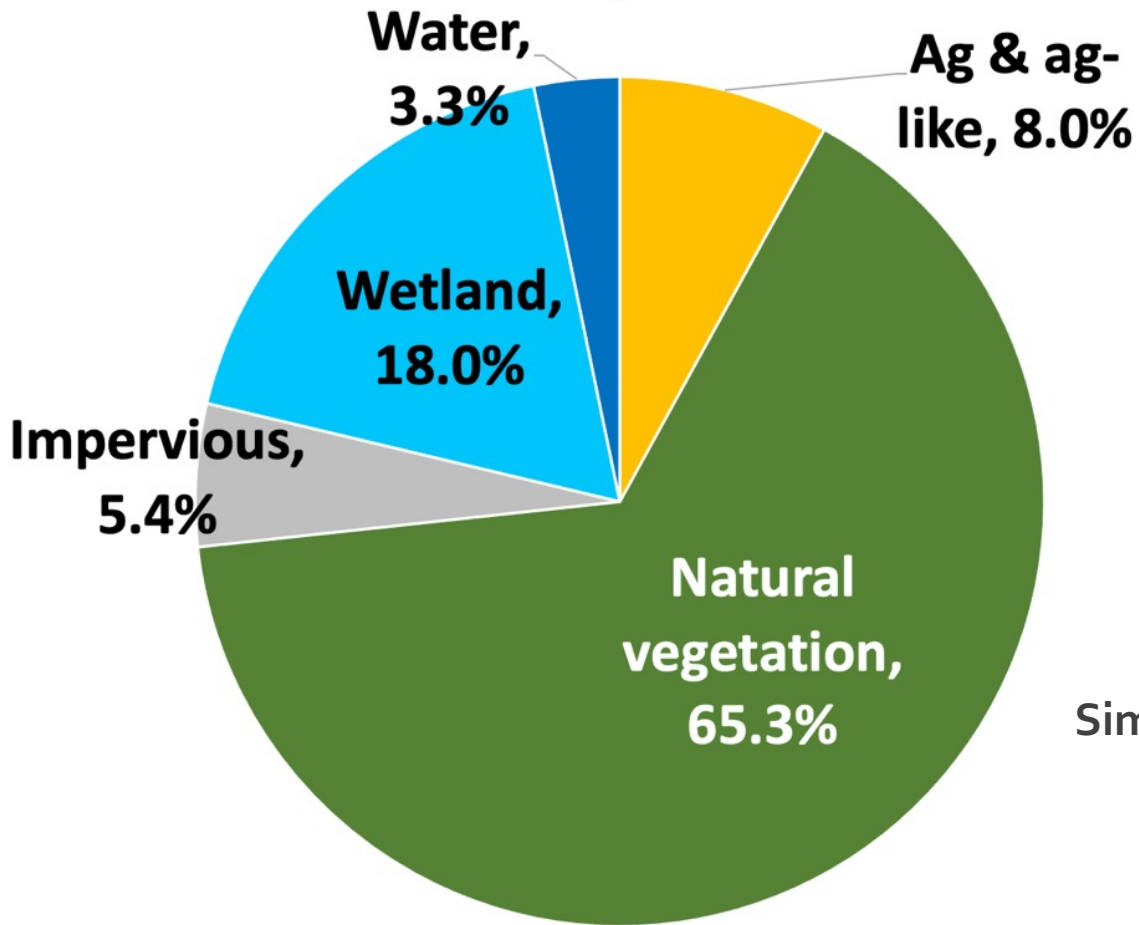
Why 100ft riparian zone?

- Most common IWWC watercourse “review zone” used in CT
- Most common width used in research studies (e.g., Goetz et al.)
- Recommended in several studies as width that is protective of water quality (e.g., UNH report)

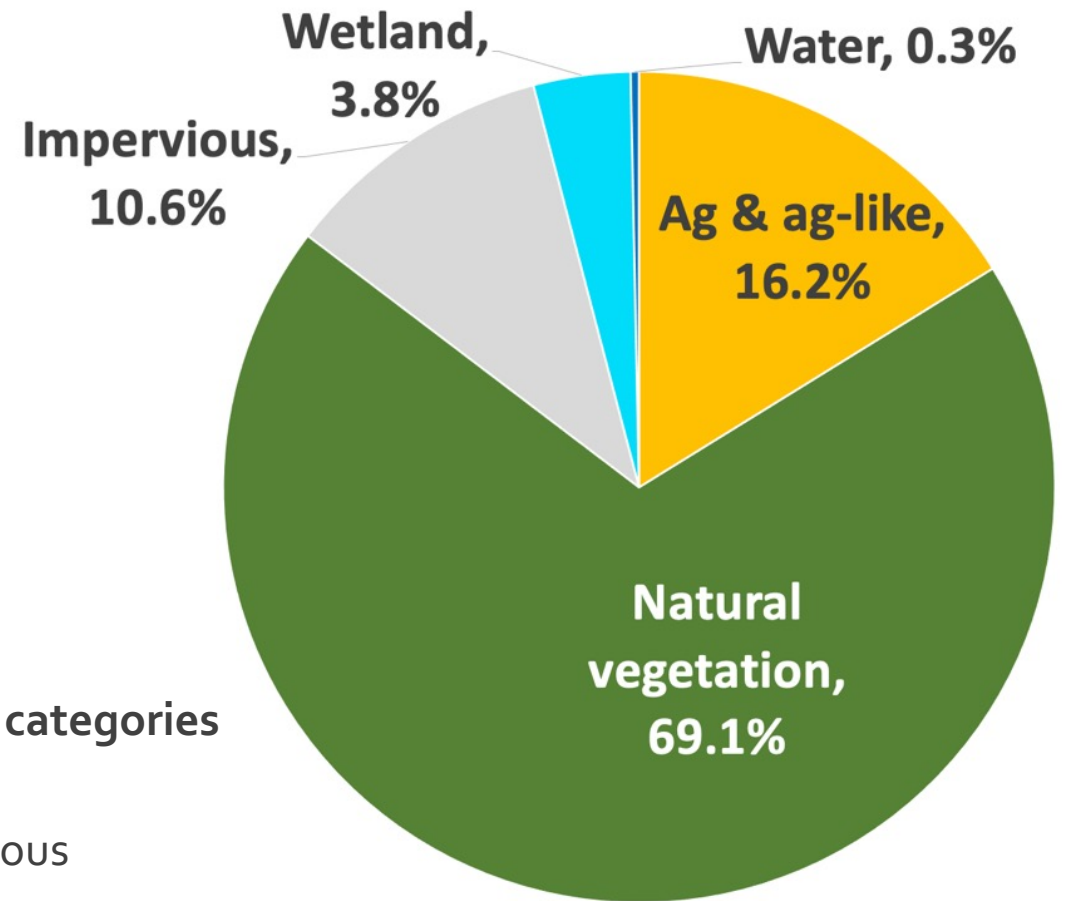


From Western CT Council of Governments, 2022.

100' Riparian Corridor



Upland area (outside of corridor)

