

# PreHarvest Planning

**why is planning important?** PreHarvest planning provides you with the solid foundation to properly layout all-important aspects of your forest management plan. You will need to (with the assistance of a professional) layout access roads, skid trails, stream crossings, and identify those areas that should not be harvested (i.e., too steep, wetlands, streamside management zones). The following checklist provides general principles of what PreHarvest planning should entail. The pages that follow offer specific examples and photos.

PreHarvest planning is the most important phase of the entire timber harvest operation. Therefore, taking the time in the beginning to properly plan your harvest will save money, time and protect water quality and soil productivity for generations to come.

## preharvest planning checklist:

- Identify and mark the forest harvest boundary and all waterbodies, wetlands, or other sensitive areas within your property.** This should first be done on a U.S. Geological Survey (USGS) topographic map and then later performed “on the ground.”
- Identify and flag special natural resource areas such as sinkholes, wetlands, and springs.** These areas play a vital role in keeping water clean and provide habitat for plants and animal species dependent on these unique features.
- With the help of a professional, layout access roads, skid trails, and log decks.** Keep these to a minimum to reduce the negative impact on your property and save you money. Some roads in the Appalachian Mountains can cost several thousand dollars per mile, so it makes financial sense to take the time to properly plan their location.
- Determine the type of logging equipment that will be used and choose those vehicles that will have the least amount of environmental impact.** For example, a front-end loader supplemented with a grapple can “walk” up slopes, reduce skid trails, increase the number of logs going to the log deck in a shorter amount of time, and most importantly, reduce environmental impact, saving money and increasing your profit. This harvesting practice is known as “shovel logging.”
- Locate and design temporary stream crossings and the type of crossing that is to be implemented** (temporary bridge, culvert, fording the stream with geotextiles).
- Recognize that some places should not be harvested,** especially very steep slopes or fragile terrain. In some cases there are ways to harvest with alternative equipment. See Alternative Harvesting Options in the previous section to understand other means of harvesting (cable yarding, helicopter, horse logging).
- Prepare the timber sale contract to conform to your PreHarvest plan.** Contact an attorney of your choice to prepare a timber sale contract which conforms to your PreHarvest plan. The best way to implement your plan is to put it in writing and make it binding on the logger who ultimately harvests your timber. See page A-62 for a sample.

**sinkholes:** During the PreHarvest planning, be sure to identify and flag all sinkhole areas. Typically found in limestone areas, sinkholes are depressions or soil collapses—often circular in shape—which accelerate the damage that typical surface runoff can cause. As shown in the illustration below and the photo on the following page, sinkholes provide a direct path or funnel for pollutants like untreated sewage or soil contaminants to drain into underground waterways. A “swallet” or drain hole is the point where runoff water leaves the surface and rapidly flows underground with little or no filtration.

Sinkholes are only the most obvious feature of karst terrane. The entire karst area—including flat areas between sinks—tends to be sensitive to pollution. Land-disrupting activities like logging, farming and development often trigger soil and sinkhole collapses. In general, groundwater degradation from harvesting activities is increased when a sinkhole contains steeper slopes and more bedrock outcrops.

See page A-4 for a map of karst occurrence in Kentucky.

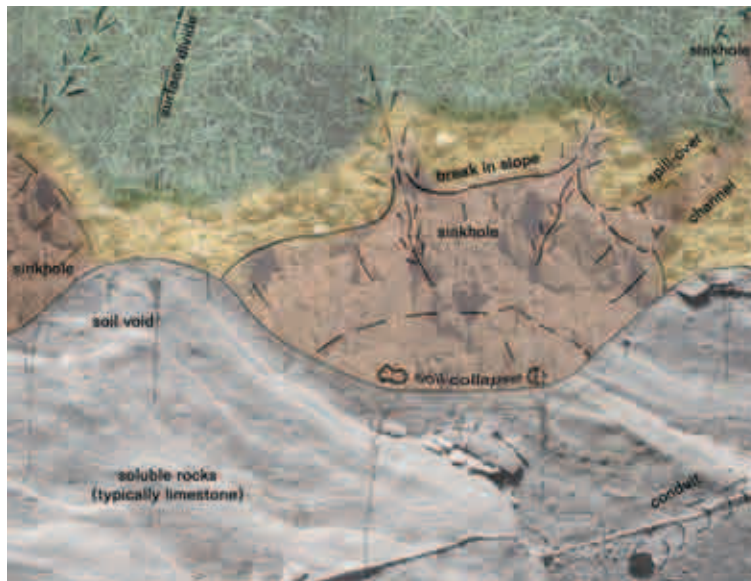


photo illustration: Sara Thilman and Joe Ray

buffer area around sinkhole	
slope of land (%)	distance (in feet)
5	30
10	35
20	45
30	55

