Stream Wise Assessment Protocol & Evaluation Criteria
Version 2.0
January 2023

Contents

How It Works

1) Desktop Assessment

2) Field Visit
   a) Property Assessment
   b) Key Messages

3) Report & Award
   a) Summary Report to Property Owner
   b) Stream Wise Award

4) Communicate
   a) Next Steps
   b) Technical Assistance

5) Follow Up
   a) Once Completed
   b) Reassessment

Appendix
How It Works
Stream Wise Assessment Protocol

The Stream Wise Assessment Protocol for properties on streams and rivers is based on research conducted on riparian buffer programs, regulations, and guidelines for Vermont, New York, and Quebec with input from a project advisory committee and regional community partners under a grant sponsored by the Lake Champlain Basin Program.

The goal of Stream Wise is to involve watershed organizations, conservation districts, and other water quality related groups to inform and incentivize riparian private landowners to protect and plant native vegetated buffers that can promote stream health and resiliency. This is accomplished through outreach, site assessment, and provision of a Stream Wise Summary Report with targeted recommendations and technical assistance to help property owners achieve Stream Wise Award status. This program is non-regulatory and completely voluntary. Stream Wise is regionally responsive and encourages private property owners to adopt and promote stream buffering protection and restoration practices. The Stream Wise Resource Library was developed to enhance the understanding of the resources related to stream buffering or other riparian protection practices. The Stream Wise process is as follows:

Stream Wise Community Partners
Local watershed organizations, conservation districts, and other water quality related groups receive funding to participate in Stream Wise

Spread the Word
Social media and print awareness campaigns

Outreach Event
Engage with stream and river property owners to participate in Stream Wise

Celebrate
Publicize successes
Engage more property owners

1) Desktop Assessment

2) Field Visit
a) Property Assessment
b) Key Messages

3) Report & Award
a) Summary Report to Property Owner
b) Stream Wise Award

4) Communicate
a) Next Steps
b) Technical Assistance

5) Follow Up
a) Once Completed
b) Reassessment

Next Steps
1) Desktop Assessment

Prior to conducting your field assessment, it’s informative to conduct a Desktop Assessment of the property. This will prepare you for the assessment and help you contextualize site conditions, especially with respect to Buffer Width opportunities and constraints.

The Desktop Assessment uses the Stream Wise Atlas hosted by the Lake Champlain Basin Program. Stream Wise uses Fulcrum to record data - get the app on iTunes App Store and Google Play. 

Contact LCBP for login information.

Record the Stream/River name and Basin from the Atlas.

Using the Atlas’ aerial imagery, measure the riparian buffer widths on the parcel. This is a rough estimate that does not account for slope, but can help you determine the widest and narrowest buffer areas and whether the width might satisfy Stream Wise buffer minimums prior to going out in the field.

- Determine the approximate parcel area (parcel coverage for VT is largely complete; in NY data availability varies by county; for QC, use this parcel mapping site (separate from the Atlas – choose the ‘Free’ option) to determine size (use the linear measuring tool).
- For properties UNDER 1 acre (0.40 hectares) with permanent (immovable) structures within 50’ (15m) of the stream or river, a 30’ (10m) buffer can be considered acceptable for an Award.
- Otherwise, 50’ (15m) is the minimum buffer width acceptable for an Award (provided other conditions are met).
- Measure the approximate Total Buffer Area within the Stream Wise minimum width criteria (50'/15m or 30'/10m). This will help to determine maximum allowances for development within the buffer.
- Estimate percentage of canopy cover within the Stream Wise minimum width criteria (50'/15m or 30'/10m). This is a very rough estimate to be confirmed in the field, especially if aerial imagery does not show foliage. 70% or naturally occurring canopy cover is the minimum for Stream Wise criteria.

Measure both the impervious (roofs, pavement, patios, etc.) and pervious developed (lawn, gardens, other non-natural landscaping, etc.) surface area within the minimum buffer area (30'/10m or 50'/15m) if aerial imagery allows estimation. To qualify, less than 10% of the buffer can be developed (whether impervious or pervious).

- Access paths (foot and vehicular) can be excluded from this requirement, provided they minimize hydrologic connection and/or are pervious.

Assess Hydrologic Soils Groups (HSGs) using resources above for infiltration potential. HSGs are a quantification of a soil’s potential to generate runoff. They can influence management practice selection. HGS types:

- A = Low Runoff / High Infiltration (sandy); B = Moderate Runoff / Moderate Infiltration (silt/loam);
- C = Higher Runoff / Low Infiltration (sandy clay loam); D = Highest Runoff / Lowest Infiltration (clay mixes / clay)

Where designations are mixed (e.g. A/D, use the higher runoff / lower infiltration designation to evaluate for management practices.

