Compensation Planning Framework

Northern Kentucky Stream and Wetland Restoration Program

February 2012

(Future proposed changes in red)

LRL-2010-326-pgj

This Compensation Planning Framework (CPF) addresses the requirements of 33 CFR 332.8[c], and describes how the Northern Kentucky Stream and Wetland Restoration Program (NKSWRP), using a watershed-based approach, will select in-lieu fee mitigation project sites to compensate for aquatic resource impacts. The NKSWRP is described at http://environmentalrestoration.nku.edu. The NKSWRP is also referred to as the NKU Stream Program.

Figures and Tables referenced in the text are provided at the end of this document.

I. SERVICE AREA

The NKSWRP serves a single Service Area encompassing the northern Kentucky region, a region which shares common characteristics including physiography, Ecoregions, topography, land use, historic and current stream impairments, wildlife preservation prioritization, and community and governmental natural resource management partnerships.

The core of the Service Area is comprised of the nine northern-most Kentucky counties: Boone, Kenton, Campbell, Carroll, Gallatin, Grant, Pendleton, Bracken, and Mason. These counties are readily accessible from NKU for project implementation (approximately one hour or less travel time, thus facilitating utilization of NKU student interns), and have the closest cultural ties to NKU and the northern Kentucky metropolitan area. At present the NKSWRP is the only in-lieu fee program serving the nine core Service Area counties. The remainder of the state is served by Kentucky Division of Fish and Wildlife.

Outlying counties of the northern Kentucky region and within the NKSWRP Service Area include particularly Oldham, Trimble, Henry, Owen, Harrison, Robertson and Nicholas. These counties are within the same major watersheds (Ohio River Tributaries, Licking, and/or Kentucky), and the same Level IV Ecoregions as the core Service Area counties (Outer Bluegrass and Hills of the Bluegrass). Fleming and Lewis Counties to the east are also within the same major watersheds as the core Service

Area counties, but include significant portions of an additional Ecoregion (Knobs-Lower Scioto Dissected Plateau). Outlying counties are more rural and provide a greater opportunity to create larger, more consolidated mitigation projects. The outlying counties are served by both the NKSWRP and the KDFWR in-lieu fee programs.

A. MAJOR WATERSHEDS

The NKSWRP Service Area includes portions of three major watersheds: Ohio River Tributaries (streams that drain directly to the Ohio River); the Licking River, and the Kentucky River. A map illustrating the major watersheds is attached. In order of predominance, the Licking River watershed constitutes about 51 percent of the Service Area core counties, versus 36 for Ohio River Tributaries, and 13 percent for the Kentucky River watershed. The Eagle Creek watershed constitutes nearly the entire Kentucky River watershed within the Service Area core counties.

B. ECOREGIONS

At the Level IV Ecoregion scale, the Service Area core counties include approximately equal proportions of two similar ecoregions:

- **Outer Bluegrass** (71d): most of Carroll, Gallatin, Boone, Kenton, Campbell, and Mason Counties
- **Hills of the Bluegrass** (71k): most of Grant, Pendleton, and Bracken Counties

The next tier northern Kentucky counties are also predominantly within these same Ecoregions, except the Knobs-Lower Scioto Dissected Plateau (70d) Ecoregion constitutes a significant proportion of Fleming County (approx. 30%) and Lewis County (approx. 70%).

A map illustrating the Level IV Ecoregions is attached. They are characterized as follows:

71d. Outer Bluegrass. The rolling to hilly Outer Bluegrass (71d) contains sinkholes, springs, entrenched rivers, and intermittent and perennial streams. Local relief is variable. Discontinuous glacial outwash and leached, pre-Wisconsinan till deposits occur in the north from Louisville to Covington. Glacial deposits do not occur elsewhere in Kentucky. Ecoregion 71d is mostly underlain by Upper Ordovician limestone and shale. Natural soil fertility is higher than in the shale-dominated Hills of the Bluegrass (71k). Today, pastureland and cropland are widespread and dissected areas are wooded. At the time of settlement, open savanna woodlands were found on most uplands. On less fertile, more acidic soils derived from Silurian dolomite, white oak stands occurred and had barren openings. Cane grew along streams and was especially common in the east. Distinct vegetation grew in areas underlain by glacial drift. Upland streams have moderate to high gradients and cobble, boulder, or bedrock substrates. Mean stream density is less than in Ecoregion 71k. Concentrations of suspended sediment and nutrients can be high.

71k. Hills of the Bluegrass. The mostly forested Hills of the Bluegrass (71k) are underlain by Upper Ordovician calcareous shale, siltstone, and limestone. It is lithologically unlike the Outer Bluegrass (71d).

Upland soils are fairly high in phosphorus, potassium, and lime but are not as naturally fertile as Ecoregion 71d; they support young, mixed forests rich in white oak, hickory, and cedar. The Hills of the Bluegrass (71k) has steeper terrain, droughtier soils, lower soil fertility, higher drainage density, and is more erosion-prone than Ecoregion 71d. As a result, less than ten percent of Ecoregion 71k is suited to row crop agriculture and the rest is wooded, pastureland, or hayland. Stream nutrient levels are generally lower than in Ecoregions 71d. Upland streams are often intermittent and have cobble, boulder, or bedrock substrates. Fish and macroinvertebrate assemblages are similar to Ecoregions 71d.

70d. Knobs–Lower Scioto Dissected Plateau contains rounded hills and ridges, narrow valleys with high gradient streams, and a few wide, locally swampy, bottoms underlain by weak shales. Cliffs occur especially in the south. High amounts of topographic and geologic variation are typical and create substantial ecological diversity. Ecoregion 70d is underlain by a mixture of Pennsylvanian-age through Silurian-age sedimentary rocks that is absent from the rest of Ecoregion 70. Ecoregion 70d is geographically adjacent and ecologically connected to the Western Allegheny Plateau (70) and, as such, is not a part of the Interior Plateau (71). Uplands knobs are forested and oak and oak–pine forests predominate. Broad valleys are mostly covered by bottomland forests but some are used for livestock or general farming. Elevation, local relief, and forest density are much greater than in Ecoregions 71d and 71k. Nutrient and ionic concentrations in streams are lower than in Ecoregions 71d. No coal mining or related stream acidity problems occur.

Descriptions are adapted from: *ftp://ftp.epa.gov/wed/ecoregions/ky/ky_front.pdf*

II. HISTORIC LOSSES AND THREATS TO AQUATIC RESOURCES

A. WETLANDS

Historically, the most significant cause of wetlands loss was draining for agriculture. Currently, filling for development is an increasing cause of wetlands loss (http://www.epa.gov/owow/wetlands/pdf/threats.pdf).

Within the NKSWRP core service area, only about two percent of the land area is comprised of NRCS-mapped hydric or partially hydric soils, which are the most likely locations for larger acreages of current or former wetlands. Small wetlands can also occur on soils that are not mapped as hydric, for example, within depressions in clayey bottomland soils, or below hillside seeps.