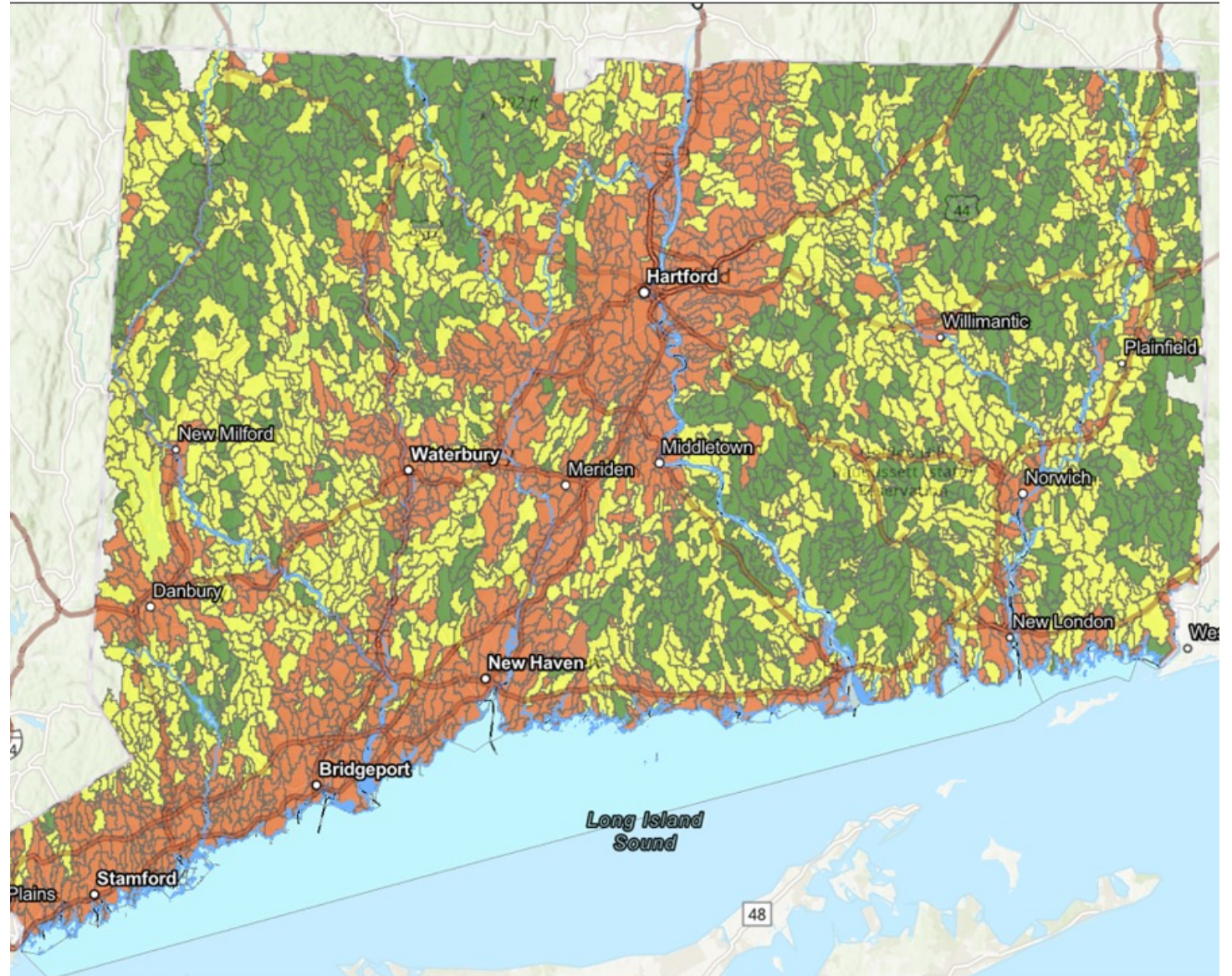


Simplified into 3 categories

- Natural
- Impervious
- Agriculture-like

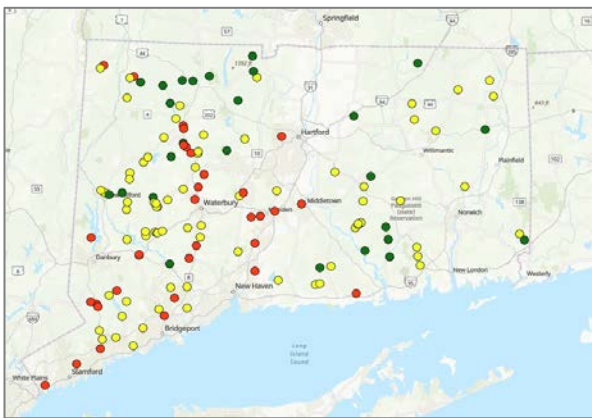
Local Watershed Assessment Tool

- Effort to assess the health of small watersheds in CT based on high resolution (1M) land cover in upland & riparian areas



The Combined Condition Index (CCI)

- **Combined Condition Index** is a metric that describes the probable health of a watershed based on land cover within the watershed.
- CCI is calculated to have best fit with Macroinvertebrate Multi-metric Index (MMI) –based on CT DEEP sampling data
- CCI ranges between 0 (poor) and 1 (excellent). Higher CCI score indicates better water quality.
- CCI is based on the land cover characteristics of riparian buffer and upland watershed.



How is CCI Calculated?

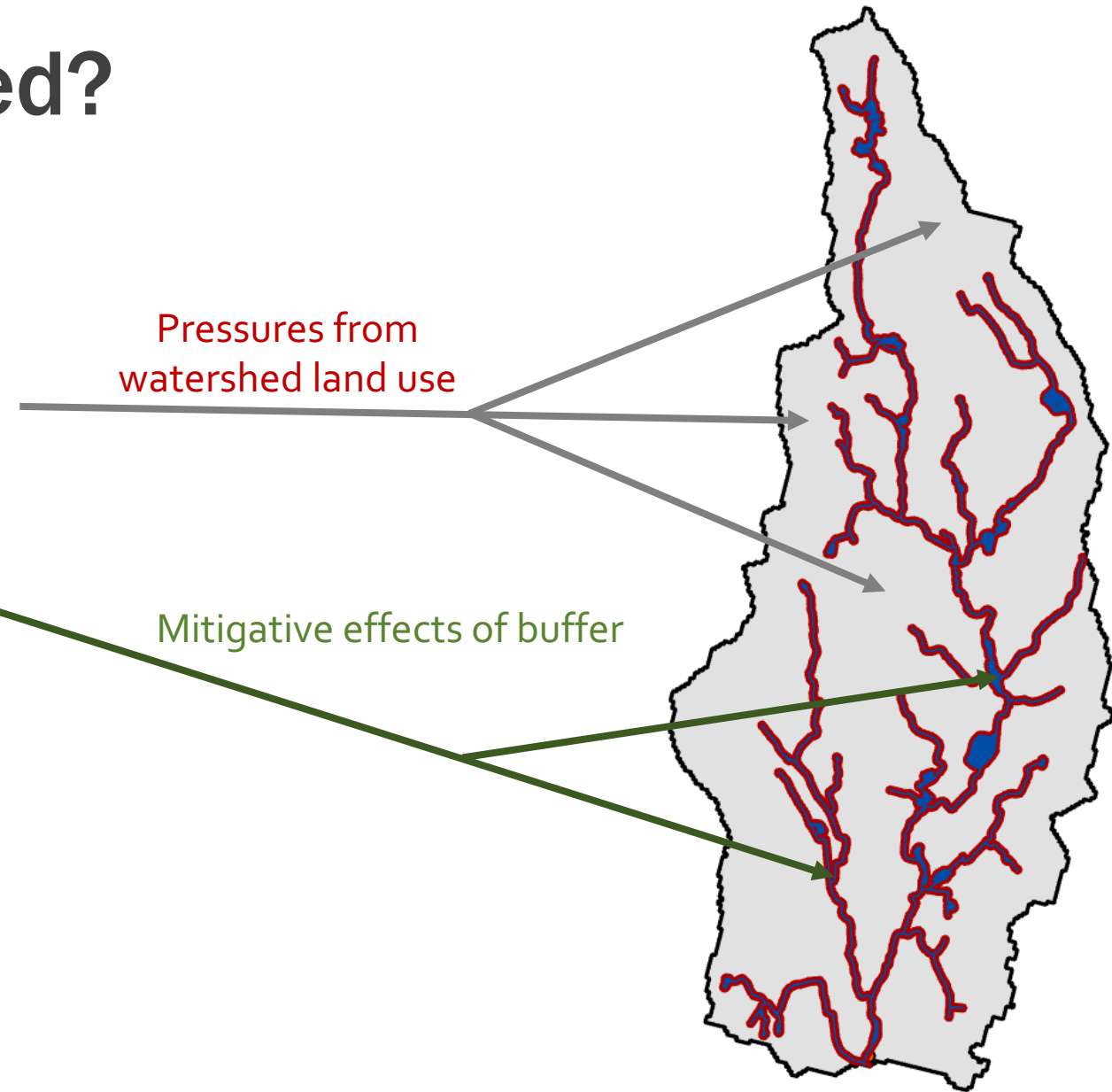
(black box version)

1. Divide a watershed into

- **upland watershed** (everything outside the buffer)
- **100' riparian buffer**

2. Compare land cover makeup of the two zones.

- Natural
- Impervious
- Agriculture-like

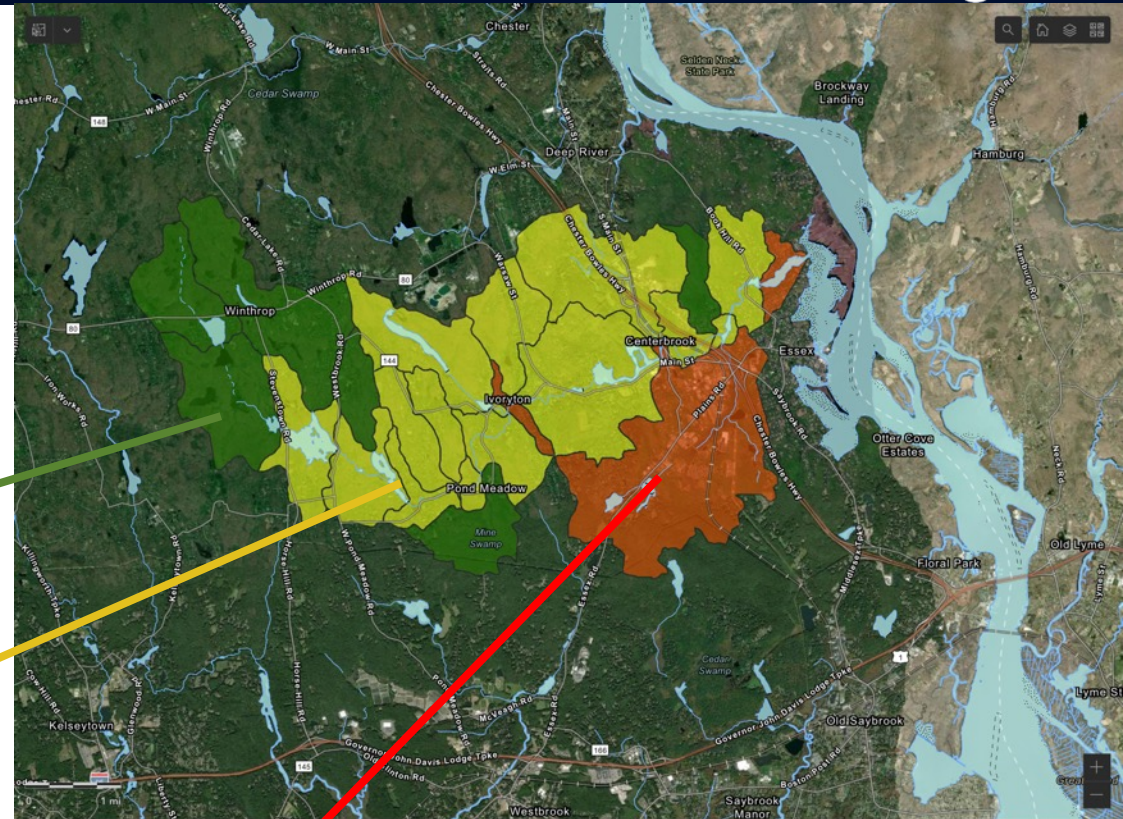


CCI Management Category indicates the state of, and suggested land use strategies for, a local basin