If possible, identify mapped river corridor, floodplains (1 year/2 year/10yr/100yr, wetlands, tributaries, ditches, polluted or impaired waters (PWL) designation, and the pollutant of primary concern.

A fillable PDF copy of the Desktop Assessment Form is also available here: Stream Wise Desktop Form
2) Field Visit
   a) Property Assessment

Assessment Criteria Scoring

For the Stream Wise Award, scoring categories are as follows:

- **Meets**: All categories of criteria are satisfied
- **Does Not Meet**: Actions must be taken to align with criteria

A property needs to meet Stream Wise Standards in all three categories (Buffer Width, Buffer Zones, Buffer Vegetation) to become Stream Wise and be given an Award sign. In order to achieve a ‘Meets’ designation, all sub-criteria must be marked ‘Meets’ as well. Some discretion may be required when evaluating this criteria. If a property substantially meets the functions, goals, and ‘spirit of Stream Wise’, outlined in this guidance, but there is an outlying condition beyond the landowners control (e.g., stream channel changes, municipal/state jurisdiction) that does not undermine the overall function of their stream/river buffer, then it may be appropriate to give them an award.

All properties will receive a Stream Wise Follow-up Report, which will include a list of good features and practices in place and a list of recommended and/or required actions that need to be taken to achieve Stream Wise Award status. Once actions have been taken and all sections can be marked as ‘Meets’ criteria, an Award can be given.

A property that cannot meet the Stream Wise standard due to prohibitive site constraints or lack of cooperation by landowner are not eligible for an Award. Prohibitive site constraints that may disqualify a property from program participation include:

- Lack of ability to achieve minimum buffer width (permanent structures or other immovable development within minimum buffer) and/or development over 10% of buffer area
  - Exceptions to the rule: If a road ROW or other development that cannot be altered due to municipal or state jurisdiction prevents a landowner from meeting the buffer width criteria, then a 30'/15m buffer can be considered sufficient on properties over 1 acre/0.4ha
- Development other than access paths within the 15’ (5m) Streamside Zone
- Hard armoring of bank with no option to vegetate (concrete or similar material retaining walls, rip rap with no possibility of establishing woody plant cover with stable, deep root systems. If rip rap has woody vegetation with extensive root systems that stabilize the bank, then this type of streambank can still meet Stream Wise criteria.

Nearly all other buffer conditions can be remediated to align with Stream Wise Program standards, for example:

- Lack of plant species composition and structure (e.g., predominantly invasive species or singular or simple vertical/horizontal structure) can be remediated and restored
- Development can be eliminated, minimized, or moved
- Contributing upland runoff can be collected, infiltrated, or turned into sheet flow (versus channel flow)
- Erosion and bank failure caused by in-stream/river flows or upland runoff (see 2d) can be remediated with riparian plantings and/or restoration using bioengineering techniques.
2a) Field Visit: Property Assessment
Continued

NOTE: Site assessment photos are important to gather - but also important is the need to caption your photos so that viewers know what they are looking at and why it is important in the assessment process. Use the Caption feature in the Stream Wise app to record information.

Stream Wise uses Fulcrum to record data - get the app on iTunes App Store and Google Play. Contact LCBP for login information.

Stream Wise Field Visit Form
2) Field Visit

a) Property Assessment

The following provides guidance for the criteria listed in the Field Form. All sub-criteria must be marked as ‘Meets’ for this category to be in compliance with Stream Wise Program goals.

Category 1) Buffer Width:

Buffer width is one of the most critical criteria for Stream Wise. The minimum buffer width is the baseline, with an ideal buffer width being 100’ (30m) or more. Buffer width should be measured from the mean high water mark. Some programs differentiate where to measure buffer width based on stream bank slope and height. For ease of site evaluation, this simpler method can be used. Mean high water mark can often be determined as the natural transition line from a predominance of aquatic plants to a predominance of terrestrial plants. If vegetation doesn’t suffice to delineate mean high water mark, use physical clues like sediment deposition or flow line demarcation due to transport of debris by high water. See following pages for additional explanation.

1a. Buffer Width – Buffer widths acceptable for Stream Wise are:
   - 50’ (15m) minimum OR
   - 30’ (10m) minimum ONLY if the parcel is under 1 acre (0.40 hectares) AND there are constraining features such as permanent structures or other immovable objects within the 50’ (15m) buffer. Where it is possible to achieve a 50’ (15m) buffer on a small lot, seek to work with the property owner to do that.

