Pennsylvania Priority Resource Concern Guidance

Priority Watersheds

Exceptional Value & High Quality Waters – Exceptional Value (EV) and High Quality (HQ) designations are assigned to Pennsylvania waters, by PA DEP, according to rules and regulations at 25 Pennsylvania Code Chapter 93 (Water Quality Standards) in Section 93.3 Protected Water Uses, to meet the antidegradation requirements of the Federal Clean Water Act.

When planning in an EV or HQ watershed, conservation practices addressing water quality should be considered to protect water resources from the effects of nonpoint pollution sources. Reduction in soil erosion and sedimentation; nutrient runoff or leaching; pathogen loads to water bodies; and improvements riparian vegetation and stream habitat should be targeted in areas contributing to EV/HQ waters. When working in an EV/HQ area there may be additional permitting requirements.

303d Ag impaired for Nutrient and Sediment – The Federal Clean Water Act (CWA) requires states, in coordination with the EPA, to identify and list waters that are either too polluted or otherwise degraded to meet applicable water quality standards. Listed, non-attaining stream segments are tracked until the water quality level improves to an acceptable level. This layer identifies non-attaining segments the integrated List for waters that are impaired by agricultural nutrients and sediment. The Streams integrated List represents stream assessments in an integrated format for the CWA Section 305(b) reporting and Section 303(d) listing.

PA DEP protects 4 stream water uses: aquatic life, fish consumption, potable water supply, and recreation. If a stream segment is not attaining any one of its 4 uses, it is considered impaired.

- Aquatic Life – The integrity reflected in any component of the biological community (i.e. fish of fish food organisms)
- Fish consumption - The risk posed to people by the consumption of aquatic organisms (ex. fish, shellfish, frogs, turtles, crayfish, etc.)
- Recreational use attainment - The risk associated with human recreation activities in or on a water body. (i.e exposure to bacteria and other disease causing organisms through water contact recreation like swimming or water skiing)
- Potable Water Supply – The risk posed to people by the ingestion of drinking water

As with EV/HQ watersheds, when planning in Ag Impaired watershed, conservation practices addressing water quality should be considered to protect water resources from the effects of nonpoint pollution sources. Reduction in soil erosion and sedimentation; nutrient runoff or leaching; pathogen loads to water bodies; and improvements riparian vegetation and stream habitat should be targeted in areas contributing to Ag Impaired waters.

Priority Watersheds – This layer identifies watersheds producing high local yields (mass of nutrients entering a stream per acre of land) of nitrogen or phosphorus from an agricultural source and adjacent CWA Ag 319 Watersheds. The data was determined by the USGS SPARROW (Spatially Referenced Regression on Watershed attributes) model which is a watershed modeling technique for relating water-quality measurements made at a network of monitoring stations to attributes of watersheds such as contaminant sources and environmental factors that affect rates of delivery to streams and instream processing. Areas of nitrate violations determined by PA DEP were also included in this layer. The purpose of this layer is to identify watersheds where implementation of a targeted upstream system of nutrient management and associated conservation practices is expected to result in greater reductions of downstream nutrient loads.

Follow nutrient management practices that avoid inappropriate applications of nutrients. The 4Rs (right source, placement, timing and rate) of nutrient application should guide changes in management. In field conservation practices, such as Tillage and Residue Management - No-Till, Cover Crop, Conservation Crop Rotation, Contour Farming and Contour Buffer Strip can be planned in a system to further avoid in-field losses. Due to topography, rainfall, soil properties, etc. nutrient loss from fields cannot always be avoided. Conservation practices, such as grassed waterways and diversions, which control edge of field losses can be planned. Pasture management practices like Prescribed Grazing and Fence can be used to improve vegetative cover, manage nutrient deposition, and keep livestock away from surface waterbodies. Filter Strip, Riparian Herbaceous Cover, Riparian Forest Buffer, and Field Border should be considered to trap nutrients before entering a waterbody.