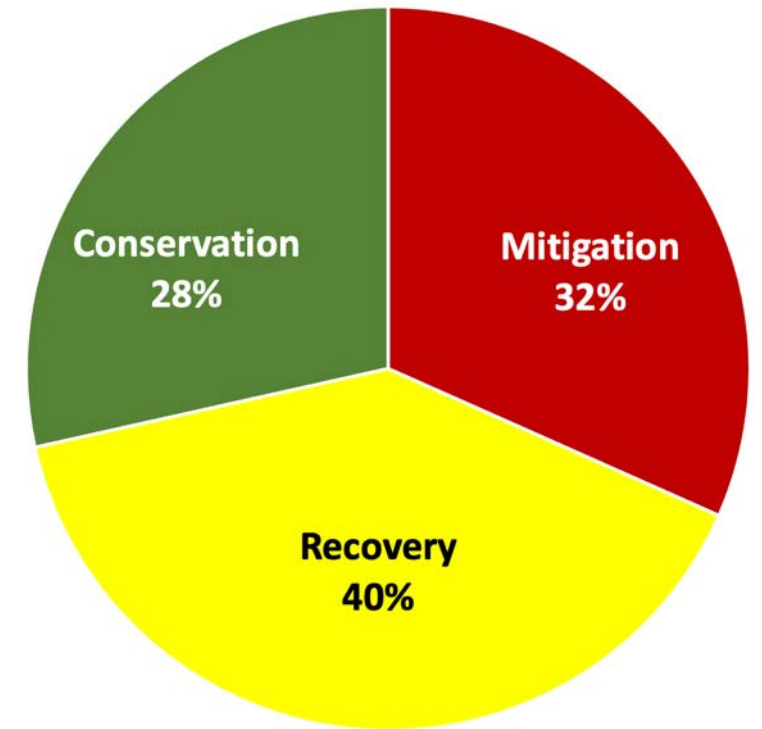
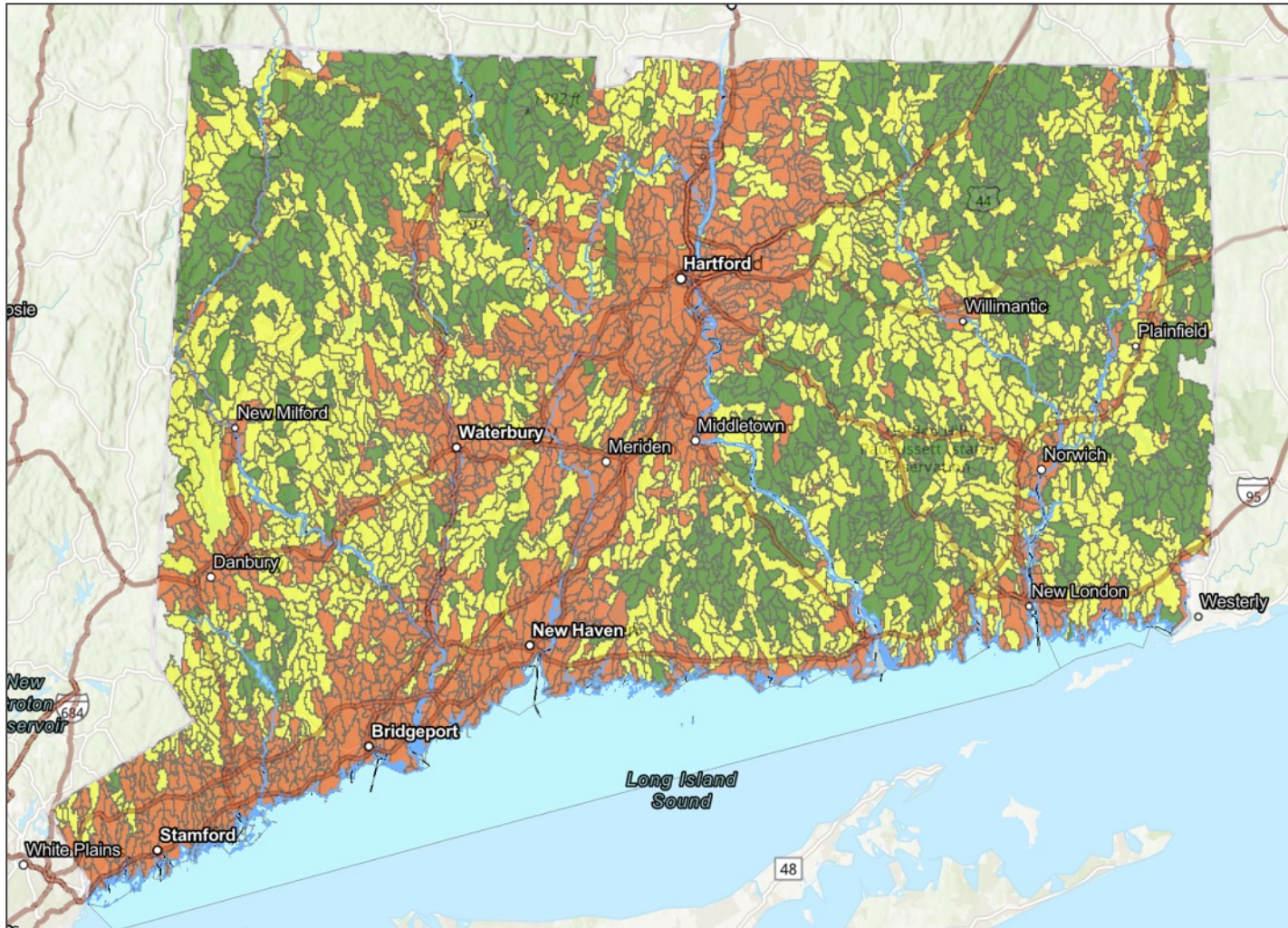
Conservation: CCI ≥ 0.75
protective strategies

Recovery:
 $0.43 < CCI < 0.75$
reforesting, riparian protection, mitigation (GSI)

Mitigation: CCI < 0.43
riparian restoration, urban tree canopy initiatives, GSI

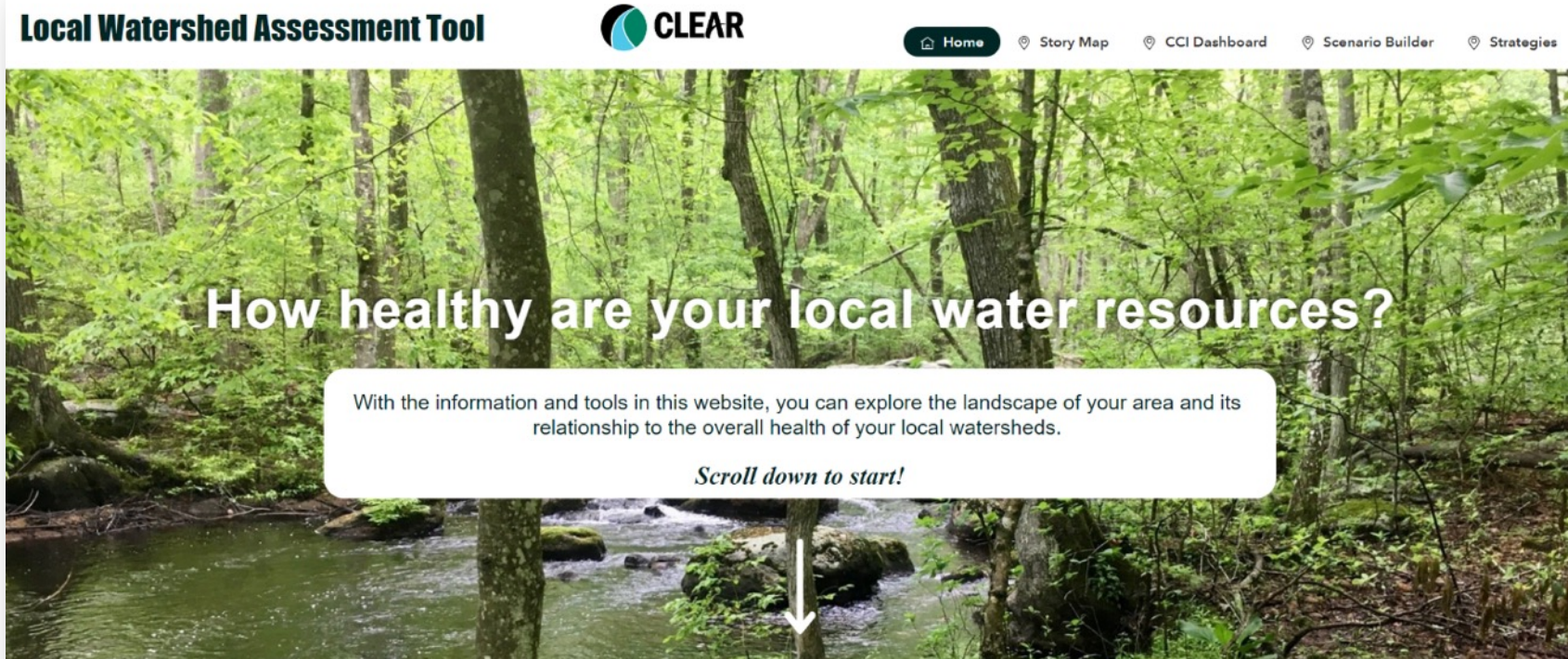


CCI map of CT



Local Watershed Assessment Tool

- <https://s.uconn.edu/wshedtool>
- integrates a Story Map, Dashboard, and Scenario Builder



Next up... webinars & workshops!