1b. Buffer Area – There is a maximum of 10% of the minimum buffer area that is in existing impervious or pervious development, including lawn, structures, decks, patios, or other non-naturally vegetated areas. This development is AT LEAST 15’ (5m) FROM MEAN HIGH WATER MARK (not in the Streamside Zone). This 10% does not include access paths.

1c. Surface Runoff – All surface water runoff from developed areas within the buffer is captured and infiltrated or converted to dispersed sheet flow (not concentrated runoff points). Surface runoff is when rain runs off a developed surface like driveways, rooftops, or even lawns as those are developed from their natural condition. The intent of this guideline is to ensure that this type of runoff is intercepted by natural features before reaching the stream or river. A ditch or pipe running through a buffer directly to a stream (or nearly directly to the stream) may mean that the property owner needs to eliminate that conveyance and manage the runoff before the naturalized buffer area.

1d. Pedestrian Access – Foot paths or stairs are 6’ (2m) wide or less and are minimized (e.g., remove unnecessary paths).

1e. Vehicle Access – Vehicle access is 12’ (4m) wide or less.

1f. Access Surface – Access points are pervious and infiltrating water or are hydrologically disconnected (all water runoff is diverted into vegetated areas, spread out, and infiltrated using switchbacks, water bars, crowned roads, turnouts, rock aprons, etc.). NOTE: Specifically for vehicle access paths – compacted gravel is not pervious. For these, pervious pavement and pavers (various types) could be used.
Identifying the Mean or Ordinary High Water Mark (OHWM)

Typically, several indicators will be used to determine the mean high water mark. The goal is to determine “…that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.” – Clean Water Act, Section 404

Examples:

<table>
<thead>
<tr>
<th>High water level</th>
<th>Normal flow</th>
<th>Natural line impressed on the bank; Scouring</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="High water level" /></td>
<td><img src="image2" alt="Normal flow" /></td>
<td><img src="image3" alt="Natural line impressed on the bank; Scouring" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sediment sorting along stream bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHWM</td>
</tr>
<tr>
<td><img src="image4" alt="Sediment sorting along stream bank" /></td>
</tr>
</tbody>
</table>
2a) Field Visit: Property Assessment

Continued

Change in plant community

Exposed root hair below intact soil

Challenging scenario: Channel flows through wetland

Look for changes in slope or vegetation type
2a) Field Visit: Property Assessment

Continued

Shelving

Other indicators can include the following, being careful that they are not a result of extreme flooding, normal water levels, or other forces (wind, wildlife):

- Leaf litter disturbed or washed away
- Fluvial deposits
- Vegetation matted down, bent, or absent/destruction of vegetation
- Wracking/presence of litter and debris
- Water staining/deposition
- Moss/lichen trim line

Images and text from Ordinary High Water Mark Identification Manual Ohio Department of Transportation, 2019
2a) Field Visit: Property Assessment
Continued

Category 2) Buffer Zone:

Within the buffer, there are multiple zones that provide protection for the waterway. They are:

2a. Streamside Zone – Minimum 15’ or 5m inland from mean high water mark.
   - There is no disturbance, clearing, or development in this zone, except for access paths and some limbing up for views (3e). Vegetation has all natural community tiers (3a) present and provides a stable root system to hold the streambank soil and prevent erosion.

2b. Middle Zone – Measuring from streamside zone to buffer edge (either 30’/10m or 50’/15m from mean high water mark).
   - There is limited human-caused disturbance (3d) and clearing in the Middle Zone (3e); 70% of canopy cover (or naturally occurring canopy cover) and vegetation below 3’, including the duff layer, is maintained. Limited development is allowed in the Middle Zone, with a maximum area of 10% of the total buffer area.

2c. Upland Zone – Beyond the buffer edge (either 30’/10m or 50’/15m from mean high water mark).
   - The Upland Zone converts all channelized or concentrated stormwater runoff flows (pipes, rills, ditches, etc.) to dispersed sheet flow or groundwater through infiltration before entering the buffer area. Natural topography, vegetation, and stormwater management practices (rain gardens, infiltration trenches, vegetated swales, etc.) slow upland runoff, spread it out, and soak it into the ground. Stormwater runoff is when rain or snowmelt runs off a developed surface like driveways, rooftops, or even lawns as those are developed from their natural condition. The intent of this guideline is to ensure that this type of runoff is intercepted by natural or built features before reaching the stream or river. A ditch or pipe running through a buffer directly to a stream (or nearly directly to the stream) may mean that the property owner needs to eliminate that conveyance and manage the runoff before the naturalized buffer area.