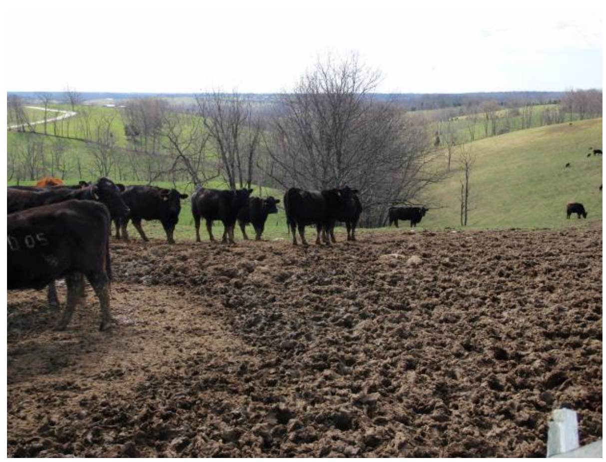
During the first 11 years of operation, less than one acre of wetlands loss was mitigated through the NKSWRP. Nevertheless, wetlands have been created or enhanced as a component of previous stream restoration projects, since wetlands are an integral part of stream quality and function (floodwater detention, pollutant removal, groundwater recharge, amphibian habitat, etc.).

B. STREAMS

The most significant threats to northern Kentucky streams, both historic and current, include **Pollution, Hydromodification, and Lack of Riparian Vegetation**. Another common issue affecting streams is **improper refuse disposal** (dumping, old landfills).

1. **Pollution**. Pollution of streams can originate from point (end-of-pipe) sources such as outfalls from industry, stormwater pipes, and wastewater treatment plants, or from non-point sources such as runoff from agricultural or urban land. The implementation of the National Pollutant Discharge Elimination System (NPDES) beginning in 1972 has drastically reduced pollution from point sources, resulting in significant improvement in stream and river water quality and aquatic life. However, releases from combined or separate sanitary sewer systems and stormwater runoff continue to pose a challenge. In the northern most counties, fecal coliform bacteria and other pollutants released from antiquated or inadequate sanitary sewers are being addressed under consent order by Sanitation District No. 1 (SD1). Stormwater runoff pollution is now a major focus of the NPDES program.

   In rural areas, straight pipes, failing leach fields, and agricultural runoff are significant sources of pollution. Pollutants include fecal coliform bacteria, pesticides, herbicides, nutrients and sediment. There are several programs that address these sources of pollution, including the implementation of agricultural best management practices (BMPs).



   According to the USEPA, **urban and agricultural runoff** (i.e., non-point sources) are presently the leading causes of surface water quality impairments nationwide (http://www.epa.gov/305b/2000report/execsum.pdf). Sediment (soil) is the most prevalent agricultural and construction site runoff pollutant, although nutrients, bacteria, and oxygen-depleting substances are also common pollutants associated with urban and agricultural runoff.

2. **Hydromodification**. Hydromodification (aka hydrology modification) refers primarily to deliberate, physical alterations of a stream, and has been a common practice in both rural and urban landscapes. Once completed, most stream channel alterations are poorly maintained or not maintained at all, which exacerbates the negative impacts. Specific examples of deliberate stream hydromodification include:

- Channelization: channel straightening, concrete lining, dredging and/or relocation
- Damming
- Hard bank armoring: sheetpile, concrete, demolition debris, refuse
- Culvertizing: piping, encasement
- Floodplain and/or channel encroachment: filling, levee construction
- Undersized and/or misaligned stream crossings (culverts, low water crossings, etc.)

Hydromodification can also refer to stream channel erosion due to modified landuse. Land clearing for agriculture results in reduced rainfall retention (loss of topsoil, un-vegetated soil, reduced evapotranspiration). Similarly, urban development results in impervious surfacing, stormwater concentration into pipes, and soil compaction. Both agricultural and urban development increase and concentrate stormwater runoff, resulting in channel erosion as receiving streams must adjust to create more channel capacity.

Hydromodification results in stream and riparian habitat loss, stream bank erosion, channel incision and/or scouring, slope failures, sedimentation/siltation of aquatic habitat, infrastructure damage, disconnection from the floodplain, downstream flooding, increased stream temperatures, increased light levels and other problems.

3. Lack of Riparian Vegetation. A buffer of native vegetation along stream corridors provides numerous benefits to streams such as organic material inputs (food web), aquatic and riparian habitat, temperature moderation, channel roughness (stream energy dissipation), nutrient and sediment removal, and bank protection (root reinforcement). The removal of native riparian vegetation, for example by forest clearing, livestock grazing, or mowing to the edge of banks, forfeits these benefits. The most obvious impairment associated with loss of riparian vegetation is bank erosion resulting in stream sedimentation/siltation. Where riparian vegetation is allowed to recover after removal, although bank stability generally improves, invasive/non-native plants and low biodiversity often reduces the quality of the riparian buffer compared to pre-disturbance conditions.

4. **Improper Refuse Disposal**. Another common impairment of streams in northern Kentucky is improper refuse disposal. Old landfills may generate contaminated leachate that migrates to groundwater then discharges to streams. Dumping of garbage, tires and other auto parts, demolition debris, and hazardous wastes such as drums of used oil or spent solvent, pose potential toxicity concerns and other hazards such as broken glass, rusted jagged metals, and mosquito habitat (especially tires). Disposal areas are often ravines, floodplains, and stream channels.

III. CURRENT CONDITIONS

A. CURRENT LAND COVER

The northern half of Boone, Kenton, and Campbell Counties are part of the greater Cincinnati metropolitan region, and constitute one of the more developed and actively developing regions of the Commonwealth. (As previously described, most permitted stream impacts to date have been in these counties.) Dense development begun in the 1800s in Covington and Newport has spread to include a much larger area of contiguous development encompassing the communities of Burlington to the west, Alexandria to the east, and Independence to the south. The Greater Cincinnati International Airport, located in north-east Boone County, is a significant factor in regional development, as is Interstate development and proximity to Cincinnati.

The lower tier of counties in the service area is generally rural, being mostly agricultural with scattered urban areas such as the county seat communities of Williamstown and Falmouth, and river cities such as Carrollton and Maysville.

Based upon 2005 data provided by Kentucky Division of Geographic Information, the land cover in the Service Area core counties is 11 percent developed, 32 percent agricultural, and 48 percent forested. (According to the 2010 KDF Statewide Forest Assessment, the state-wide landcover is 47 percent forest.) Forest acreage has increased throughout the region in recent decades due to the idling of marginal agricultural land. For example, a county-wide forest assessment utilizing aerial photography analysis demonstrated that forested land increased from 17% in 1954 to 38% in 1998 in Boone County. Where forests have recolonized idled agricultural land, they are often dominated by early successional species such as boxelder, black locust, and white ash. Furthermore, these forests often exhibit a high concentration of non-native / invasive plants, such as bush honeysuckle and multiflora rose, due in part to the loss of topsoil, as well as the competitive advantage of these wind-blown and/or bird-dispersed seed species. These invasive plants are unsightly and choke out native forest vegetation, and often create impenetrable thickets (photo right). Research is showing negative effects to aquatic ecosystems as well.

Kentucky Division of Forestry has designated Forest Priority Areas throughout the state based upon large forest blocks, forest health, forest management, wildlife conservation, water quality, and other factors. Most of the NKSWRP service area lies within either the Bluegrass Rivers or Appalachian Forest Priority Areas.