Brook Trout, Greatly Reduced or **Naturally Reproducing Brook Trout** - The brook trout (*Salvelinus fontinalis*), Pennsylvania's state fish, is the only stream trout native to Pennsylvania. It prefers clean, cold streams, but can adapt to ponds and dams. The brook trout is experiencing steep population declines because of decreasing water quality and increasing water temperatures in Pennsylvania's streams. These water quality problems are associated with changing land uses (from forested to non-forested), mining and mining discharges, and siltation of streams. The priority watersheds are based on the PA Fish & Boat Commission's designation of Wild Brook Trout streams and Naturally Reproducing Brook Trout populations. Activities to benefit brook trout should focus on reducing surface water temperatures, reducing siltation and nutrient loading, or increasing fish habitat in streams. This can be accomplished through riparian forest buffers and riparian herbaceous cover, improved manure and fertilizer management, increased use of cover cropping, reduced tillage, and field borders on upslope ag lands, stream crossings and streambank fencing, and off-stream watering facilities for livestock. Habitat improvement projects and practices can include Streambank and Shoreline Protection, Stream Habitat Improvement and Management, and in-stream habitat structures. Activities in these areas can benefit both wild brook trout populations and any stocked or reintroduced brook trout and other aquatic species.

Priority Species

Bog Turtle – The bog turtle (*Glyptemys muhlenbergii*) is a federally threatened species which has been listed under the Endangered Species Act since 1997. That status means that the species is likely to become endangered in the foreseeable future. It is a small turtle that is extremely dependent on freshwater wetlands, fens, and bogs that are unpolluted and open to sunlight. Wetlands with little or no tree cover and an abundance of sedges and rushes are preferred habitats. The greatest threats to the bog turtle are habitat loss and illegal poaching. Habitat losses occur when wetlands are drained or converted to other uses (often agriculture or development), when wetlands are polluted, when wetlands are altered by invasive species, or when wetlands are shaded by forest growth. Activities to benefit the bog turtle should focus on protecting existing wetlands, restoring wetlands that have been altered or drained, controlling invasive species, and managing plants in the wetland.

Indiana Bat – The Indiana bat (*Myotis sodalis*) has been a federally-listed Endangered Species since 1967, which means that the species is in immediate danger of going extinct. It is a small, gray-brown bat which feeds almost exclusively on flying insects. Bats, including Indiana bats, provide vital and cost-effective control of mosquitoes and other pests, particularly for agriculture. Indiana bat populations have declined severely in the last 40 years; recent monitoring indicates that there may be less than 100 Indiana bats remaining in Pennsylvania. Priority

areas for Indiana bats are based on current or past bat populations. Originally, bat declines were related to human disturbance of hibernation sites and loss of habitat, but the recent onset of the White-Nose Syndrome fungus has caused even greater declines. Indiana bats hibernate from late October to April, in caves and old mines with specific temperature and airflow characteristics. For the rest of the year, they forage over wide areas but roost in mature forests with large trees and trees with cavities or loose bark. They especially prefer shagbark hickory trees, because of the species' peeling bark. Activities to benefit Indiana bats should focus on protection, maintenance, or restoration of cave and mine sites through easement purchase, access restriction to the cave/mine entrances through practices such as Mine Shaft and Adit Closing, and forest management around the hibernaculum. On summer roosting/foraging areas, efforts should focus on forest management, recruiting/creating/retaining roost trees and hickories, invasive and noxious plant control, and avoiding spraying/fogging insecticides after dusk.

Massasauga Rattlesnake – The Eastern massasauga rattlesnake (*Sistrurus catenatus*) is a federally threatened species which has been listed under the Endangered Species Act since 1998. That status means that the species is likely to become endangered in the foreseeable future. It is relatively small, well-camouflage rattlesnake that is extremely secretive and surprisingly docile. The snake is uncommon and rarely seen in Pennsylvania, with known populations only in Butler and Venango Counties. Many people fear snakes and mistakenly think that all snakes—especially poisonous ones—should be killed. But even in the areas with the highest concentrations of massasaugas (Michigan and Ontario), only 1-2 people are bitten by the snakes in any given year, with no fatalities. Massasaugas are closely linked to wetlands, where they hibernate and spend much of their time; however, they also use drier uplands near wetlands. The massasauga is most threatened by habitat loss, due to the destruction of wetlands, and persecution by humans. Activities to benefit massasaugas should focus on protecting existing wetlands, restoring wetlands that have been altered or drained, enhancing the wildlife value of nearby uplands, and avoiding interfering with the snakes themselves.