## sinkhole checklist:

- Identify and flag all karst areas and sinkholes.
- Avoid harvesting near sinkholes if possible. Healthy tree roots help stabilize sinkhole slopes. If the area cannot be avoided, **maintain good buffer area around sinkhole (see chart on the previous page). Keep all tree tops, slash, runoff and debris from roads, skid trails and log landings away from sinkhole buffer.**
- Avoid harvesting on slopes greater than 30% (~3 ft. drop per 10 foot slope) in areas with sinkholes.
- Keep equipment fluids, pesticides and fertilizers out of sinkhole areas.

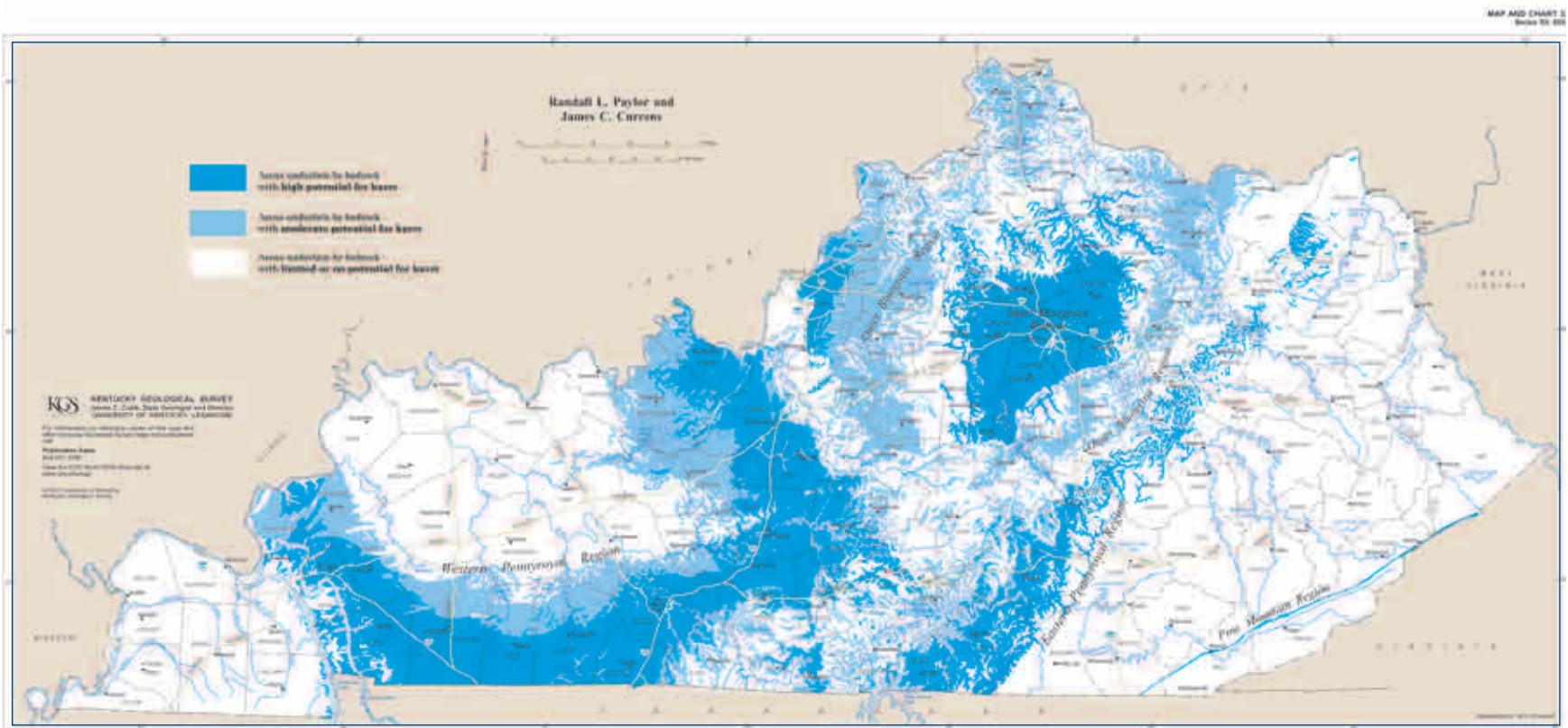


photo courtesy of Keith Mountain, Kentucky Geographic Alliance

## karst occurrence in Kentucky

Karst is a terrane that is generally underlain by limestone or dolomite, where the topography is formed chiefly by dissolving rock. Karst landscapes are commonly characterized by sinkholes, sinking streams, closed depressions, subterranean drainage, large springs and caves.