Natural limitations to land development in the region include steep topography and landslide-prone soils on the hillsides, especially in areas underlain by Kope Formation limestone-shales. An illustration of some of northern Kentucky's steepest topography (Eden-Cynthiana Association Soils; 12-30 percent slopes), which constitute 42% of Boone, Kenton, and Campbell Counties, is provided below:

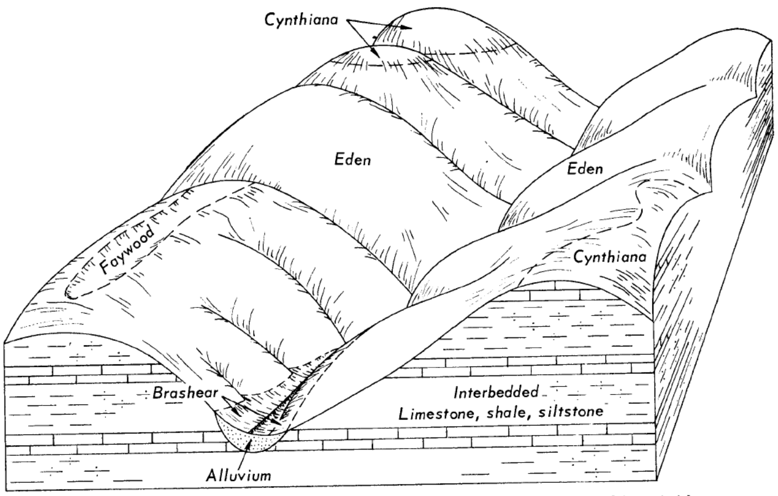


Figure 2.—Relationship of soils in the Eden-Cynthiana association to topography and underlying material.

Illustration source: Soil Survey of Boone, Kenton, and Campbell Counties, Kentucky (1989)

Due to development and agricultural limitations of steep slopes, forest lands are disproportionately located on steep slopes such as ravines containing first, second, and higher-order streams, providing benefits such as water quality protection and wildlife corridors.

B. SIGNIFICANT NATURAL / AQUATIC RESOURCES

The State Nature Preserves Commission records of 191 state and/or federal rare plant and animal species are illustrated on an attached map and include (not limited to):

- Fanshell, Pink Mucket, Sheepnose, and Salamander mussels
- Northern Leopard Frog
- Redback Salamander (photo right) and Eastern Hellbender (salamanders)
- Northern and Slender Madtom (fish)
- Running Buffalo Clover and Nodding Rattlesnake-root (riparian zone plants)
- Black bear and eagle
- Indiana bat

Priority Conservation Areas designated by the KDFWR for the “purpose of focusing conservation efforts that benefit the largest number of species with the greatest conservation need” (Kentucky's Comprehensive Wildlife Conservation Strategy, 2005) are illustrated on an attached map and include:

- Wetland Bird Priority Areas: Ohio River bottoms (west) and Licking River watershed
- Forest Bird Priority Area: Licking River watershed
- Amphibian Priority Area: portions of northern Boone and Kenton Counties

C. FEDERALLY DESIGNATED THREATENED AND ENDANGERED SPECIES

US Fish and Wildlife Service maintains a list of known and potentially-occurring federally-designated threatened and endangered species by county. A summary list of T&E species for the NKSWRP counties (bold type) and surrounding Kentucky counties is provided as an attachment.

Federal T&E species known to occur in the NKSWRP counties include 8 species of mussels and one plant (Running buffalo clover). Indiana bat is not known to occur in the service area, but is listed as potentially occurring in all NKSWRP counties. USFWS T&E information can be viewed directly at: http://www.fws.gov/frankfort/EndangeredSpecies.html.

D. EXCEPTIONAL USE WATERS AND AQUATIC LIFE USE SUPPORT

Exceptional Use Waters include streams designated by KDOW as reference reach waters and/or streams that exhibit “excellent” populations of fish or macroinvertebrates. Exceptional Use Waters (2009) and Aquatic Life Use Support designation (2003-2007 and 2010-2014), as determined by KDOW for northern Kentucky streams, are illustrated on an attached map. The streams deemed Exceptional Use Waters and the counties in which they are located are listed below:

- Licking River main stem (multiple counties)
- Boone: Double Lick, Little South Fork, Garrison Creek, Second Creek
- Carroll: Indian Creek
- Gallatin: UT to Big Sugar Creek

- Henry: Drennon Creek, Emily Run, Little Sixmile Creek, Sixmile Creek
- Kenton: Bowman Creek, Sawyer's Fork
- Lewis: Kinniconick Creek
- Mason: UT to Shannon Creek
- Owen: Mill Creek, Severn Creek, UT to Cedar Creek
- Pendleton: Blanket Creek, Flour Creek, Grover's Creek, South Fork Grassy Creek
- Robertson: West Creek
- Trimble: UT to Corn Creek

E. 2010 303(D) LIST OF IMPAIRED WATERS

Excluding rivers and those streams listed solely for pollution attributed to sewage, a total of 48 streams in the Service Area core counties are included in the 2010 303(d) List of Impaired Waters, compiled by KDOW. A summary table of impairments by stream is provided on an attached table. The summary calculations below exclude Lewis and Fleming counties. Among these 48 impaired streams, the most common pollutants identified by KDOW are, excluding sewage, in order of predominance:

- Sediment (28 streams; 58%)
- Nutrients (27 streams; 56%)
- Fecal coliform from farm operations (3 streams; 6%).

Consistent with nation-wide trends, the KDOW-identified sources of these pollutants are, in order of predominance:

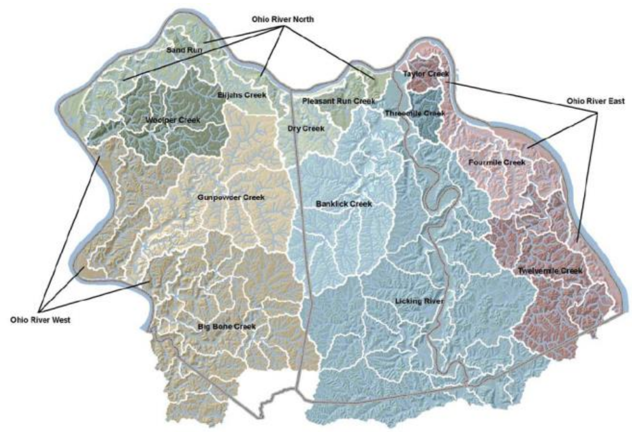
- Urbanization (42 streams; 88%)
    - Land development (16 streams; 33%)
    - Stormwater runoff (13 streams; 27%)
    - Hydromodification (13 streams; 27%)
- Agriculture (29 streams; 60%)
- Loss of riparian vegetation (4 streams; 8%)

The source of impairment for one stream was determined to be surface mining, four other streams were impaired by industrial/municipal discharges, and the source of impairment for eleven streams was determined to be "unknown".

Note that most stream miles have not yet been assessed, and assessments typically do not include the lowest order, upper headwater streams that are priorities for stream mitigation. The total number and length of impaired streams is no doubt much more than currently documented. Nevertheless, the identified pollutants and sources are believed to be representative of the impairments for all streams in the region.

F. SD1 WATERSHED CHARACTERIZATION REPORTS

In addressing its consent decree with USEPA and KDOW, SD1 assessed the conditions of 16 watersheds (not HUC 8 sub-basins) that comprise Boone, Kenton, and Campbell Counties, and prepared Watershed Characterization Reports for each watershed. These reports address current and future land cover, stream conditions such as bank and bed erosion, water quality sampling data, etc. They provided the basis for the development of 5-Year Watershed Plans submitted to the agencies in June 2009 and to be updated every five years until 2025. The Plans were based upon a watershed approach to water quality attainment, emphasizing green solutions rather than only conventional "gray" (concrete) technologies. The primary focus of the consent order is fecal coliform (determined to be an issue "almost everywhere" in the SD1 service area); however, the reports also address sediment and other pollutants, hydromodification, and other impairments to some extent. Information on obtaining the watershed reports can be found at: sd1.org.