2d. Streambank Stability
   - Streambank is stable. There is no erosion, channelization, or unnaturally bare soil caused by upland runoff above the mean high water mark. If there is erosion above the mean high water mark caused by in-stream/river flows (e.g., bank undercutting, scouring, sediment deposits), the property is still eligible for an award, but technical assistance is recommended to help restore and stabilize the streambank. Erosion occurring within the stream channel - below mean high water mark - is outside of the Stream Wise criteria.
   - There is no hard-armoring (rip rap, retaining walls) that is not also stabilized with a strong and extensive root system underneath made up of woody vegetation.
   - See the following pages for additional explanation.
2a) Field Visit: Property Assessment
Continued

Streambank erosion can be a source of nutrient pollution to water bodies. There are two main causes for streambank erosion – upland runoff and in-stream/river flows. Upland runoff (i.e. concentrated or channelized flow from areas above the streambank) can erode the bank from the top down. In-stream/river flows will typically erode the streambank from the bottom of the slope and is due to factors such as natural stream/river adjustment over time, increased flows from development upstream or extreme flooding events, or undersized structures (culverts/bridges) increasing flow velocity.

Stream Wise is not equipped to assess erosion or bank failure that is caused by in-stream/river flows. However, it is recommended to seek out technical assistance from stream morphology and riparian restoration professionals to determine conditions and best management practices, especially for major erosion and channel adjustments or migrations.

Stream Wise is only equipped to manage upland runoff-caused streambank erosion. Evaluate the area upland of the streambank to determine the cause of runoff (look for channelized flow or point-sources like pipes). Use an appropriate stormwater management feature to control runoff.

If the bank is 'hard armored' using concrete retaining walls or rip rap and there is no option to vegetate the rip rap with woody plantings or remove those features and restore the bank with riparian plantings and bioengineering practices, the property may not be eligible for an Award. A follow-up report will be provided with recommendations for remediation.

Rip rap can be allowed under Stream Wise guidance if woody vegetation with deep, extensive root systems are present (trees have strong root systems that extend to the canopy edge and often beyond, woody shrubs also have strong and extensive root systems) - solely herbaceous vegetation does not suffice. The intent of this guideline is to encourage strong root development in the streambank to hold soil and prevent erosion in addition to the hard-armoring.
Identifying erosion, channelization, and concentrated flows:

Erosion in the buffer (streamside and middle zones) or the upland zones is not acceptable for Stream Wise properties. Erosion can be caused by a lack of vegetation and soil stabilization and concentrated flow points (e.g., culverts, drainage pipe outlets), wind, and rain causing sheet, rill, and gully erosion (see erosion types graphic below).

![Five types of erosion](Image: USDA NRCS)

However, erosion within the stream channel is beyond the control of the landowner and is acceptable for Stream Wise properties. [Acceptable] erosion in the stream channel may look like this:

![Erosion within the stream channel](Image: USDA NRCS)
2a) Field Visit: Property Assessment
Continued

Category 3) Buffer Vegetation:

Buffer vegetation must be mature growth reflecting the local natural communities (forested, shrub, herbaceous wetland), composed of mostly native species (regionally appropriate and representative of local natural communities), and complex in types of plants and diversity of species.

3a. **Natural Community Tiers Present** – All vegetation tiers normally associated with the predominant local natural community are present, unless lack of vegetation tier is outside landowners control, e.g. deer grazing, microburst, or other natural causes. Some communities may not have all five tiers naturally present, such as an evergreen forest with little understory, wetland marsh/.meadow, woody shrub swamp, rocky ledge with no duff, etc.

1. **Canopy**: tall, mature deciduous and evergreen trees that create structure and canopy cover
2. **Understory**: saplings/sufficient replacement trees (e.g., in the case of a dying canopy, ability of forest to bounce back), small understory trees and tall shrubs
3. **Shrubs**: low-growing deciduous and evergreen woody shrubs
4. **Groundcover/Herbaceous Layer**: Herbaceous vegetation (perennials, annuals, biennials), including native grasses, sedges, flowers, ferns, and mosses
5. **Duff**: organic material on forest floor – leaves, twigs, dead plant material, woody biomass, mushrooms, etc.

3b. **Native plants** – Native plant species comprise 75% or greater of the buffer area. The buffer should be comprised mostly of plants that are native to the local area or the region; for plantings, encourage true native plant species over cultivars (nativars) of native plant species.

3c. **Invasive plants** – There is 25% or less invasive species cover within the buffer. (Remove invasive species physically where possible, seek technical assistance for other solutions).

3d. **Disturbance** – Disturbance in the buffer is minimized; it is not mown, raked, or weed whacked; woody debris (dead trees, branches), leaves, and other organic matter are left to decompose and provide food sources and nutrient cycling in the buffer (removal of hazardous trees is allowed).