Northern Long-eared Bat — the Northern Long-Eared Bat (*Myotis septentrionalis*) was federally listed as threatened under the Endangered Species Act in 2015. That status means the species is likely to become endangered in the foreseeable future. The NLEB is a medium-sized, brown bat with a body 3-4 inches long and a wingspan of 9 to 10 inches; its unusually long ears are the source of its name. NLEBs eat insects, and can capture both flying insects and stationary insects on plants. NLEBs can occur anywhere in Pennsylvania, and may roost in any tree larger than 3 inches in diameter. Bats, including NLEBs, provide vital and cost-effective control of mosquitoes and other pests. NLEB population declines of nearly 99% are almost entirely caused by the fungal White-Nose Syndrome, which weakens and kills NLEBs during hibernation. Activities to support NLEBS should focus on protection of hibernacula and management of forests around hibernacula, management of forests near roost trees and summer habitat, and avoiding spraying/fogging insecticides after dusk. Forest management should focus on long-term forest sustainability and recruiting/creating/retaining roost trees, especially hickory species.

Cerulean Warbler - The Cerulean warbler (*Setophaga cerulea*) is a migratory songbird that is experiencing significant population declines caused by the loss of forest habitat and declines in mature forest health. The population has seen a reduction by about 70% since 1966 in Pennsylvania. In the Appalachian portion of their breeding range, Cerulean Warblers seek out mature oak and northern hardwood forests containing tall deciduous trees with open canopies and gaps that allow sunlight to reach the forest floor. The Cerulean warbler focal area is based on the current known breeding range and concentrations of the species as well as areas with high

management potential located geographically adjacent to current population concentration areas. At this time the Cerulean Warbler is neither a species listed or proposed for listing under the Endangered Species Act (ESA) nor a candidate for listing. The project to benefit Cerulean warbler habitat in Pennsylvania is part of a nationally funded Regional Conservation Partnership Program (RCPP) which is a partnership between the Appalachian Mountains Joint Venture of the American Bird Conservancy and the NRCS. Though significant areas of Pennsylvania remain forested, the loss of structurally complex forests has resulted in the present-day population decline of the species. Forests that are particularly uniform with densely packed trees and closed canopies often lack the variety of overstory and understory habitat structure required by Cerulean warblers for breeding. Projects aimed at improving Cerulean Warbler habitat within the focal area concentrate on specific habitat components such as within landscapes that have at least 1,800 acres of contiguous forests or areas that have at least 80% deciduous forest canopy cover within a 1.5 mile radius of project areas. Cerulean Warblers are often associated with forests that occur on steep slopes that are dominated by oak species and in stands that contain gaps in the forest canopy. Habitat improvement treatments, primarily through the Forest Stand Improvement practice, focus on manipulating forest structure and composition to better develop understory and upper canopy layers by reducing stand density while leaving a few larger trees for nesting, roosting, and seed production. Noxious and invasive weeds should also be controlled according to Tree/Shrub Site Preparation, Brush Management, and/or Herbaceous Weed control practice standards.

Golden winged Warbler (GWW) - The Golden-winged warbler (*Vermivora chrysoptera*) is a migratory songbird that is experiencing steep population declines caused by loss of early successional forests, hybridization with the Blue-winged warblers (Vermivora cyanoptera) which is expanding into GWW habitat, and habitat loss on the wintering grounds. The species experienced a 97.8% loss in the Appalachian Mountains since 1966 to 2010. Breeding GWW populations require a dense vegetation structure, often found in early successional ("young forest") patches within forested landscapes. At this time the GWW is neither a species listed or proposed for listing under the Endangered Species Act (ESA) nor a candidate for listing. GWW is one of seven high priority Working Lands for Wildlife (WLFW) focal species. WLFW focuses on improving habitat for focal species through NRCS conservation investments and collaborative partnerships. The Northern Appalachian GWW Focal Area, included within Pennsylvania, is one of 18 defined focal areas within the Appalachian Region. This focal area is based on the current known breeding range of the species which has contracted significantly from the former breeding range prior to 1990. Projects aimed at improving GWW habitat within the focal area concentrate on specific habitat components including areas at higher elevations (>950 feet) and within landscapes that have at least 70% canopy cover within a 1 mile radius. Habitat improvement treatments focus on reducing canopy cover by creating early successional young forests through the Early Successional Habitat Development/Management practice. These areas retain a few scattered or clumped residual overstory trees for singing perches and foraging sites. Treatments encourage forest regeneration with shrub and sapling clumps interspersed with native herbaceous openings while controlling noxious and invasive weeds according to Tree/Shrub Site Preparation, Brush Management, and/or Herbaceous Weed control practice standards.

Priority Soils

Hydric Soil – Wetlands are important features in the landscape that provide numerous beneficial services for people and for fish and wildlife. Some of these services, or functions, include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters and maintaining surface water flow during dry periods. These valuable functions are the result of the unique natural characteristics of wetlands.