Map source: http://sd1.org/documents/Summary-2009_Final.pdf

G. LAND USE TRENDS

Positive trends in land use and development in northern Kentucky include:

- Implementation of construction site BMPs (sediment and erosion control)
- Improving regulation of agricultural and urban stormwater runoff (quality and quantity)
- Emerging awareness of green engineering and infrastructure, riparian buffer and floodplain protections, low-impact / conservation development, and other practices benefiting aquatic resources among local government, developers, and citizens
- Idled land reforestation (albeit with high invasive/non-natives and low diversity)
- Voluntary land conservation among private, non-profit (e.g., local conservancies), government, and government-supported (EQIP, WHIP, CRP, HIP) landowners
- Correction of failing sewer systems such as combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs) by SD1 (consent decree compliance deadline 2025) and reduction of straight pipe discharges in rural areas (e.g., 319 grants)

- Improved waste management and refuse cleanup (e.g., Clean County Certification)

Negative or flat trends in land use and development in northern Kentucky include:

- Increasing impervious surfaces and stormwater piping associated with continued development
- Resistance to zoning and subdivision regulation changes to facilitate conservation development practices (e.g., curb and gutter drainage, minimum pavement width requirements)
- Development on land-slide prone, currently-forested hillsides
- Lack of maintenance or repair of prior stream hydromodifications: impoundment failure, culvert plugging/outlet erosion, bank armor failure, bank erosion, channel incision, etc.
- Spread of invasive/non-native vegetation such as bush honeysuckle
- Slow implementation of agriculture water quality BMPs

H. CHRONIC ISSUES

All of the causes of stream impairment described above—urban and agricultural runoff pollution, hydromodification, lack of riparian vegetation, and improper refuse disposal—are chronic stream issues in northern Kentucky. Among historic impairments, perhaps only industrial point sources and landfill leachate are no longer uncontrolled, systemic issues.

IV. GOALS AND OBJECTIVES

The goal of the NKSWRP is to locally fulfill the purpose of Section 404 of the Clean Water Act and the Compensatory Mitigation Rule, namely:

- To **restore and maintain** the chemical, physical and biological integrity of the Nation's waters, and
- To **compensate for the loss of aquatic resource functions and services** that result from permitted impacts to streams and wetlands.

Practically speaking, the most commonly permitted impact to streams is the culvertization (loss) of headwater streams for land development. Mitigation projects will offset the permitted stream losses by restoring streams at project sites—addressing urban and agricultural runoff pollution, hydromodification, lack of riparian vegetation, and improper refuse disposal.

V. PRIORITIZATION STRATEGY

To the extent practicable, NKSWRP mitigation projects will be selected considering the following priorities:

- **In-kind mitigation.** In general, stream impacts will be mitigated with stream projects, and wetland impacts will be mitigated with wetland projects. Furthermore, **perennial and intermittent headwater streams** will be prioritized, since these are the jurisdictional streams most commonly impacted. Headwater streams are defined by KDOW as generally draining less than 5 square miles, and in northern Kentucky headwater streams are generally high gradient (rocky-bottom). In order to address a major regional stream impairment source—urban stormwater runoff—mitigation using "green" practices such as stormwater wetlands or biodetention may be appropriate, so long as it is not addressing regulatory requirements of other parties. Similarly, riparian wetlands are often integral to stream functions and services, such as groundwater/baseflow recharge, floodwater storage and energy dissipation, and habitat, and may be an appropriate component of a stream mitigation project. The Corps may approve mitigation using **out-of-kind and/or non-jurisdictional waters** on a case-by-case basis where it serves the aquatic resource needs of the watershed.

- **Addresses multiple functions and services**: aquatic and wildlife habitat, floodwater storage and downstream flood protection, water energy dissipation, temperature moderation, pollutant removal, natural aesthetics, environmental education, etc.
- **Protects buffers, aquatic or semi-aquatic T&E species, and/or critical habitat**.
- **Located adjacent to or near previously approved ILF project, public natural lands, environmental conservation lands, etc**.
- **Located within the same major river basin (i.e., Ohio, Licking, or Kentucky) where impacts were generated.** To the extent practicable, projects will be proportionately distributed to major river basins based upon impacts. Other considerations such as the size, quality, and timeliness of available project sites may override this criterion.
- **Addresses pollutants and/or sources** identified in watershed or stream assessments and/or the 303(d) list, such as sediment or nutrients attributable to hydromodification, bank erosion, lack of riparian buffer, etc. Water quality issues which are too severe may eliminate project sites from consideration. Projects should directly reduce pollutants of concern, or other actions within the watershed should address identified water quality issues so that restored habitat may be utilized by organisms. Sewage related impairments, such as rural straight pipes and failing septic systems, or antiquated urban sanitary sewers, will not be directly mitigated.
- **Practicability of implementation**: cost-effectiveness, constructability, self-sustainability, development trends, landscape position, habitat connectivity, etc. will be considered to maximize project benefits and the probability of long-term success. Candidate sites with multiple utility line or roadway easements will be scrutinized to ensure the existing or planned disturbance will not significantly compromise the mitigation site success.
- ~~**Voluntary landowner participation.** Preference will be given to projects with voluntary participation from either public or private landowners; however, purchase of conservation easements or land title may be necessary or desirable under certain circumstances (e.g., habitat for threatened or endangered aquatic or semi-aquatic species, mature riparian forest, adjoining public natural area, etc.).~~
- **Existing watershed plans** (not necessarily USEPA Watershed Based Plan format or contents). The following watersheds have plans developed or under development:
    - Upper Allen Fork (Boone County Engineer)
    - Banklick Creek (Banklick Creek Watershed Council; KDOW First Priority Watershed)
    - Gunpowder Creek (Boone County Conservation District)
    - Woolper Creek (Boone County Conservation District)
    - Lower Eagle Creek (Kentucky Watershed Management Framework 2001 Priority Watershed)
    - Ten Mile Creek (N. Ky Independent Health District; mostly focused on fecal coliform)

- 16 watersheds of the SD1 service area (see above)

  Other plans may exist or be under development.

- **Complements regional conservation initiatives** such as:
  - Local watershed planning initiatives (see above)
  - KDOW Licking River Basin Management Unit
  - USDA Mississippi River Basin Initiative Focus Area Watershed (Licking River)
  - SD1 Green Infrastructure Program and Watershed Community Council
  - Licking River Watershed Watch
  - Northern Kentucky Urban and Community Forestry Council

- **Risk to aviation**. From the Compensatory Mitigation Rule preamble: "*Locating compensatory mitigation projects near airports is likely to attract wildlife species and pose hazards to aviation. This does not mean that no compensatory mitigation projects can be located near any airport; it means that compatibility with existing facilities must be considered*."

VI. PRESERVATION

From the Compensatory Mitigation Rule preamble: *Preservation is particularly valuable for protecting unique, rare, or difficult-to-replace aquatic resources, such as bogs, fens, and **streams**, and may be the most appropriate form of compensatory mitigation for those resources*.