3e. **Views** – Limited cutting for views and firewood/coppice is allowed in the Middle Zone, but not the streamside zone; Limbing up trees for views is allowed in both zones, e.g., prune lower 1/3 of branches instead of cutting tree or topping tree - leave branches on the ground; There is a minimum 70% canopy cover or the canopy cover is representative of the natural community present. Use best judgment and nearby natural areas as clues to estimate natural canopy cover. Some forests may naturally have 60% canopy cover and some woodlands may naturally have only 25% canopy cover. In cases like marshes or wetlands, canopy cover may not be present at all. The intent of this guideline is to ensure that human-caused clearing is limited; There is no removal of vegetation (or duff) below 3’ (1m) (removal of hazardous trees is allowed).

3f. **Pesticides and herbicides** – There is no pesticide or herbicide use on the property unless recommended by a professional to remove invasive species.
Native and Invasive Plant Species

It will be necessary to identify native and invasive plant species during the site evaluation. The evaluator should be familiar with common native and invasive plant species found in riparian areas in their region. Native plant identification can serve as indicators of soil type, soil moisture, and natural plant communities. Invasive plant identification will help to determine prevention, suppression, and removal strategies. A plant identification guide may be helpful to bring into the field during evaluations.

Steam Wise has assembled a number of resources to help identification of both Invasive and Native species. These resources are organized by region and consist of both guidebooks and maps or other resources. They can be found at streamwisechamplain.org/for-owners.
2) Field Visit
b) Key Messages

The following are Key Messages to help the evaluator communicate best practices to the property owner while conducting the Field Assessment. These messages align with Stream Wise branding and outreach.

Let the Buffer Be

- Protect existing vegetation – the most important trees are living trees
- Embrace the ‘messiness’ of natural vegetation, naturalistic is intentional
- Leave dead trees, woody debris, leaf litter and other plant material on the ground
- Minimize your impact, limit access and disturbance, but still enjoy your stream!
- Terms/Phrases: Do Not Disturb, Re-wild, Keep it Wild, Leave it Wild, Successional buffers are successful buffers, Every tree counts; Be A Stream Steward; Share the Shore

Grow Native Buffers

- Widen the buffer – the wider the buffer, the cleaner the water! Diverse and extensive roots stabilize the streambank and protect soil (your land!) from eroding - cutting one tree can undermine the whole system
- Stop mowing! Allow succession of diverse native plant species
- Enhance the buffer: Plant diverse multi-tiered species of natives (trees, replacement trees, shrubs, herbaceous groundcovers), native plants are adapted to the climate and soils as well as fellow plants and insects – less maintenance for you!
- Remove invasives – invasives outcompete natives, create bare soil, and do not support native insects and fish
- Terms/Phrases: Less Lawn, More Leaves; Nature Knows Best; No-Mow; Mow-where-you-go; Plant Natives; Buffers for Blue Waters; Planting a buffer is an investment in our future

Slow it, spread it, sink it

- Minimize upland water runoff and convert channelized flows to dispersed sheet flows
- Collect: rain barrels from roof gutter
- Slow Down: thick herbaceous (meadow) filter strip, vegetated on-contour swales
- Spread out: shallow bowl rain garden, infiltration basin
- Soak in: infiltration trenches and basins, vegetated swales, rain garden
- Buffers are most effective when receiving sheet flow, wider buffers have more surface area to capture sediments and nutrients in runoff that are harmful to streams

Buffers benefit everyone

- Buffers provide flood resiliency protecting you, your family, your property, and your neighbor
- Vital highly biodiverse buffer habitat provide wildlife corridors, sources of food, and shelter along the shore. Woody debris create habitat for microorganisms that feed fish.
2b) Field Visit: Key Messages

Continued

- Fish need shade! Trees and shrubs on the shoreline provide shade needed for aquatic habitats and maintain water temperatures
- Terms/Phrases: Roots for Resiliency; Fish Grow on Trees; Protect Your Property; We need the water, the water needs us; Water is Life; Stream Strong; Your stream community needs you!