Executive Order 11990 states in part, in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. To achieve this, each federal agency shall provide leadership and shall take action to the destruction, loss or degradation of wetlands, and to preserve and enhance natural and beneficial values of wetlands in carrying out the agency's responsibilities.

The Conservation Compliance provisions of the Farm Bill and the Food Security Act Manual provides agency guidance that assures wetlands are protected while carrying out the various programs offered to the public through NRCS.

Hydric soils are just one of the three components making up a wetland, the others being hydrophytic vegetation and hydrology. To protect wetlands it is very important that during the planning process, conservation planners understand the importance of hydric soils and how to identify hydric soils both off site and on site to avoid potential wetlands. Hydric soils generally correspond to the following drainage classes; very poorly drained soils, poorly drained soils and to a lesser extent somewhat poorly drained soils. The Web Soil Survey and soils data contained in Toolkit provides information relating to the hydric statues of particular soil and that of the overall soil map unit. It should be one of the first reference sources utilized in evaluating the potential wetlands within a project area during the planning process. Due to the high water table associated with hydric soils, they are very limited for most agricultural or development uses and should be avoided or enhanced/restored through planning and implementation processes.

To facilitate a better understanding of potential impact on hydric soils and wetlands, PA NRCS is moving away from the use of the term of "Partially Hydric" to the five category breakdown as follows:

Hydric = 100 percent hydric soil components
Hydric = 66 to 99 percent hydric soil components
Hydric = 33 to 65 percent hydric soil components
Hydric = 1 to 32 percent hydric soil components
Not Hydric = 0 percent hydric soil components.

So, soil map unit listed with 0 to 32 percent hydric soil components does not have a major resource concern associated with wetlands as a soil map unit listed with 33 to 100 percent hydric soil components has a major resource concern associated with them relating to wetlands and should be avoided or enhanced/restored. As always an on -site investigation should be conducted to confirm the extent of hydric soils within the project area.

High Runoff Potential Soils – This layer is composed of poor, somewhat poorly, and very poorly drained soils where water is removed slowly so the soil is wet at shallow depth periodically throughout the growing season, remains wet for long periods, and/or may have ponded water at times throughout the year. The wetness can be caused by extended periods of rain, subsurface seepage, or a high water table.

The main resource concern associated with poorly drained and somewhat poorly drained soils is water quality related to nutrients. Poorly drained soils have higher runoff potential which can result in increased soluble and sediment bound nutrient losses. Phosphorus is particularly vulnerable to loss when manure is applied off season, not incorporated, or erosion is high following tillage. Best management practices include: pasture management meeting Prescribed Grazing requirements, timely application of manure near to crop uptake, low-disturbance manure injection, cover crops and winter crops, splitting application to match crop uptake, and greater than 25% crop residue. Additionally, in areas livestock have access to, limit livestock access during wet periods to limit nutrient application, compaction, and erosion. Conservation practices that should be applied on these areas include 327, 329, 330, 340, 362, 386, 390, 391, 393, 412, 512, 585, 590, and 600.

Soil wetness also restricts the growth of many crop plants and can result in rutting, compaction, and denitrification. Conditions for denitrification are greatest in the spring when soils are wet and warm, but plant update of nitrogen is slow. Denitrification occurs only under anaerobic (without air) conditions when soil is saturated with water. Soils may typically lose up to 15% of nitrate in this manner and results in significant loss of available N for crop production. Nitrous oxide gas produced during denitrification is a major greenhouse grass and 300 times more damaging than carbon dioxide. Denitrification losses can be minimized by delaying nitrogen application until corn is 10 to 16 inches tall (sidedressing). This is especially critical on soils with a high potential for denitrification. On these soils, responses to sidedressing are relatively consistent. Denitrification is most serious on soils rated as somewhat poorly drained or poorly drained, but it also can occur on any soil that is saturated with water.

High Leaching Potential Soils – The potential for nitrate nitrogen to leach through an agricultural soil depends on several factors, including soil properties that affect rate of water movement through the soil and rate of surface runoff, rainfall, as well as the amount, type, and timing of nitrogen fertilizer being applied to the field. Well drained soils with a high infiltration rate have a high potential for nitrate leaching. Fields in areas of karst topography also have a higher nitrate leaching potential. Nitrate leaching occurs most often in the spring with higher rainfall amounts and slow crop growth and can cause both human health problems and environmental problems like eutrophication of water bodies.