According to USEPA, "existing, relatively intact ecosystems are the keystone for conserving biodiversity, and provide the biota and other natural materials needed for the recovery of impaired systems" (http://www.epa.gov/owow/wetlands/restore/principles.html).

In addition to protection of Exceptional Use Waters, aquatic or semi-aquatic T&E species, and other priority natural or aquatic resources, preservation may also be appropriate as a means to preserve and restore streams and riparian vegetation in other urban and rural landscapes. Restoration and preservation of riparian buffers is currently being promoted by numerous land management entities such as SD1, Conservation Districts, NRCS, Boone County Planning, Northern Kentucky Area Planning, etc. to address issues of urban stormwater runoff quantity and quality, flooding, agricultural water quality, bank erosion, wildlife corridors, greenspace and livable communities, air pollution, and (recently) carbon sequestration. ILF projects consisting of 100% preservation or where preservation is the major emphasis of a project may be implemented if it meets the needs of the watershed, the resource is rare or difficult to replace, or for other reasons as approved by the Corps.

Preservation may be used to provide mitigation when all the following criteria are met:

1. The resources to be preserved provide important physical, chemical, or biological functions for the watershed.

2. The resources to be preserved contribute significantly to the ecological sustainability of the watershed (to be determined quantitatively if practicable). *[Interpreted to mean the resource must be in high quality condition rather than impaired condition based upon functional assessment.]*

3. Preservation is determined to be appropriate and practicable.

4. The resources are under threat of destruction or adverse modifications.

5. The preserved site will be permanently protected through an appropriate site protection instrument (e.g., easement, title transfer to state resource agency or land trust).

VII. STAKEHOLDER INVOLVEMENT

An October 2010 draft of this CPF was submitted via email to over 100 individuals and organizations known to be involved in natural resources conservation and protection within the service area, many of whom have worked directly with the NKSWRP on past projects. In addition to being invited to review and comment on the CPF, stakeholders were invited to forward the invitation to other potentially interested parties, and to suggest candidate mitigation project opportunities. Additionally, anyone visiting the NKSWRP website (http://nkswrp.nku.edu) will see a link to view the CPF. Email solicitation of stakeholder input will be repeated approximately biannually. Stakeholder input will be incorporated into future updates to this CPF.

VIII. LONG-TERM PROTECTION AND MANAGEMENT

Mitigation project sites are to be provided long-term site protection to protect the site against future incompatible uses to the extent practicable. (In cases of public or private lands that inherently have a natural areas preservation function, such as state wildlife management areas and natural areas owned by conservation organizations, a project-specific site protection instrument may not be necessary.) The options for long-term site protection include conservation easement or deed restriction, transfer of title to a conservation organization or agency, or in certain circumstances, a management agreement. Prior to executing a conservation easement or deed restriction, the NKSWRP will conduct a title search. If it is determined that there is a mortgage on the property, the NKSWRP will attempt to subordinate the mortgagee's interest to the conservation easement. The Corps will be apprised of the site protection mechanism in the Mitigation Project Plan.

Site protection instruments executed after the effective date of this Instrument will include a clause requiring the Corps to be notified 60 days prior to voiding or substantially modifying the instrument. The conservation easement holder (if applicable) and Corps shall also be notified 60 days prior to transfer of property ownership.

If efficacious to move the project forward in a timely manner, the landowner may sign a memorandum of agreement to execute the site protection instrument at a later date.

Each project budget will include a line item cost to be deposited into the Site Protection Account. This is to be a non-wasting account (endowment) used to perform long-term site protection tasks including, but not limited to, periodic site inspections, replacement of boundary posts, fencing, landowner or neighbor contacts, and legal assistance to ensure the provisions of conservation easements, deed restriction, and/or management agreements are enforced.

NKURF, as designated holder of all conservation easements obtained to date, has established a formal conservation easement monitoring and enforcement policy.

IX. EVALUATION AND REPORTING

Program Evaluation and Reporting is addressed in the NKSWRP Instrument, to which this CPF is an attachment.

FIGURES

Impact and Project Sites

Major Watersheds

Level IV Ecoregions

Hydric and Partially Hydric Soils

Land Cover

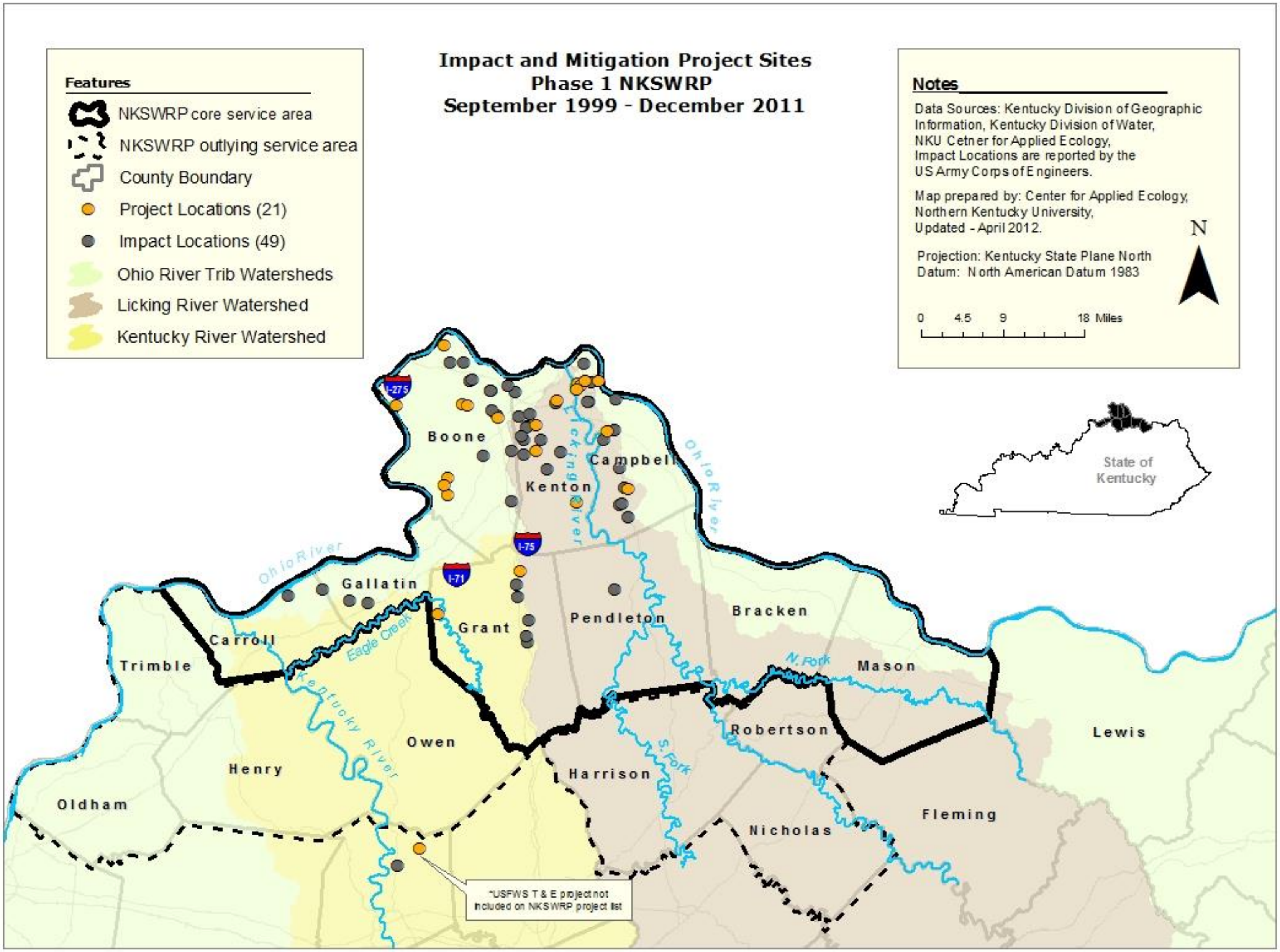
Wildlife Priority Areas and Occurrences for Threatened, Endangered, and Special Concern Species