Buffers are beautiful

- Frame your view with trees
- Enjoy diverse native plants' flowers, foliage, berries, and bark throughout the seasons
- Attract more birds and other beneficial species like butterflies and bees
- The land wants to be wooded, let it grow as it wants to be
- Terms/Phrases: Hang a hammock; Frame the View; Provide Pollinator habitat; Bird-friendly

The following practices are not required for inclusion in the Stream Wise Award program, but should be communicated and encouraged during a site assessment with the property owner:

Stream community

- Buffers are stronger together – spread the word!
- ‘Bring a neighbor’ – group site assessments
- The more Stream Wise properties, the more resilient the stream

Connectivity

- Buffer connectivity to adjacent neighboring buffers or nearby habitat patches (e.g., forests, fields)
- Recommend to a neighbor!
- Hydrologic connectivity
- Removal of berms along stream to allow for functioning floodplain (seek technical assistance)

Mimic local natural plant communities

- Observe natural areas upstream and downstream
- Notice what plant species are present, where they grow, and what other plants they grow near
- Plant local natural plant communities in your buffer, see local resources (p.20) for help with identifying natural plant communities

Protect and enhance buffers along other waterways on property

- Ditches, wet areas, ephemeral and intermittent streams

Identify waters of importance

- Headwaters, critical floodplains, drinking water sources, etc.
3) Report & Award

a) Summary Report to Property Owner

Once the Field Assessment is complete, make sure to record the results of the Field Form, along with Award status in the Stream Wise database.

All Participating Properties

Provide the landowner with a Stream Wise Summary Report, based on the templates, which includes a review of positive features and practices and specific areas that need to be improved to get an Award, if possible. This digital document will include recommended Best Management Practices (BMPs) and regional technical assistance resources with contact information for organizations that may be able to assist with assessment and implementation of more technical buffer remediation measures. Visit the Stream Wise website for a Summary Report Template and Sample Language for the report.

Communicate Next Steps. The Summary Report will be sent as a follow-up to the site visit via email and will include the process for reassessment, if applicable. If possible, it may be helpful to have a second site visit to give out the Award or review the Summary Report and recommendations for the property.

If the property was identified as requiring technical assistance from another Stream Wise partner organization to achieve Award status, provide the appropriate staff person with the name and contact information of the property owner so that staff can be aware of incoming contact or reach out as appropriate.

Stream Wise Tools

b) Stream Wise Award

Award Properties Only

Distribute the Stream Wise Award. If a property is clearly able to obtain the Stream Wise Award, distribute it while on site. Be sure to photo document the site and the key features that led to the granting of the award. Also photograph the giving of the award if the property owner is amenable to having their image recorded and shared as part of Program outreach efforts.
4) Communicate

a) Next Steps

To ensure that property owners understand the Stream Wise process, as well as receive the necessary assistance and resources to achieve Award status if the property needs improvement in certain areas, Stream Wise has created a list of resources on the Stream Wise website to help guide communication. There are resources for:

Common Issues and Solutions

- Buffer Width
- Buffer Zones
- Buffer Vegetation

DIY Technical Assistance Glossary

- Quick reference guide for certain practices associated with property improvement to meet Stream Wise Award criteria. Visit the For Owners page of the Stream Wise website for this DIY resource.

Assemble the Summary Report for the property owner, drawing from these resources as needed. The intent of these resources is to provide the owner with the easiest, most appropriate means by which they can either effect riparian buffer improvements on their own or to give them the most appropriate organization to work with in order to accomplish necessary changes.
4) Communicate
b) Technical Assistance

DIY Riparian Restoration & Planting

Stream Wise has assembled resources which are designed to be used and understood by property owners. As such, they are not overly technical in nature. While they may not be sufficient for all properties to achieve Stream Wise Program standards, they will be adequate for many. As a Stream Wise Host, it would be useful to have a working familiarity with these documents.

Comprehensive How-To Guides

This resource section contains materials that comprehensively look at stream or river management issues and solutions from riparian planting all the way to bioengineering practices for slope failure management.

Stormwater Management Resources

This section focuses on managing stormwater runoff from any developed surface on a property, whether from house rooftops and patios or from driveways or other roads. This is especially useful for properties where runoff may be channelized into or through a buffer.

Additional Guidance for Practitioners

The Stream Wise program developed a comprehensive Resource Library which contains guidance primarily for Stream Wise practitioners (view a summary). The information is generally more technical in nature and therefore less suitable for direct distribution to landowners. The full Resource Library and Literature Review is available as an Excel table.

Other Guides

Other Guides: Some of these resources touch on various aspects of riparian planting, restoration, or shoreline stabilization, as well as stormwater management. There are resources for each of the Stream Wise region which may prove useful.