Management of fields with high leaching soils should follow the 4R principles – use the right fertilizer source, at the right rate, at the right time, in the right place. Conservation practices that should be applied on these areas include 327, 340, 386, 390, 391, 393, 512, 528, 561, 590, 595, 635.

- Don't exceed Penn State recommended nitrogen rates. Be sure to credit nitrogen from applied manure, residual N from previous manure applications, legume N from last year's soybeans or alfalfa, any N in the starter fertilizer. Reduced nitrogen application rate – rate does not exceed crop N recommendation or N removal by legumes and considers previous legume crop, previous manure history, and planned manure application.
- Fertilizer is applied in split application in sync with crop uptake (e.g. apply by cutting grass forages, sidress N on corn, apply bulk of N in the spring to winter grains)
    - *This is especially critical on soils with a high potential for leaching. On these soils, responses to sidedressing are relatively consistent. Leaching is most serious on well-drained, sandy, and gravelly soils, but it also can occur on well-drained upland limestone and shale soils. Sidedressing 50 to 90 percent of nitrogen requirements using UAN and dribble tubes is preferred over broadcast seedbed applications*
    - *Leaching losses can be minimized by delaying nitrogen application until corn is 10 to 16 inches tall (sidedressing).* Fifty to ninety percent of the nitrogen requirement of corn can be applied at sidedressing. In fields that receive periodic manure applications and where legumes are grown in a relatively short rotation, applying all but the starter nitrogen as a sidedress is the best approach. In continuous corn where manure is not applied, applying more nitrogen than just the usual starter amount at planting time may be advantageous.
    - For forage grasses, synchronize N application in sync with crop uptake (e.g. apply a portion of recommended N after each grass forage harvest.
    - For winter grains, apply up to 20 pounds of N at planting with the remainder broadcast in the spring.
    - Fertilizer is applied to a growing crop or within days of planting annual crop.
- When using manure as a nutrient source, use the Pre Sidedress Nitrate Test (PSNT) or Chlorophyll Meter as recommended by Penn State. Often the PSNT or chlorophyll meter can help you reduce the amount of purchased N needed for sidedressing.

- Plant cover crops immediately following summer crop harvest to scavenge nitrogen. This is especially important after corn silage harvest. Shorter season grain crops can create an earlier cover crop planting window for those crops. Also Penn State recommends interseeding cover crops into corn at sidedress time. Cover crops can provide forage sources in drought years.
- Follow an NRCS 590/CNMP plan or an Act 38 CAO or VAO nutrient management plan.
- Review Agronomy Facts 76 **Nutrient Management to Improve Nitrogen Use Efficiency and Reduce Environmental Losses** (Penn State Extension) http://extension.psu.edu/plants/nutrient-management/educational/soil-fertility/nutrient-management-to-improve-nitrogen-use-efficiency-and-reduce-environmental-losses

Concentrated Flow – Over the course of the last few years, many of the field teams have been noticing more gully formation in crop fields which have approved crop rotations to meet T based on RUSLE calculations and output. To address this issue and provide additional tools to identify areas of potential gully formation in a field the Flow Accumulation tool in Spatial Analysist was used.

The Flow Accumulation tool calculates accumulated flow as the accumulated weight of all cells flowing into each downslope cell in the output raster. If no weight raster is provided, a weight of 1 is applied to each cell, and the value of cells in the output raster is the number of cells that flow into each cell. Cells with a high flow accumulation are areas of concentrated flow and may be used to identify stream channels. Cells with a flow accumulation of 0 are local topographic highs and may be used to identify ridges.

The concentrated flow accumulation data was constructed from satellite based, PAMAP LiDAR (Light Detection and Ranging) elevation points. The result of the flow accumulation calculations is a raster of accumulated flow to each cell as determined by accumulating the weight for all cells that flow into each downslope cell.

The data sets provided are county based and highlight the areas of potential gully formation on a farm. This can be used to assist the planner in identifying resource concern areas within a field and can help to direct workload and field visits. The areas in red indicate a moderate risk of concentrated flow. The areas in black indicate a high risk of concentrated flow. Keep in mind this layer identifies areas that should be assessed for risk of gully formation through the life of the planned management sequence, not just for the current condition. This layer is not intended to identify existing concentrated flow or gully erosion, although in some cases it will be present. Practices used to address concentrated flow can include Conservation Crop Rotation, Cover Crop, Diversion, Grassed Waterway, and/or Terrace.