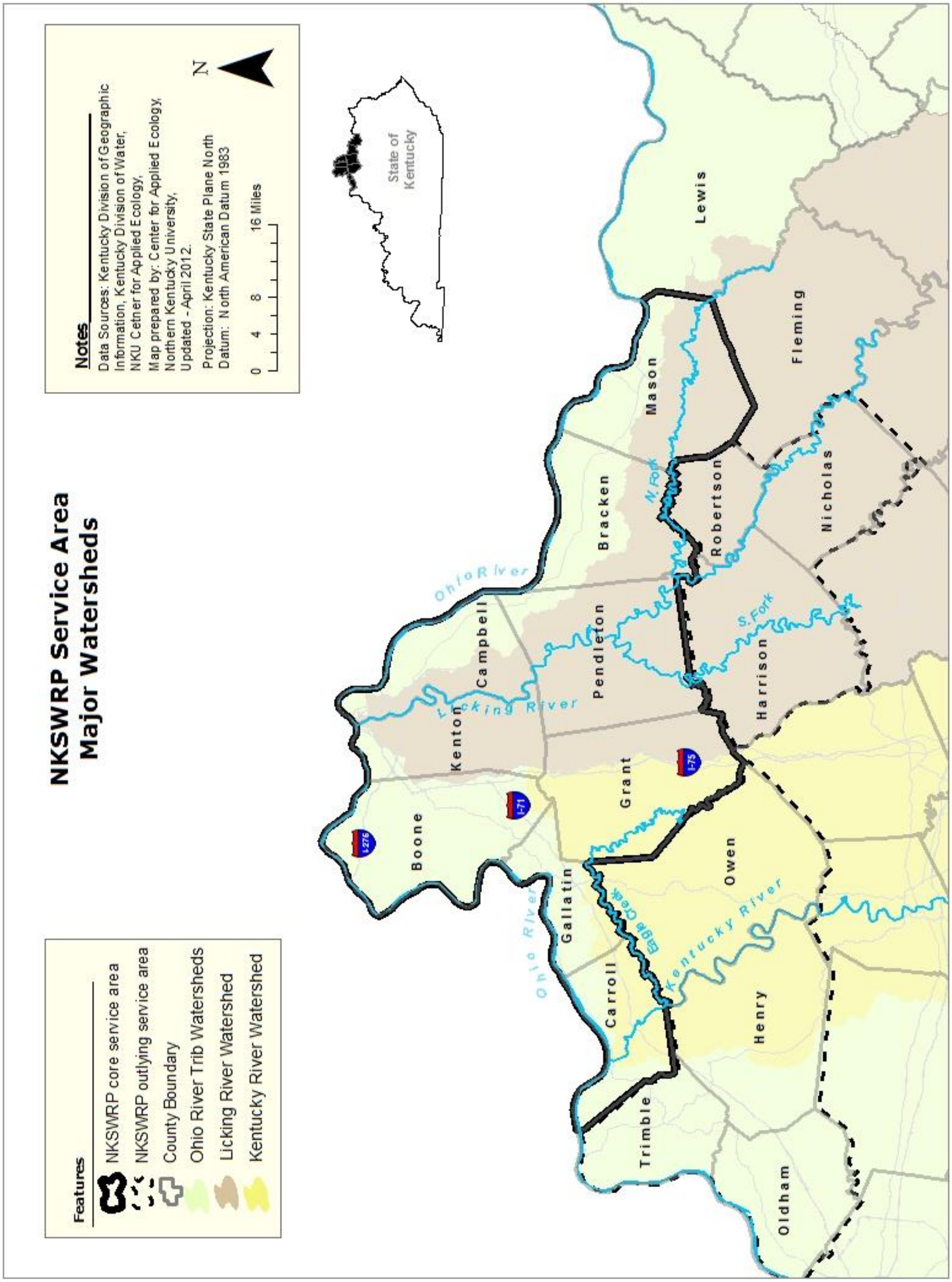
KDOW Stream Assessment Classifications

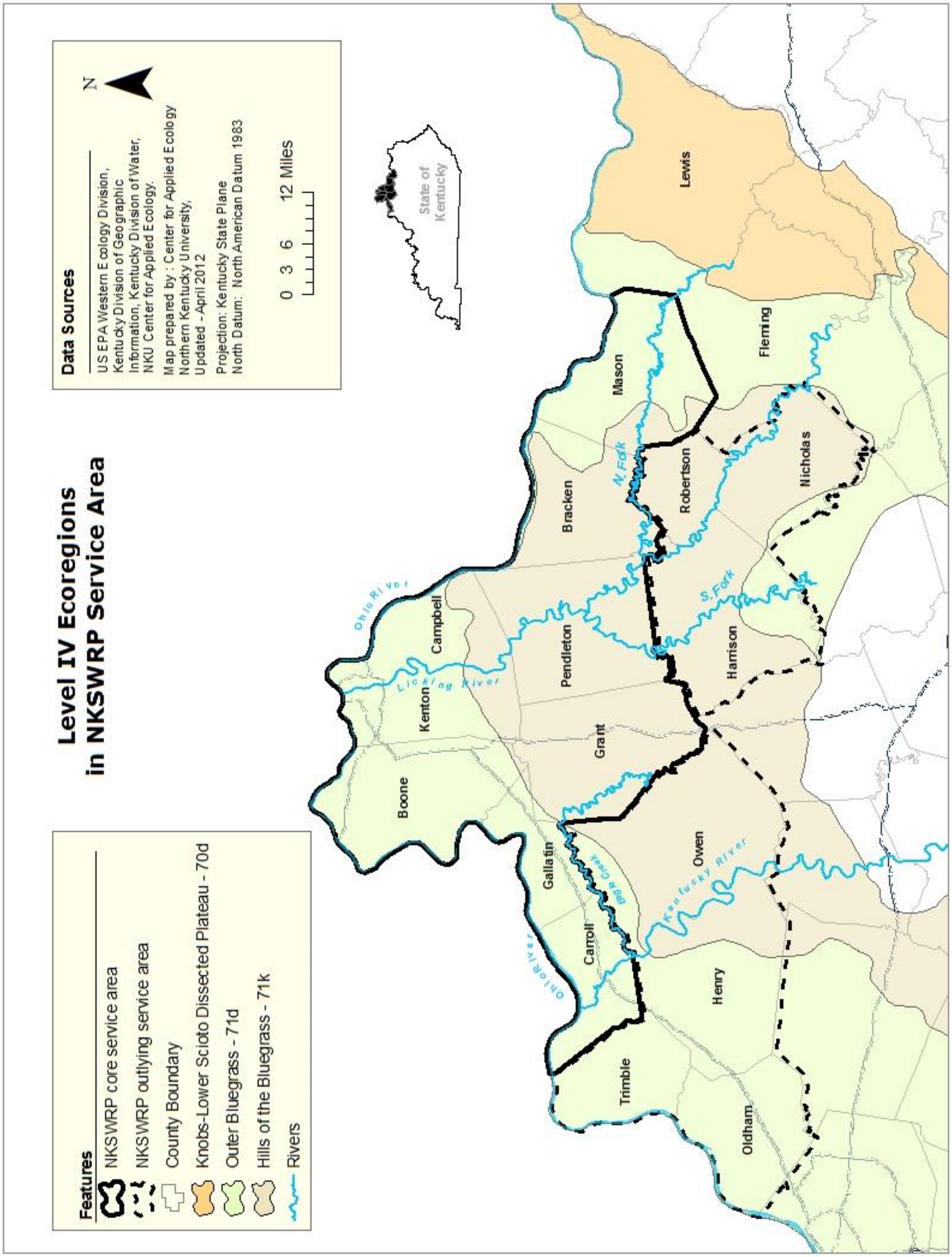
TABLES