Native and Invasive Species

Invasive species spread rapidly and threaten native plant species and the health of stream ecosystems. They spread easily along streams and river corridors and are commonly found along streambanks. It is imperative to prevent and remove invasive species as much as possible to contain and prevent their spread. Invasive species can be very hard to remove and often require repeated and prolonged removal techniques, including mechanical/physical, suppression, and herbicide injection, depending on the type of species and the extent of the spread. Technical and professional assistance may be necessary. Stream Wise has assembled resources by region for Vermont, New York, and Quebec. Visit the For Owners page of the Stream Wise website for this resource.
4b) Communicate: Technical Assistance
Continued

DIY Technical Assistance Glossary

Stream Wise has assembled a list of links to a variety of useful practices that are generally easy to understand by both practitioners and property owners. Use these to quickly find and communicate these resources to property owners. The resources can be found on the For Owners page of the Stream Wise website and cover topics such as:

Establish a no-mow zone

Protect and enhance a native forested riparian buffer

Establish native plant communities

Build a rain garden

Plan and redirect pathways

Intercept, redirect, and infiltrate runoff

Practice riparian restoration (bioengineering, living shorelands, soft-scaping)

Build green stormwater infrastructure

Plan and manage roads

Manage yards
5) **Follow Up**

a) **Once Completed**

**2nd Property Evaluation after actions taken**

Once a property owner has completed the necessary actions and conditions on the property are deemed to have improved to pass Stream Wise criteria, a reassessment may take place at the discretion of the assessing community partner. That reassessment may lead to a Stream Wise Award being given.

b) **Potential Reassessment**

**For Stream Wise Award properties**

A questionnaire will be sent out to Stream Wise Award property owners 3-5 years (TBD) after initial assessment. An online survey and a print survey will be made available via email and physical mail. The survey will include questions about the stream buffer, observations made, further actions taken, further questions or recommendations for the program, and a self-certification of continuing compliance with Stream Wise criteria.

The assessing organization will determine if an in-person re-visit of the property is desired and necessary.
Appendix

Example

Landscape visualization of a before and after scenario of a re-naturalized riparian buffer that would meet Stream Wise standards. The before photo shows current conditions with a narrow buffer and lack of multi-tiered vegetation. The after image is a photo-simulation showing a roughly 50’ buffer of multi-tiered diverse native vegetation. Even though some of the field is taken out of agricultural production, the land is protected from further erosion, sloughing of the bank, and the resulting loss of land.

Before

![Before Image]

After

![After Image]
Resources Relating to Program Criteria

50’ (15m) Min. Buffer / 30’ (10m) Min. with qualifying conditions

Based on the buffer science literature, it seems that a target recommended buffer width should be a 100’ (30m) wide forested riparian buffer (Sweeney, 2014; Hawes & Smith, 2005; Wenger, 1999; USDA NRCS 1998; USDA FS, 2017). However, given the reality of existing development and land uses within 100’ (30m) of streams and rivers, there may need to be an alternative minimum recommended buffer width. Based on the literature, it seems a 30’-50’ (10-15m) minimum buffer requirement is necessary to ensure the long-term protection of aquatic resources.

“The scientific literature appears to support that buffers of less than 35 feet cannot sustain long term protection of aquatic resources. To provide an array of functions then, buffers should be a minimum of 35 to 100 feet in width under most circumstances. Buffer widths toward the lower end of the range appear to provide some physical and biological components of the stream ecosystem, especially on small streams. Buffer widths at the upper end of the range are likely to provide protection of physical, chemical, and biological characteristics of the aquatic resource.” (USDA FS, 1997)

50’ (15m) forested buffer minimum in regional regulations:

- **Vermont**
  - Acceptable Management Practices (AMP) for Forestry Operations – for 0-10% slopes along streams
  - Act 250 – small to moderate sized streams with low risk of lateral or vertical channel adjustment, small floodplain requirements, low risk of erosion, and without significant wildlife travel corridors or riparian dependent species
  - Riparian Management for ANR Lands - Intermittent/Small Perennial Streams
  - VT DEC River Corridor Easement funds requirement
  - Vermont Trees for Streams program – 35’ minimum width for planting projects
- **New York**
  - Protection of Waters Regulatory Program - Permit required for disturbance within 50’
  - Wild, Scenic, and Recreational Rivers Act - Permits needed for cutting and disturbance within 100’
  - Adirondack Park Agency Act - Cutting limited within 35’, minimum setbacks are at least 50’
  - NYSDEC Trees for Tribs recommends a minimum buffer width of 30’ to 100’ for private property where parcel boundaries and site layout allows
- **Quebec**
  - Ministry of Environment - For streams where slope is greater than 30% or less than 30% and riverbank more than 5m high
  - MRC Brome-Mississquoi - For streams where slope is greater than 25% or riverbank more than 5m high in urban areas and everywhere outside of urban areas
15’ (5m) Streamside Zone

A 15’ (5m) streamside zone is commonly cited as the minimum to protect physical integrity and stabilize the streambank and protect the ecological integrity of the stream ecosystem by providing habitat to aquatic species (Hawes & Smith, 2005; USDA FS, 2017).