Training on the tools



CLEAR Webinar April 17 at 1pm:

The Role of Riparian Buffers in Watersheds and in Your Local Landscape

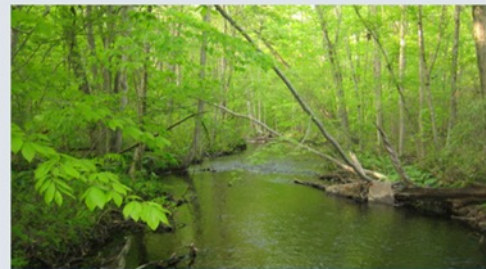
<https://s.uconn.edu/ripwebinar1>



Strategies for conservation, mitigation, and recovery



Riparian Restoration



Riparian Protection



Low Impact Development



Open Space Conservation

Status of Protections for Riparian Areas in CT

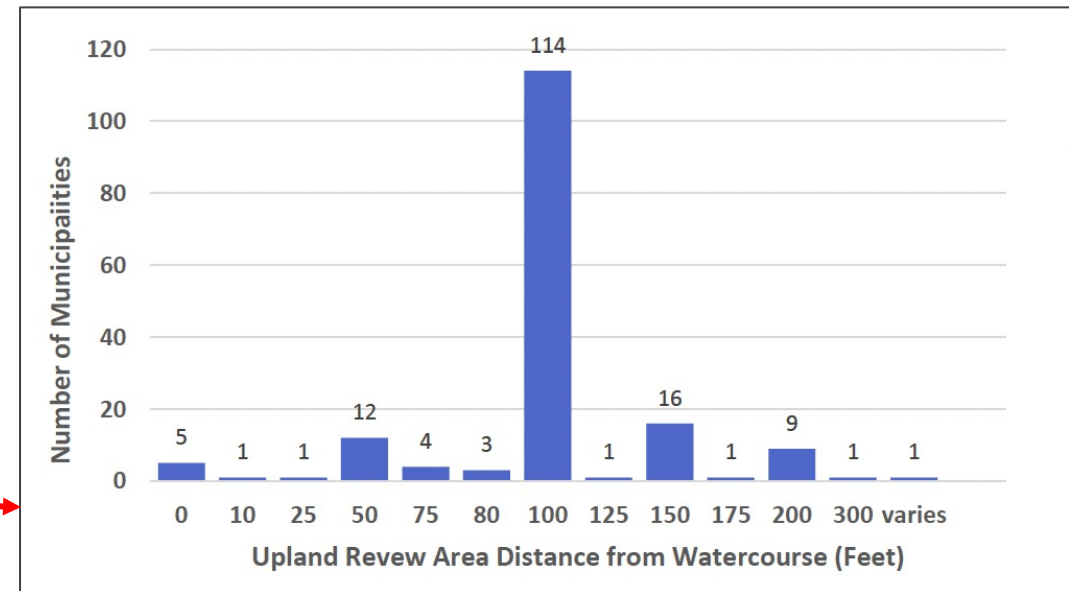
- Enabling Legislation
- What Zoning Regulations in CT are already protective of riparian areas?
- Do they appear to be effective given current data?



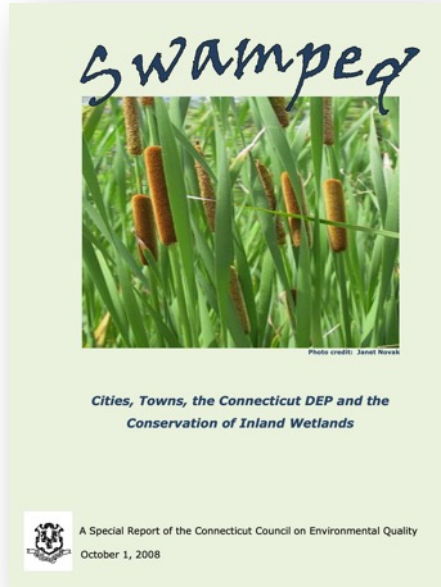
Dr. Zbigniew J. Grabowski
Associate Extension Educator
in Water Quality
UConn CLEAR

Inland Wetlands & Watercourses – CGS Chapter 440

- Recognizes importance of IWW protection for public welfare
- Requires (some) training for IWW commission member(s) and establishes review
- Requires permits for activities impacting IWW
 Boundaries of upland review areas set by municipalities

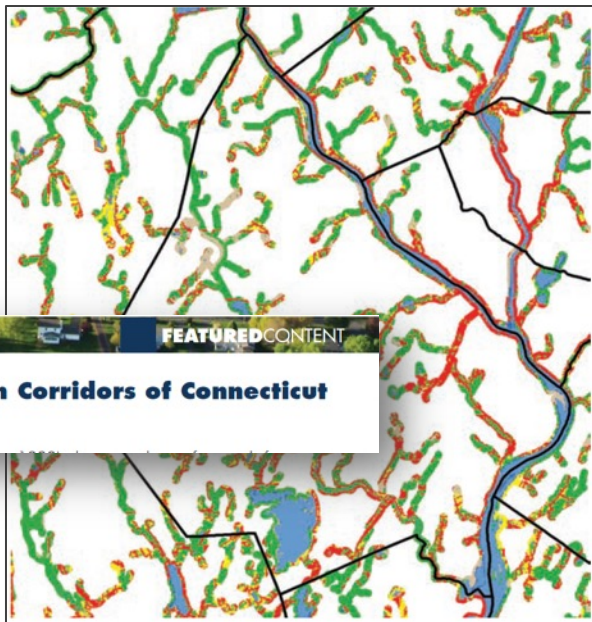


From Western CT Council of Governments, 2022.



CT Council on Environmental Quality (2008):

- Training effective, but needs to be more accessible and updated
- Municipalities have inconsistent reporting to DEEP
- DEEP lacked capacity implement, enforce, or provide sufficient technical assistance to IWWA
- Combined IWW and PZC appear less effective at protecting wetlands



CLEAR (2011)

- Amounts of developed land were lower in riparian zones than in the state as a whole.
- However, increases in riparian zone development were closely correlated with overall increases in development in the town in which they were located.
- This suggests that physical factors (slope, wet soils) were more of a determinant of riparian development than local IWWC or other regulations

THE CASE FOR RIPARIAN CORRIDOR PROTECTIONS



Zoning Strategies to Reduce Pollution of Inland Waters and Resultant Hypoxia of Long Island Sound

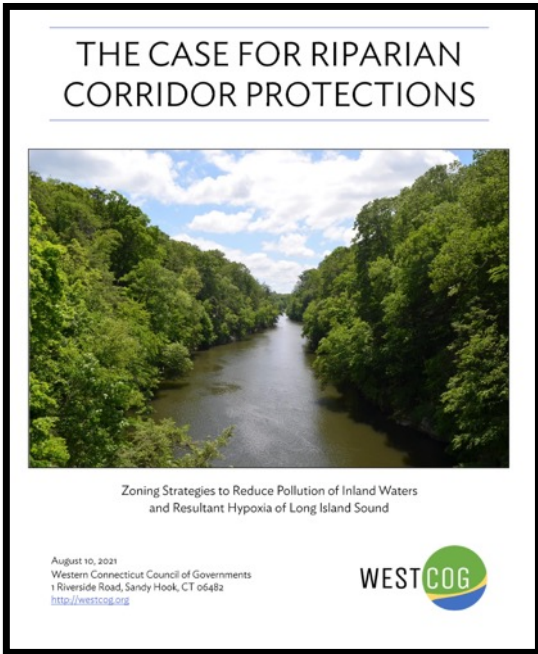
August 10, 2021
 Western Connecticut Council of Governments
 1 Riverside Road, Sandy Hook, CT 06482
<http://westcog.org>



WestCOG 2021 (Viddich)

"...inland wetland regulations do not prohibit development with upland areas adjacent to riparian corridors and FEMA's flood insurance program does not prohibit development within the 100-year floodplain..."

...this case-by-case review process enables development to nibble away at the integrity of the water quality values associated with undeveloped riparian forest buffers."