Summary Information from 2010 303(d) Listed Streams in Northern Kentucky

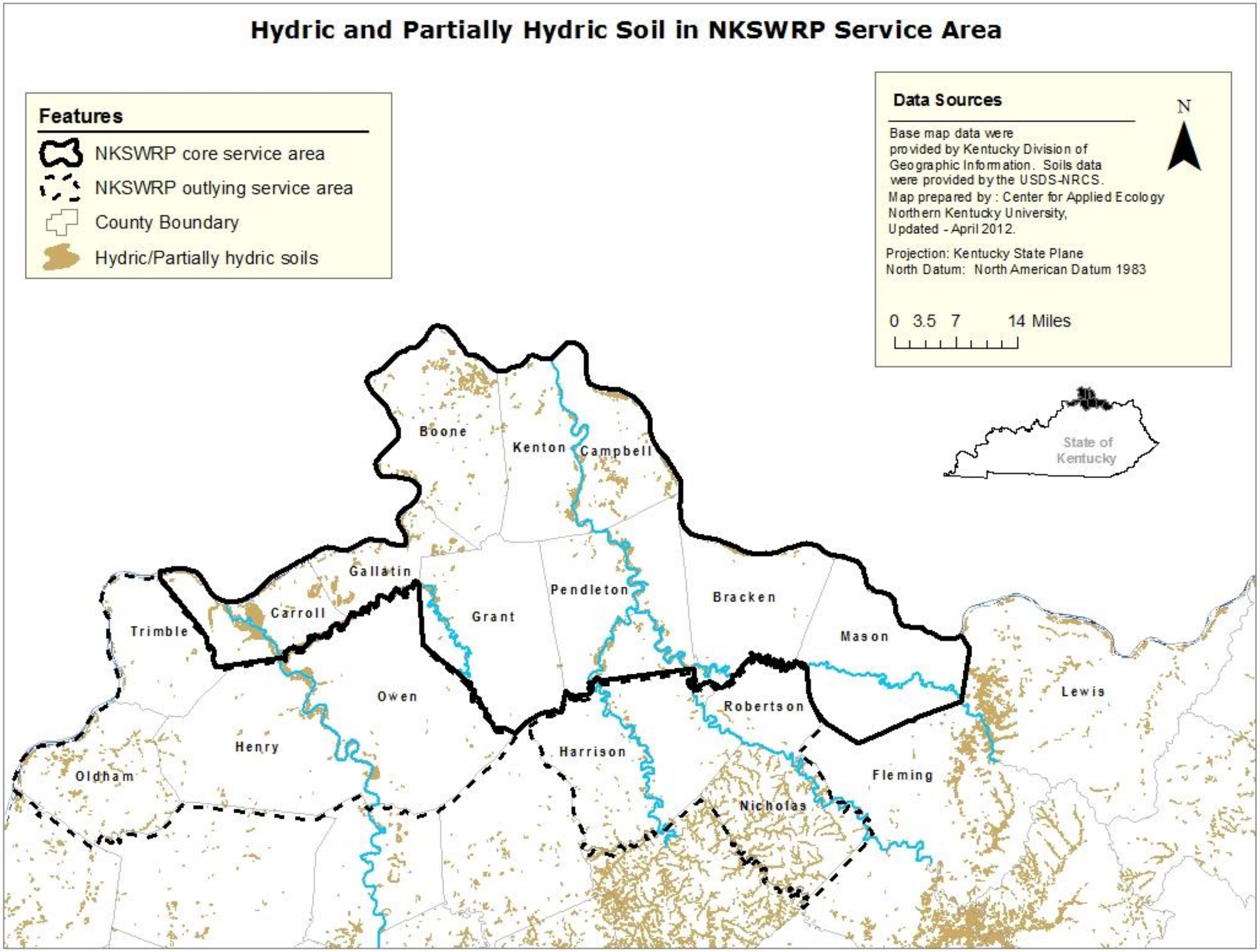
T&E Species Potentially Occurring is Service Area