15’ (5m) forested buffer minimum in regional programs:

- **Vermont**
  - VT DEC Lake Wise Award Program requires a 15’ (5m) minimum of naturally vegetated lakeshore buffer to receive the award

- **New York**
  - NYS Forestry BMPs Field Guide protects a 15’ (5m) minimum – forest cover maintained, disturbance and equipment excluded

- **Quebec**
  - Environmental Quality Act - Minimum for small, constrained lots with no extensive buffer possible
  - MRC Memphremagog minimum for all areas with no vegetation maintenance
  - Prime-Vert project planting width minimum

Minimum 70% canopy cover

Studies find that greater densities of buffer vegetation cools water temperatures for water quality and vital aquatic habitat, with the densest (70-90%) ensuring cover for shallow water aquatic habitat (Garner et. al., 2017; Broadmeadow et. al., 2011).

Regional Examples:

- **Vermont**
  - VT ANR recommends maintaining a 60% canopy cover during timber harvest to provide adequate shading and protect terrestrial habitat

Maximum 10% of Buffer in development

Total impervious cover greater than 10% in a watershed can adversely affect aquatic environments. Directly connected impervious surfaces are more harmful on water quality, and a watershed with only 5% directly connected impervious area will experience adverse water quality impacts. It is important to disconnect water runoff to receiving water bodies and to keep development below 10% in the immediate streamside watershed (Schueler, 1994, 1995; Trinkaus, 2018; Center for Watershed Protection, 2003).

A search of the literature clearly suggests that buffer sizes necessary for adequate performance of specific buffer functions vary widely (USDA FS, 1998). “…The available field data are only sufficient to describe broad relationships between buffer width and function and remain inadequate for developing quantitative recommendations for defensible, variable-width buffers” (Sweeney, 2014, p. 576).
## Bank stabilization
- 33'-66' (Fisher and Fischenich, 2000)
- 49'-98' (USACE, 1991)
- 164' min. (ELI, 2003)

## Erosion prevention
- 30'-98' (Hawes & Smith, 2005)

## Water quality
- 16'-98' (Fischer and Fischenich, 2000)
- 50' (Palmstrom, 1991 via Chase, 1995)
- 95'-150’ (Welch, 1992 via Chase, 1995)
- 328’ min. (ELI, 2003)

## Organic matter and debris
- 10'-33' (Fischer and Fischenich, 2000)
- 10'-328' (Hawes & Smith, 2005)
- 50' (Wenger, 1999)
- 66'-102' (USACE, 1991)
- 82'-328' (Broadmeadow and Nisbet, 2004)
- 98’ (Sweeney, 2014)
- 164' min. (ELI, 2003)

## Sediment trapping
- 30-200' (Fischer and Fischenich, 2000)
- 33' (65% removal)-98’ (85% removal) (Sweeney, 2014)
- 33-148' (USACE, 1991)
- 49-213' (Broadmeadow and Nisbet, 2004)
- 82-328’ (Wenger, 1999)
- 98’ min. (ELI, 2003)

## Nutrient and pollution removal and retention
- 16'-98’ (Fischer and Fischenich, 2000; Broadmeadow and Nisbet, 2004)
- 16-164’ (Hawes & Smith, 2005)
- 50-100’ (Wenger, 1999)
- 52-164’ (USACE, 1991)
- 82’ min. (ELI, 2003)
- >98’ for nitrate removal (Sweeney, 2014)

## Terrestrial Wildlife Habitat
- 30'-656' (USACE, 1991)
- 98'-1,640' (Fischer and Fischenich, 2000)
- 150'-330'+ (Hawes & Smith, 2005)
- 220'-574’ (Wenger, 1999)
- 328’ min. (ELI, 2003)

## Aquatic Habitat
- 33-64' (Broadmeadow and Nisbet, 2004)
- 33-164’ (Hawes & Smith, 2005)
- 98’ min. (USACE, 1991; Fischer and Fischenich, 2000)
- >98’ (Sweeney, 2014)

## Temperature and microclimate regulation
- 30-230’ (Hawes & Smith, 2005)
- 33-66' (USACE, 1991)
- 33-98’ (Wenger, 1999)
- 49-230’ (Broadmeadow and Nisbet, 2004)
- 66’ (within 2 degrees C) - 98’ (full protection) (Sweeney, 2014)
- 98’ min. (ELI, 2003)

## Flood Attenuation
- 66'-492’ (Fischer and Fischenich, 2000)

## Pesticide retention
- 49-328’ (Hawes & Smith, 2005; USACE, 1991; Wenger, 1999)
Appendix
Continued

Additional References


Hawes, Ellen and Smith, Markelle, 2005. Riparian Buffer Zones: Function and recommended widths. Yale School of Forestry and Environmental Studies.