All other New England states require buffer protection of some kind, and have explicit state-defined setback standards

Table D. Riparian Buffer Zones in New England States at the State and Local Levels: 2021

State	Municipalities with Riparian Buffer Setback Regulations	Municipalities Governed by State Administered Riparian Buffers	Municipalities in State	Percent with Local Riparian Buffer Regulations	Percent with State Riparian Buffer Regulations
Connecticut	38	0	169	22%	0
Maine	488	488	488	100%	100%
New Hampshire	147	234	234	63%	100%
Massachusetts*	31	351	351	9%	100%
Vermont	97	246	246	39%	100%
Rhode Island	0	39	39	0%	100%
Total	801	1358	1527	52%	89%

Note: * Massachusetts municipalities regulate riparian buffer setbacks through Conservation Commissions – not municipal zoning.

**Beyond IWWA and
Floodplain programs:**

*Riparian
protection via
zoning regs*



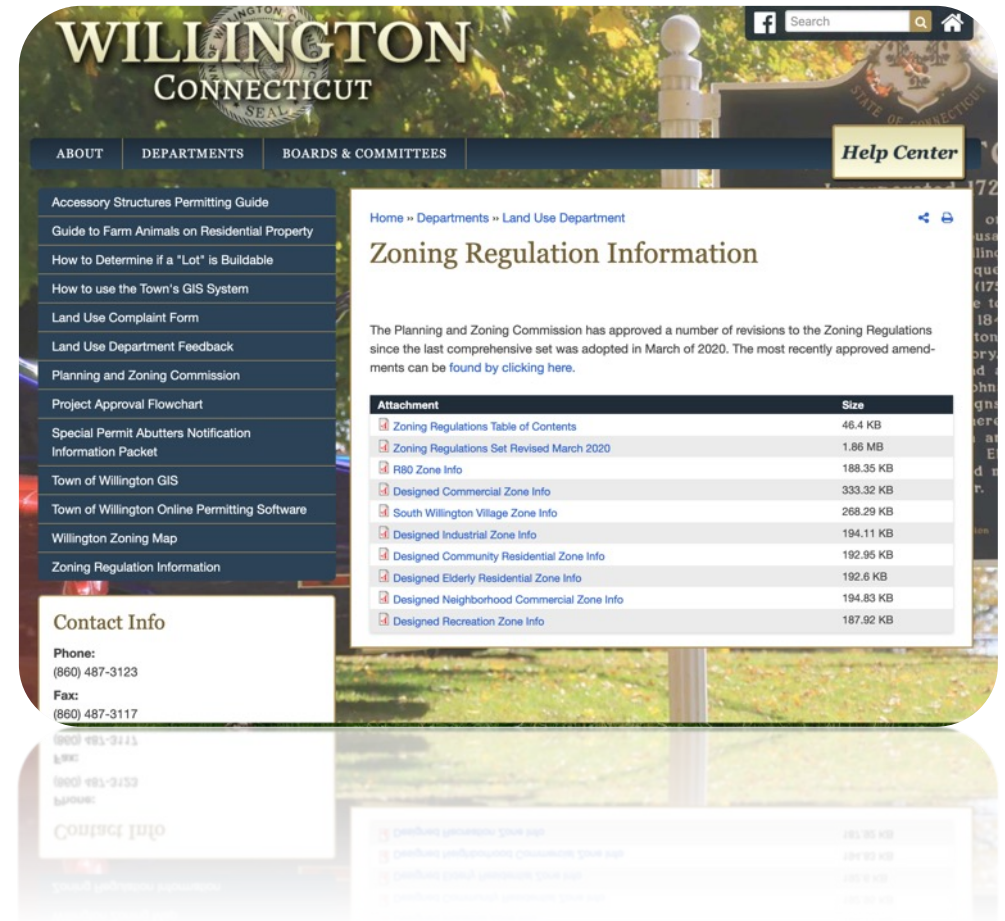
Review of Current Statewide Municipal Zoning Protections

- **31** (18%) CT Municipalities explicitly refer to riparian areas in their zoning regulations
- **51** (30%) have at least partial restrictions on clearance of vegetation near watercourses and wetlands
- **157** (93%) have at least partial restrictions on development, largely due to floodplain regulations
 - **20** of those restrict almost all development in the floodway and/or floodplain
- **33** (20%) have some restriction on agricultural activity near wetlands and watercourses

“Streambelt Zoning”: Identification of priority waterways

Willington CT, Effective 12/15/2012

Riparian Corridors. The following watercourses and their tributaries (upstream to the point where their drainage area is less than 200 acres) **are of special concern** within the town: Fenton River, Roaring Brook and Willimantic River. For these watercourses and their tributaries, **no buildings or associated parking areas, septic systems, or clearing of vegetation shall be proposed within 150 feet** measured horizontally from the wetland boundaries adjacent to each side of the watercourse...



Special Overlay Zones

Eightmile River, Farmington River

The riparian and wetland features of the Eightmile River Watershed are a key component of the largely intact watersheds and natural character of East Haddam. The purpose of this Overlay District is to maintain a continuous buffer of native forest and shrubs around all watercourses and wetlands.

East Haddam, 2016

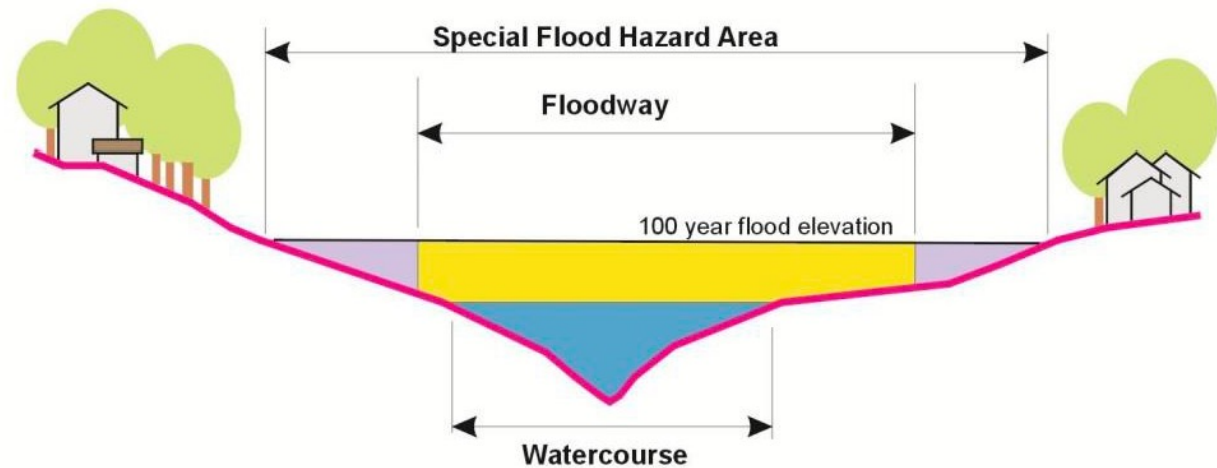


Estuary Magazine

Indirect zoning strategies

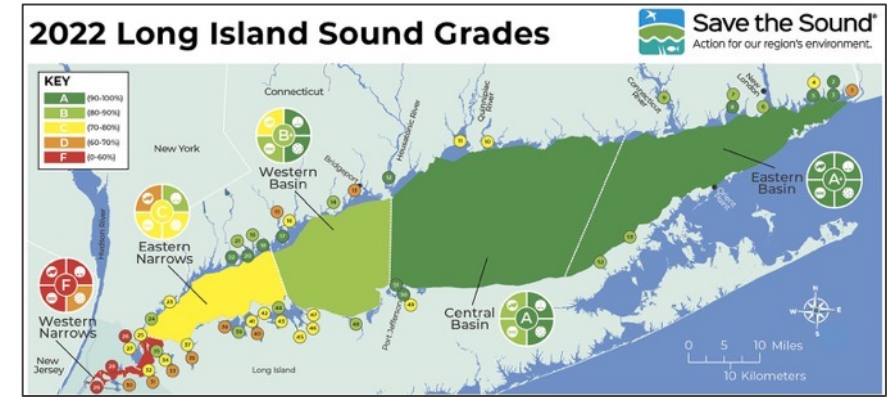
- Stricter floodplain regulations (New Hartford)
- Minimum buildable lot/area standards (Lisbon)
- Aquifer & water supply protection zones (Montville)
- Open space network overlay zones (Granby)
- Stricter IWWC requirements (Washington) (not zoning...)