Karst regions are susceptible to unique problems such as sinkhole collapse, sinkhole flooding and rapid groundwater pollution. Springs in karst areas are an important, productive source of groundwater. Rare biologic communities and endangered species can be found in the fragile underground environments developed in karst landscapes.



## **sinkholes—what is required by law:**

The following BMPs are required by law. To obtain a complete copy of these requirements, contact the Division of Forestry or visit <http://www.ca.uky.edu/agc/pubs/for/for67/for67.htm>.

## **the Forest Conservation Act (FCA) /Agriculture Water Quality Act (AWQA) minimum requirements**

- Leave a buffer zone between any disturbed area and the open swallet of a sinkhole of 30 feet for areas of 5 percent slope. An additional 10 feet in width should be added to this zone for each 10 percent increase in slope.
- Divert runoff from haul/access roads, skid trails, and log landings so as not to drain directly into sinkholes, sinking streams, or caves. (Note: if runoff does enter a sinkhole, a UIC permit may be required.)
- Do not push soil, logging debris, and/or other waste material into the bottom of a sinkhole or into any noticeable sinkhole opening.
- Do not drain fluids from equipment onto the ground. They should be collected in a container, transported off site, and recycled or properly disposed.
- Maintain a buffer zone along sinking streams or in sinkholes with an open swallet if there is fertilizer and/or pesticide usage in the vicinity.

## **other regulatory requirements:**

- Activities around sinkholes, cave entrances, etc.: (KRS 433.870-433.875)
- Endangered species in caves: (Federal Register 55:6184 and 56:58804-58836)
- Modified sinkholes: (May need to be registered and/or permitted)
- Cave streams and other underground surface waters: (may deal with KY Surface Water Statutes and/or Outstanding Resource Waters)
- All silvicultural operations: (410 KAR 5:026, 5:029, 5:030, and 5:031)
- Activities near high-quality waters and outstanding national resource Waters: (401 KAR 5:029, 5:030, and 5:031w)
- Activities near wild rivers: (KRS 146.200 et seq. and 401 KAR 4:100-140)

# Forest Buffers (aka Streamside Management Zones)




<p><b>Buffer Zone or smz</b> 100 feet, plus slope smz = 100' + 2 x (slope)'</p>	<p><b>Waterbody</b> ponds, rivers and all perennial, intermittent and ephemeral streams</p>	<p><b>Buffer Zone or smz</b> 100 feet, plus slope smz = 100' + 2 x (slope)'</p>
 <p>surface runoff</p> <p>subsurface flow</p> <p>groundwater</p>		
<p><b>UNDISTURBED BUFFER ZONE</b></p>	<p><b>STREAM</b></p>	<p><b>UNDISTURBED BUFFER ZONE</b></p>
<p>Mature trees, shrubs and grasses help regulate water flow. Dead trees or snags contribute to animal habitat.</p>	<p>By following buffer guidelines you will contribute to stream quality, provided wildlife habitat and help offset the effects of drought and flooding.</p>	<p>Nature helps to filter sediment, nutrients and pollution from runoff and water below the surface.</p>

photo illustration: USDA Forest Service and Sara Thilman

# Forest Buffers aka Streamside Management Zones (SMZs)

**what are they?** The strips of forest bordering a stream are considered buffer zones. Trees and plants should remain intact in the streamside management zone to buffer or protect the stream and its inhabitants from silt, sediment and disturbance from harvest activities.



photo courtesy of Keith Mountain, KY. Geographic Alliance

The actual width of the buffer area varies depending upon the slope, soil and other factors. Guidelines are on the following page. Some sources offer different guidelines for intermittent streams (those that flow only during rainy seasons) and perennial streams (those that flow year round). Since pollutants and unwanted nutrients can get trapped in the soil of a dry stream bank, we recommend using the same buffer width for both intermittent and perennial streams.