Floodplain / Floodway



New Zoning Authority: Public Act 21-29

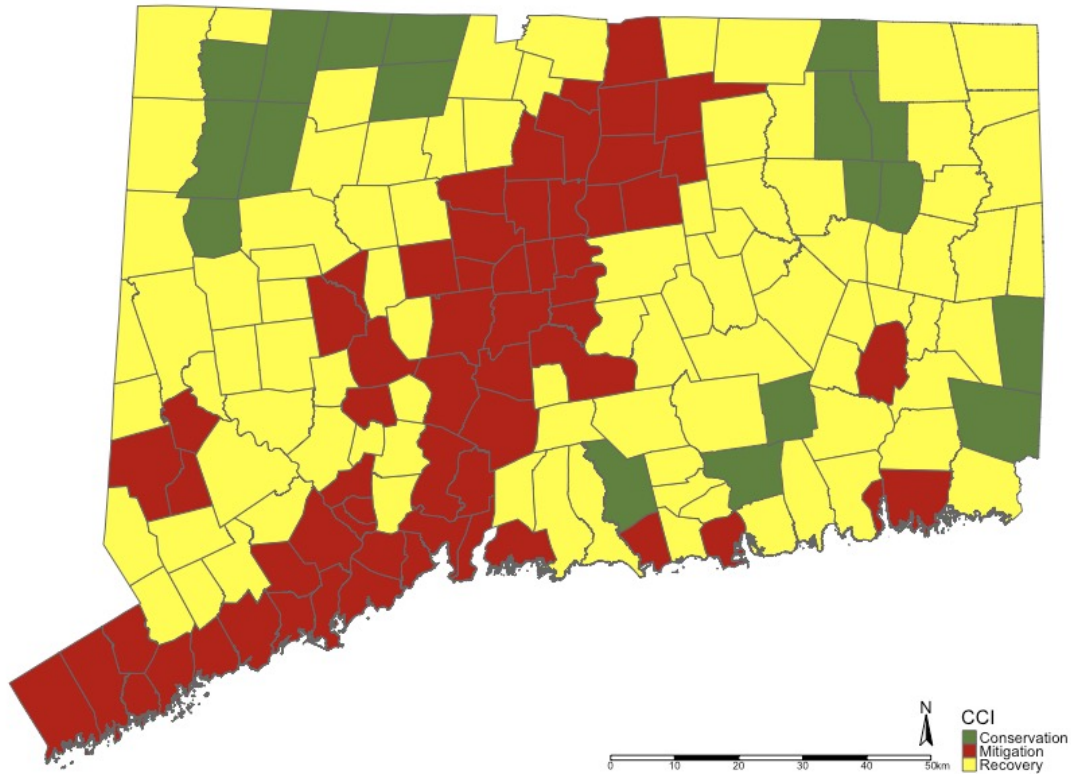
In any municipality that is contiguous to or on a navigable waterway draining to Long Island Sound, zoning regulations shall:



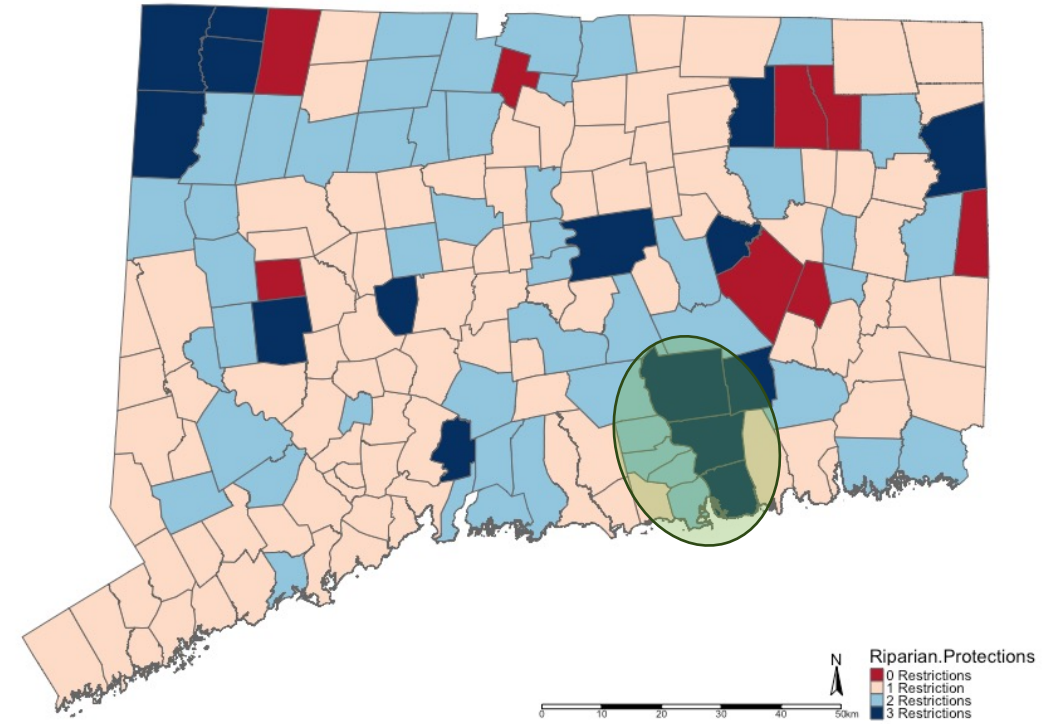
- (A) be made with reasonable consideration for the restoration and protection of the ecosystem and habitat of Long Island Sound;
- (B) be designed to reduce hypoxia, pathogens, toxic contaminants and floatable debris on Long Island Sound; and
- (A) provide that such municipality's zoning commission consider the environmental impact on Long Island Sound coastal resources, as defined in section 22a-93, of any proposal for development.

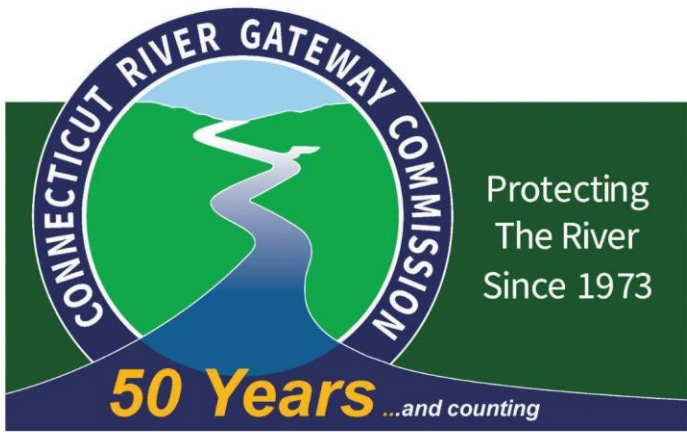
NEXT: *Can we see the impact of these regulations in our current land cover data?*
(Stay tuned...)

Town Wide Weighted CCI Category



Town Restrictions on Activities within Riparian Buffers



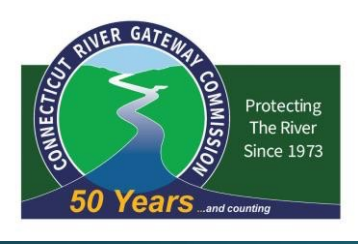


Alan N. Ponanski, Esq.
Rules Committee Chairman

2024 Connecticut Land Conservation Conference
Wesleyan University

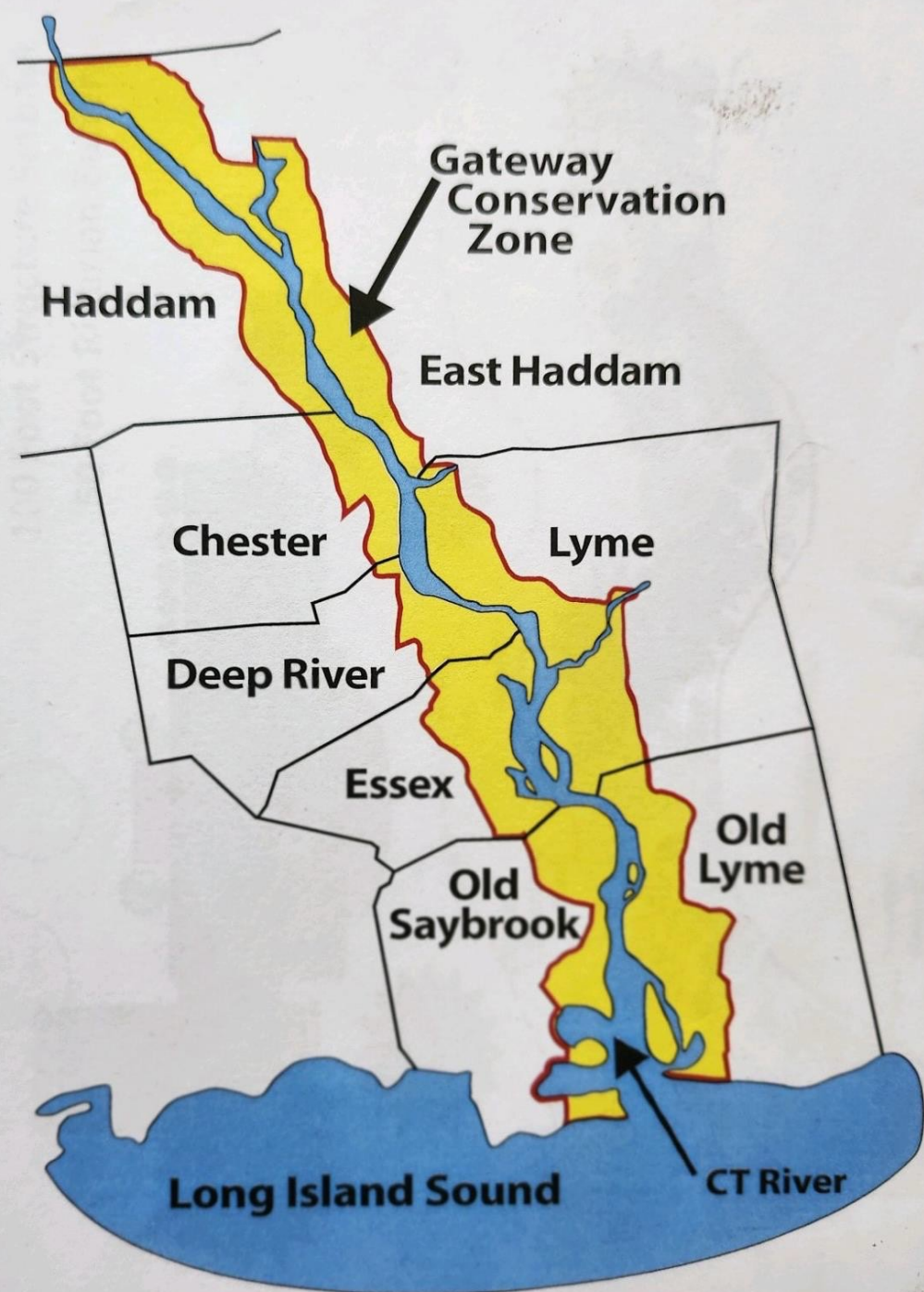
Connecticut River Gateway Commission

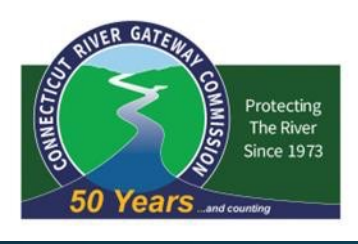
Protecting Riparian Buffers



Creation of the Conservation Zone

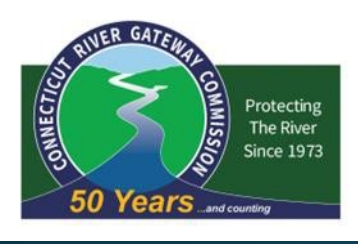
- 1973: The Connecticut General Assembly authorized the Connecticut River Gateway Conservation Zone, recognizing the Connecticut River Estuary as a unique and precious resource for the entire state (Connecticut General Statutes, C.G.S. Sec. 25-102 c)
- **Purpose:** To protect the natural, historic and aesthetic resources of the lower Connecticut River in the Conservation Zone, nearly 30,000 acres from ridge top to river's edge.
- **Zone:** Encompasses Connecticut River shoreline in Chester, Deep River, East Haddam, Essex, Haddam, Lyme, Old Lyme and Old Saybrook.





The member municipalities voted overwhelmingly to join this effort to protect the Connecticut River Valley:

- By guiding future development through common zoning, planning and development criteria.
- Adopting a 100-foot structure setback & a 50-foot riparian buffer to protect the river's edge in the Conservation Zone.



Riparian Buffer Regulation

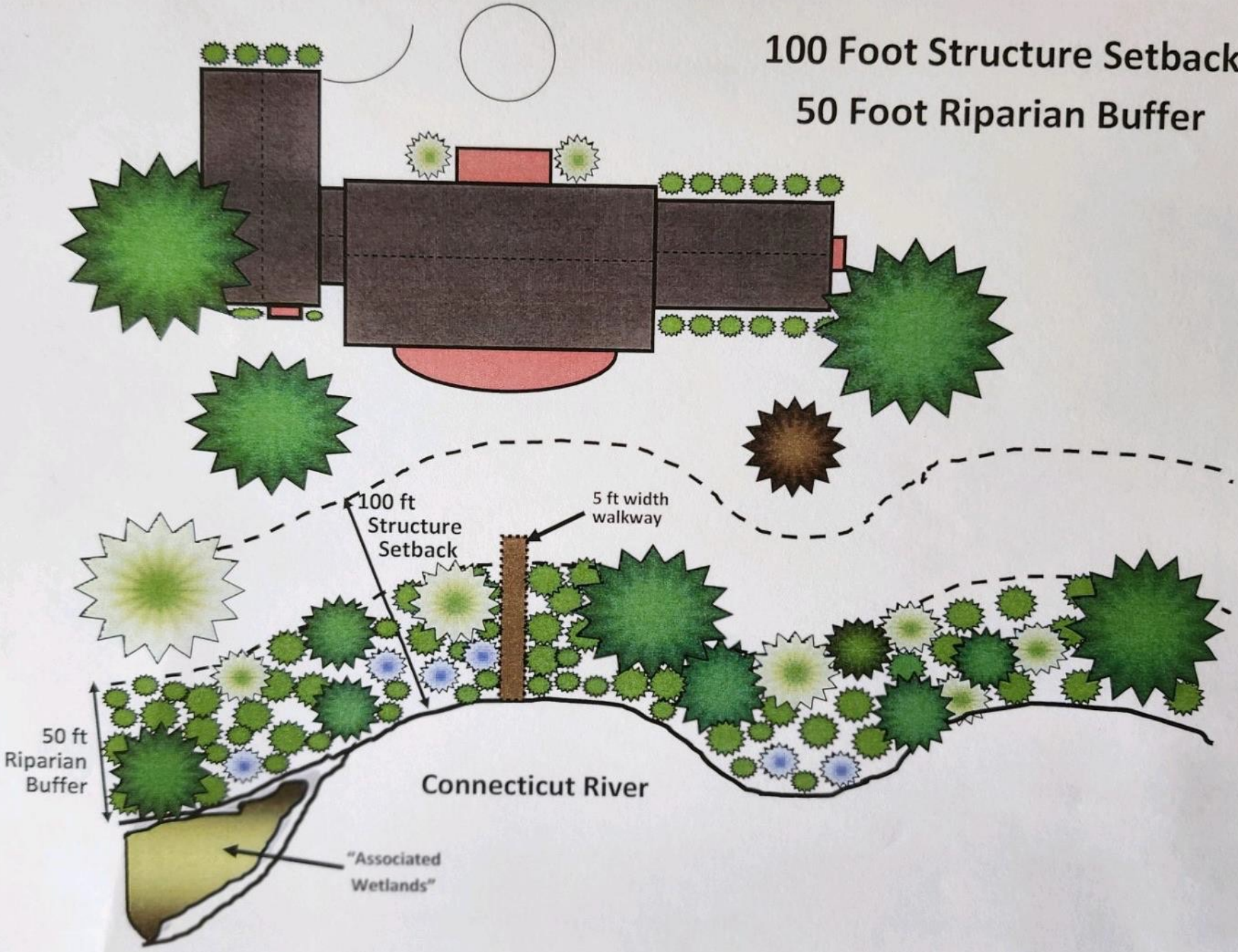
The 50-foot riparian buffer standard requires that:

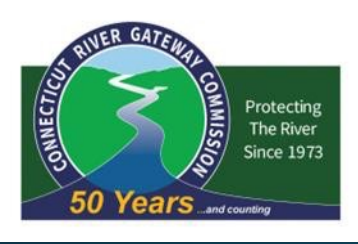
- All vegetation be retained within a minimum of 50 feet of the Connecticut River, its tributaries, and marshes in the Zone.
- Vegetation includes understory and mature trees.

Purpose:

- To protect and enhance water quality;
- To preserve the natural river appearance as development continues