**Streamside Management Zone is a legal definition developed specifically for forestry. Included in this buffer area is the riparian forest—the strips of vegetation that border water bodies and typically have different plants than the upland forest. Riparian forests are considered the primary buffer area since they are closest to the water’s edge and are critical to fish, wildlife and water quality. See illustration (previous page). For more information about riparian forests, see pages 23 and 24.**

### Creating a Streamside Management Zone (SMZ) buffer:

- ✓ Protects water quality
- ✓ Helps control flooding
- ✓ Filters and traps unwanted sediments and pollutants
- ✓ Spreads surface water, slows water flow, minimizes erosion
- ✓ Promotes wildlife habitat
- ✓ Provides shade for aquatic habitat
- ✓ Minimizes streambank erosion
- ✓ Is required by Kentucky law (details follow)

**why is planning important?** Forest buffers or streamside management zones apply to many types of forestry activities. In most cases buffers are only a small percentage of a landowner’s forest, but they support a wide variety of plants and wildlife. Think of the buffer area as protection for your water supply. In many areas sediment is the #1 pollutant of streams and rivers. Why would you pollute or throw debris into your stream if it is relatively easy to avoid?

### what size buffer or smz is recommended?

The Forest Conservation Act requires a minimum buffer width for areas next to perennial streams lakes and ponds of 25’ to 55’ feet on land with less than 15% slope and a minimum of 55’ to 90’ feet on land with slope of 15% or greater. (The complete FCA guidelines are on page A-11.)

However, an ecologist from the University of Georgia conducted a review of over 140 scientific articles and books assessing various buffer methodologies. This research found that a base buffer width of 100’ is a solid recommendation for adequate sediment removal under most circumstances. A 100’ buffer (plus additional for slope) will also help maintain good aquatic

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habitat by shading the stream and preserving stream bank stability. This recommendation is very similar to that used by Daniel Boone National Forest (DBNF). DBNF requires that the 100 year floodplain be protected by a minimum of 100' for all perennial streams, plus additional buffer width as the slope increases.

### To determine the recommended buffer width for your property:

$$100' + 2' \times (\text{slope}) = \text{buffer on both sides of your stream or waterway.}$$

For example, if your property is on a steep (15%) slope, your buffer should be  $100' + 2 \times (15) = 130'$  on each side of your waterbody.

### forest buffer (smz) checklist:

- No harvest or harvest related activities in a 100' Buffer Zone on either side of the stream. Add additional width of 2' to compensate for each 1% increase in slope. This guideline is wide enough to capture soil and other pollutants before they reach the water. It's much easier and less expensive to protect your water than it is to correct a pollution problem.
- The buffer applies to all perennial, intermittent and ephemeral streams.
- Extend the SMZ to include the entire floodplain and adjacent wetland areas.
- Exclude all land disturbing activities from the SMZ including logging roads, disposal sites and tree cutting.
- Promote trees and vegetation to shade the stream. This helps regulate water temperature critical for aquatic habitat.
- Keep out wheeled or track-type equipment.
- Keep out all pesticides, fertilizers, hazardous waste, chemicals and fuels.

**Important note:**

The width of the buffer zones should always maintain Kentucky's minimum width and is always dependent upon the site-specific nature of the area. Buffer zones should be adapted for each area and are expected not to be linear, but rather to fluctuate in length depending upon the slope percent. Buffer zones are only as good as the low point in the topography. This is the same as saying that a chain is only as good as its weakest link. As you mark off your buffer zones, look for those locations that have linear depressions where water will collect and become a concentrated flow. More often than not, these "low point" locations are areas where the buffer zones will fail because water becomes concentrated and punches through the buffer zones making it ineffective.

Another area to watch out for is where a culvert empties into a buffer zone. The water coming off the road and through the pipe is moving fast and will act like a water cannon punching through the buffer zones.

**To avoid these occurrences, install energy dissipaters such as hay bales, small boulders, or slash. These items, if installed correctly, will slow down the water velocity, trap sediment, and prevent a breakthrough to the buffer zones. Keep in mind these energy dissipaters will need regular maintenance in order to continue working properly.**

Minimize possible problems, damages or potential liability by avoiding steep terrain. Harvesting on steep terrain can present dangers to your land, water and the individual performing the harvest. Tailor the width of the buffer zone or SMZ to the varying degrees of slope found throughout your property. For example, the buffer zone will be wider in areas with steeper adjacent slopes, more narrow in flat areas. A sound SMZ will protect water quality by functioning as a filter for potential water runoff with the associated nonpoint source pollution, as seen in the photo below.



photo: Keith Mountain, KY. Geographic Alliance

The trees and shrubs along this stream not only add to the beauty, but help to naturally protect it by trapping debris and silt before it reaches the water.

## Special Consideration: Wetland Forest Management

All wetlands provide beneficial functions to our environment. They reduce flooding, trap and filter pollutants, clean groundwater and provide abundant wildlife habitat. At one time there were an estimated 1,566,000 acres of wetlands in Kentucky. As of 1978, only about 637,000 remained (REP America, 2002). Forestry operations can devastate wetlands and should be considered with great care and planning.