100 Foot Structure Setback 50 Foot Riparian Buffer



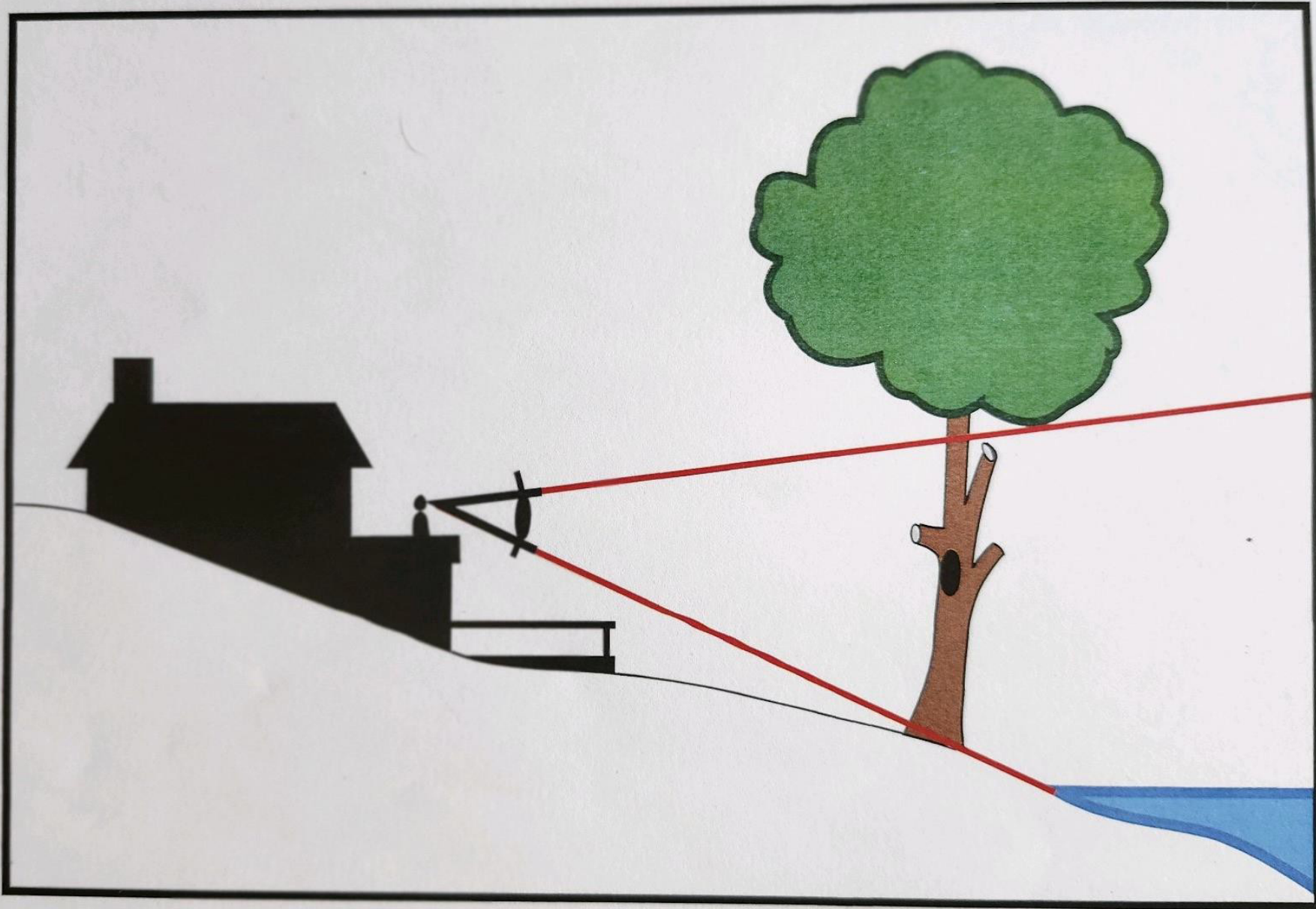


Riparian Buffer Exceptions

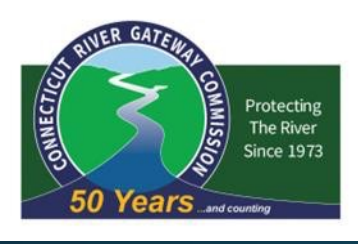
Waterfront property owners:

- May clear a 5-foot path through the buffer to gain access to the water.
- Are permitted to remove the limbs on the lower third of mature trees to gain river views.

Note: This limited pruning, often called “limbing up,” allows property owners to retain their views, while neighbors and river users continue to enjoy the natural vegetation.



View corridor after removing limbs on the lower 1/3 of the tree



Riparian Buffer Coordination

Critical to protecting the riparian buffers and the “natural and traditional riverway scene” are coordinated efforts by the Connecticut River Gateway Commission Staff and:

- Property owners;
- Land use staff in member towns;
- The engineers and architects employed in the lower CT River valley.

Gateway staff offer development suggestions so that owners can enjoy their property while preserving the beauty of the Connecticut River valley.

















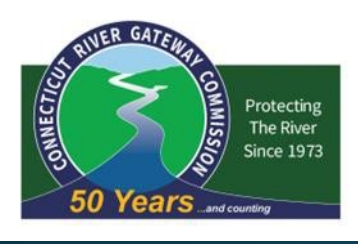






Riparian Buffer Expansion : A Case Study

- Citing CGS Section 25-102h, the Old Saybrook Zoning Commission (ZBA) requested Gateway review a variance application with special use exception to permit the demolition of an existing structure and then rebuild a new house using the existing foundation which encroaches 5 feet into the 100-foot Structural Setback.
- Applicant met with Gateway several times, understood Gateway's mission and used feedback from those meetings to design a house that protected the 100-foot setback by modifying the foundation.
- Applicant agreed to use plantings expanding the Riparian Buffer along the tidal wetland boundary and in the yard to soften the view of the property from the river.
- Gateway advised the ZBA that those modifications counterbalanced any potential adverse impacts on the natural and traditional riverway scene on the Connecticut River.

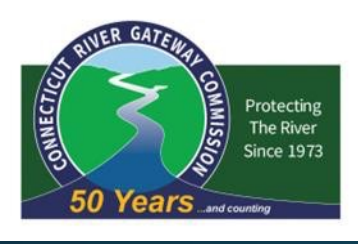


For that project, Gateway also requested Old Saybrook ZBA impose the following conditions:

1. The south-side wing of the house remain a single story.
2. Preserve existing trees on the property.
3. Use dark roofing materials and earth tones on the house.
4. Minimize lighting used and use Dark Sky compliant lighting fixtures.
5. Use diverse native plants in the landscaping and Riparian Buffer.
6. Use low reflective glass in the windows.

Landscape Architectural Plans
100 ...
Landscape Architectural Plans
1119-022

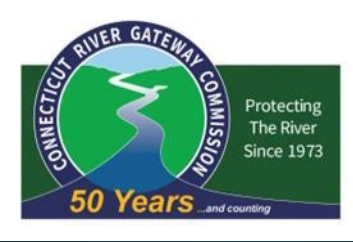




Conclusion:

Gateway Has Successfully Protected & Enhanced Riparian Buffers

- **Gateway expects applicants for variance to respect the preservation practices put in place by Gateway Standards including planting and encouraging growth of natural riparian vegetation along waterways to improve the ecological health of the CT River.**
- **Gateway staff seek to help applicants for variance achieve their development goals while balancing the legal requirements for preserving/enhancing riparian buffers and the beauty of the river valley.**
- **Due to this expectation and cooperation, Gateway has successfully guided hillside/waterfront development to reduce its visual impact while protecting and planting riparian buffers.**



For more information:

- **Connecticut River Gateway Commission:** www.ctrivergateway.org;
contact@ctrivergateway.org;
- **Connecticut River Coastal Conservation District** <https://www.conservect.org/ctrivercoastal/>
Middletown
- **CT SeaGrant Healthy Coastal Ecosystems** <https://seagrant.uconn.edu/focus-areas/healthy-coastal-ecosystems/>
- **Living Shoreline** – informational articles below
 - <https://www.nhregister.com/shoreline/article/Living-shoreline-in-Old-Saybrook-among-16692399.php>
 - <https://www.ctpublic.org/news/2021-07-28/living-shorelines-becoming-more-common-in-ct-for-erosion-control>





Riparian Buffers: A Lightning Round Policy and Regulatory Assessment

Alicea Charamut

Executive Director, Rivers Alliance of Connecticut



Buffers and Setback Standards in New England

Riparian Setback Standards Adopted by New England States: The Case for Riparian Corridor Protections by WestCOG

Appendix 3: Riparian Setback Standards Adopted by New England States: 2021

State	State Law Establishing Buffer Zone	State Law Establishing Minimum Setbacks
Connecticut (1995)		
Regulate activities adjacent to wetlands**	No	No
Regulate activities Adjacent to Rivers and Streams**	No	No
Maine (2002)		
Regulate activities Adjacent to Wetlands		75
Regulate Shore lands of Rivers		250
Regulate activities Adjacent to Streams		75
Principal Structure Setback 12 Significant River Segments		125
Shore & Protection Sub-Dist. Rivers draining 50 sq. miles+		250
Massachusetts (1996)		
River Front protection corridor for perennial streams	200	
River Front protection in 14 designated Urban Areas	25	
New Hampshire (1988, 1990)		
State established buffer zone	250	
Setbacks for 4th order streams and Higher		150
Setbacks for Primary Structures on 1st to 3rd order Streams		50
Setbacks for Accessory Structures		20
Setback for Woodland Buffer*		50
Setback for controlled release fertilizers		25
Setback for all other fertilizers		50
Setbacks for New Auto Junk Yards***		50/250
Setbacks for applicator license applied Pesticides		50

Rhode Island (2015)****		
Buffer zones for Swamps of 3 acres or more	100	
Buffer zones for Marshes of 1 acre or more	100	
Buffer for Rivers, Streams & Intermittent streams < 10 ft. wide	100	
Buffer for Rivers, Streams & intermittent streams > 10 ft. wide	200	
20 Designated Drinking Water Supply Reservoirs	200	
Rivers in watershed of public drinking water supply reservoirs	200	
76 Designated Rivers in Regions 1&2	200	
33 Designated rivers in Regions 1&2	150	
All Streams in River Protection Zones 1&2	100	
Swamps & Marshes of any size in Urban region	100	
3 Designated rivers in Urban region	150	
14 designated rivers in Urban region	100	
Ponds contiguous to river in public drinking water watershed	100	
15 designated Ponds greater than 10 acres	50	
Vermont (2015)		
Setback from streams less than 2 square mile watershed		50
Setback from streams more than 2 sq. mi watershed		100

*25% of woodland buffer between 50 & 150 feet remains unaltered (RSA 483-B:(V(b)))

**Buffer zone recommendations established by CTDEP policy in 1997.

***Auto Junk yards on streams (1st to 3rd order) designated before 2015 are setback 50 ft. On streams designated after 2015, auto junk yards are setback 250 ft.

**** Rhode Island's wetland regulations implement a 2015 law. Table reflects the final rule.



How Can We Do Better?

- Look at how the IWWA can be updated to include the most recent science and incorporate climate change.
- Provide for more consistent riparian buffer protections while avoiding “takings.”
- Increase resources to increase staff dedicated to Inland Wetlands and Watercourses within DEEP.



HB 5218 - AN ACT CONCERNING THE ESTABLISHMENT OF RIPARIAN BUFFERS AND REVISION OF CERTAIN INLAND WETLANDS PROVISIONS

- Reminds DEEP that green infrastructure funds for stormwater can and should be used to incentivize and establish riparian buffers.
- Directs DEEP to develop mandatory setbacks.
- Directs DEEP to update the comprehensive training program
- Raises the bar on training for commission members.



Contact Information



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Questions & Comments(?)



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Workshop Evaluations