Fens and bogs are typical forested wetlands found in Kentucky's Appalachian region. Fens and Bogs are peat-forming ecosystems with high water tables, accumulation of organic matter (peat), and low nutrient availability to plants.

In Canada, fens and bogs can cover several square miles; in Kentucky they are limited in size to just a few acres. Therefore, protecting their unique contribution to Kentucky's environment is very important.

Harvesting trees in wetlands can alter the hydrology of the wetland, thus, changing the wetland's functionality forever. Potential forestry operation impacts occur from road and skid trail construction, log decks, and harvesting. **Since wetland areas are considered fragile, each wetland should be regarded as a "hands off" zone.**

You should be aware of the numerous laws and regulations (both federal and state) that apply to forestry activities. Accordingly, forestry activities in wetland areas require special permitting from the U.S. Army Corps of Engineers. This is required by Section 404(a) of the Clean Water Act, which regulates the discharge of dredged or fill material into waters of the United States.

**The best practice to protect your wetlands is to identify, flag the boundary and consider these areas off limits to forestry operations.**

## forest buffers—required by law:

The following BMPs are required by law. To obtain a complete copy of these requirements, contact the Division of Forestry or visit <http://www.ca.uky.edu/agc/pubs/for/for67/for67.htm>.

## the Forest Conservation Act (FCA) /Agriculture Water Quality Act (AWQA) minimum requirements

These are the **minimum standards for buffer zones (SMZ's) required by law** :

- In no case use stream beds as roads or for the skidding of logs except where site conditions (rock walls, notches, or other limiting factors) leave no other alternatives for access or where road or skid trail placement in normally recommended locations is either impossible or will cause a higher degree of water quality degradation.
- If an exception due to physical site conditions is necessary, stream channels may be used only as roads or for skidding for the minimum distance required.
- In areas adjacent to perennial streams, lakes and ponds, forest buffers should be maintained for a minimum surface distance of 25 to 55 feet on the ground with less than 15% slope and a minimum surface distance of 55 to 90 feet on the ground with slope of 15% or greater. Management activities are acceptable in these areas; however, equipment operation should be avoided except at designated crossings, and at least 50% of the original tree overstory (canopy cover) should be retained to shade the water and to maintain water temperature. Where minimum distances are not possible, roads, trails and landings can be located at less than the recommended distance, but should be constructed to protect water quality. Take precaution to prevent tree debris, such as tops from harvested trees, from remaining in or being washed into perennial streams.
- In areas adjacent to intermittent streams, complete removal of overstory trees is acceptable. Equipment operation should be avoided in a zone of at least 25 feet on each side of an intermittent stream except for designated crossings. Where minimum distances are not possible, roads, trails and landings can be located at less than the recommended distances, but should be constructed to protect water quality. Mechanical site preparation should be excluded from areas adjacent to intermittent streams to maintain the duff layer and filtering capacity. Take precautions to prevent tree debris, such as tops from harvested trees, from remaining in or being washed into intermittent streams.
- Cold water Aquatic Habitats (CAHs) (high-quality trout streams), as designated by the Kentucky Division of Water, need additional protection.
- CAHs should have a minimum of 75 percent of the original tree overstory (canopy cover) retained within the 60-foot-wide strip on either side of the stream.
- Understory vegetation immediately adjacent to CAH streams should be left undisturbed.
- Fertilizers and pesticides should only be applied in SMZs in compliance with silviculture BMPs 7 and 8, respectively.

## other regulatory requirements:

- Debris in floodplains: (KRS 151.250)
- All silvicultural operations: (410 KAR 5:026, 5:029, 5:030, and 5:031)
- Activities near high-quality waters and outstanding national resource waters: (401 KAR 5:029, 5:030, and 5:031)
- Activities near wild rivers: (KRS 146.200 et seq. and 401 KAR 4:100-140)

## wetlands areas—required by law:

### **Regulatory Requirements that loggers or foresters must adhere to for Wetlands Areas include:**

- Filling or draining a wetland: (33 USC 1251 et. seq., Section 404)
- All silvicultural operations:(410 KAR 5:026, 5:029, 5:030, and 5:031)
- Activities near high-quality waters and outstanding national resource waters: (401 KAR 5:029, 5:030, and 5:031)
- Activities near wild rivers: (KRS 146.200 et seq.and 401 KAR 4:100-140)

### These are the **minimum standards for Wetlands required by law:**

- Minimize construction of permanent roads and locate landing on higher grounds.
- Restrict vehicle traffic to a minimum.
- Avoid stream crossings if possible.
- Leave 50 - 70% of overstory to shade perennial streams and sloughs.