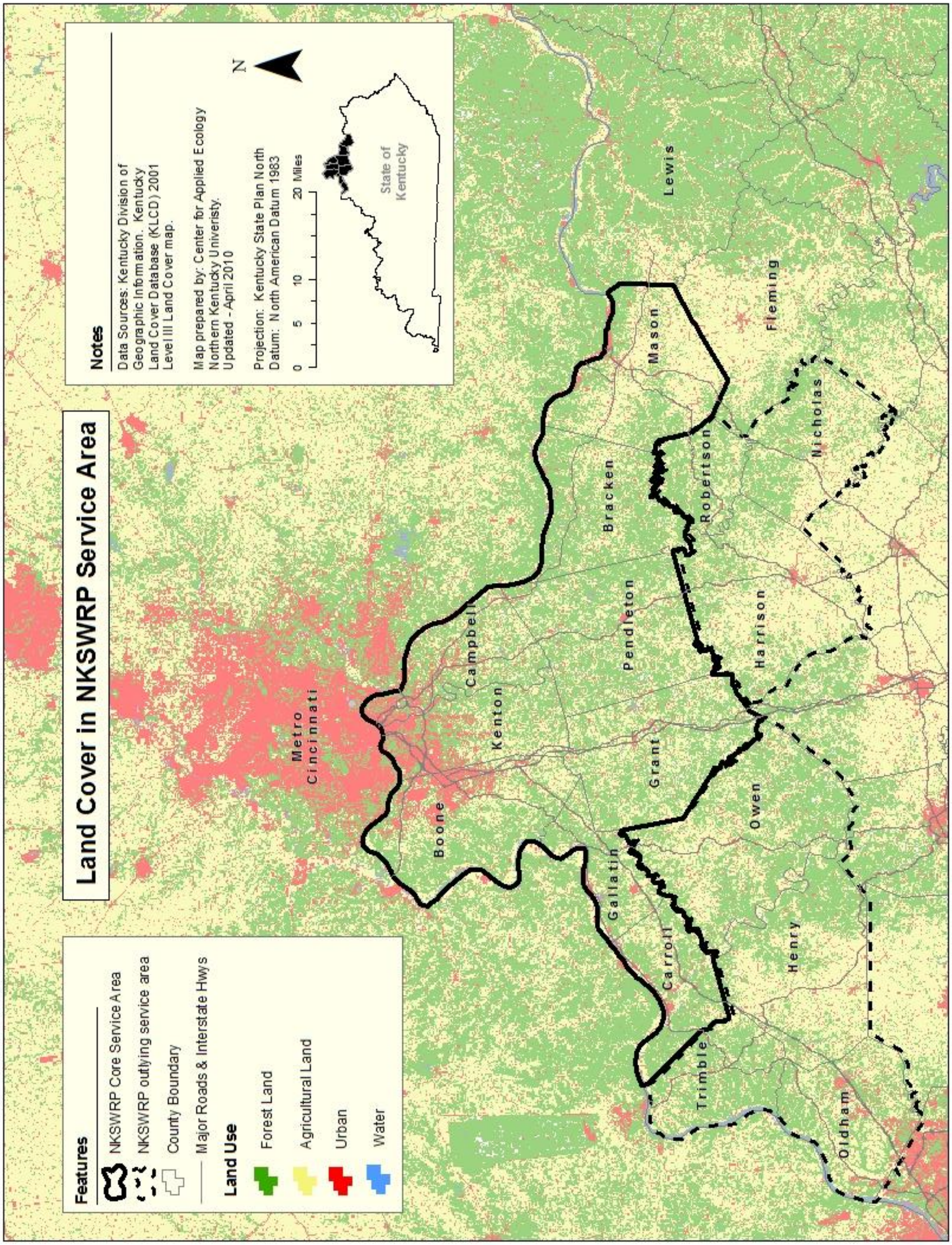

Impact and Mitigation Project Sites
Phase 1 NKSWRP
September 1999 - December 2011
Features
NKSWRP core service area
NKSWRP outlying service area
County Boundary
Project Locations (21)
Impact Locations (49)
Ohio River Trib Watersheds
Licking River Watershed
Kentucky River Watershed
Notes
Data Sources: Kentucky Division of Geographic Information, Kentucky Division of Water, NKU Cetner for Applied Ecology, Impact Locations are reported by the US Army Corps of Engineers.
Map prepared by: Center for Applied Ecology, Northern Kentucky University, Updated - April 2012.
Projection: Kentucky State Plane North
Datum: North American Datum 1983
N
0 4.5 9 18 Miles
State of Kentucky
Boone
Kenton
Campbell
Gallatin
Grant
Pendleton
Bracken
Mason
Lewis
Carroll
Trimble
Oldham
Henry
Owen
Harrison
Robertson
Nicholas
Fleming
Ohio River
Licking River
Kentucky River
Eagle Creek
N. Fork
S. Fork
I-275
I-75
I-71
*USFWS T & E project not included on NKSWRP project list

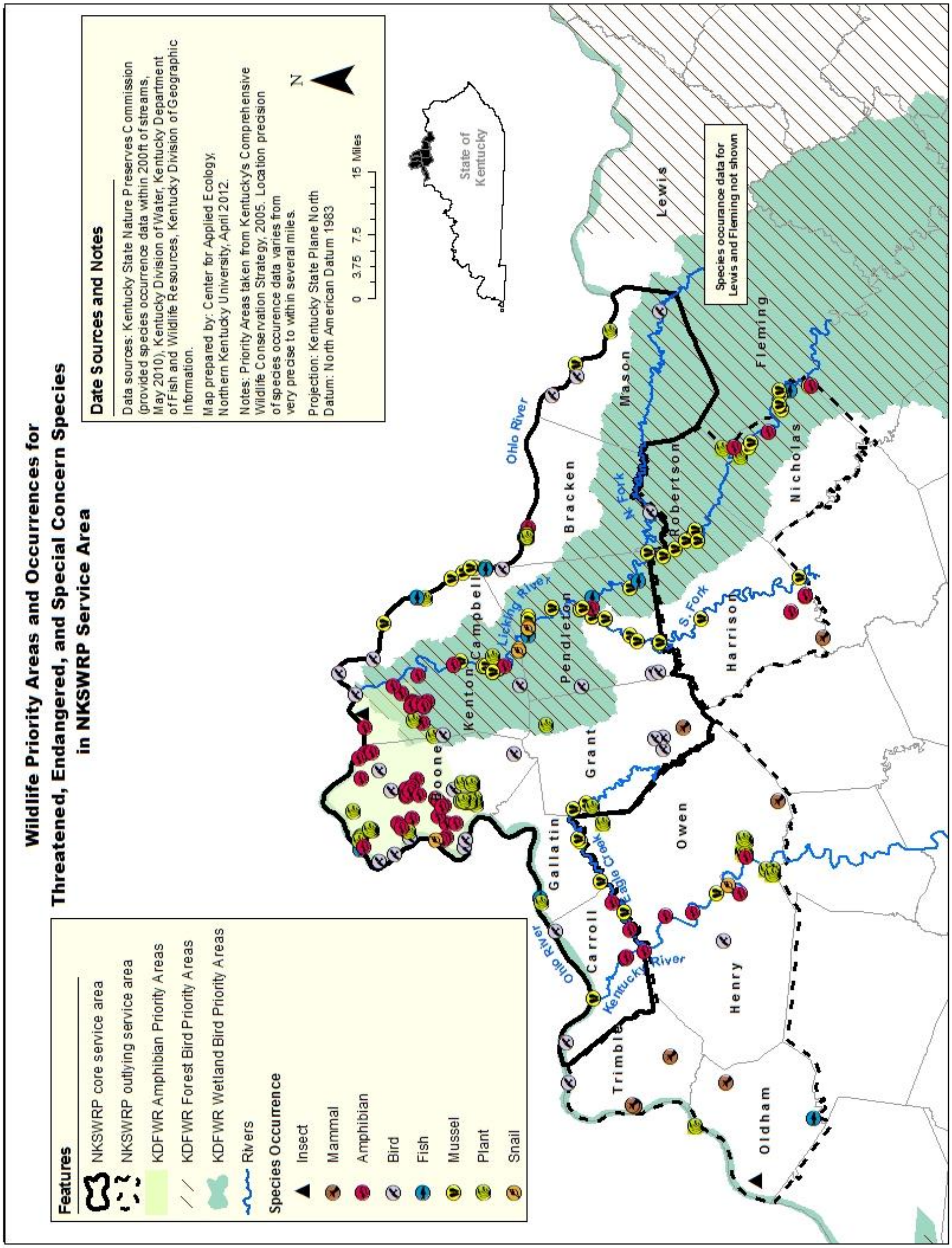

NKSWRP Service Area
Major Watersheds
Features
NKSWRP core service area
NKSWRP outlying service area
County Boundary
Ohio River Trib Watersheds
Licking River Watershed
Kentucky River Watershed
Notes
Data Sources: Kentucky Division of Geographic Information, Kentucky Division of Water, NKU Cetner for Applied Ecology,
Map prepared by: Center for Applied Ecology, Northern Kentucky University,
Updated - April 2012.
Projection: Kentucky State Plane North
Datum: North American Datum 1983
0
4
8
16 Miles
N
State of Kentucky
Boone
Kenton
Campbell
Gallatin
Grant
Pendleton
Bracken
Mason
Lewis
Fleming
Robertson
Nicholas
Harrison
Owen
Carroll
Henry
Trimble
Oldham
Ohio River
Licking River
Kentucky River
Eagle Creek
N. Fork
S. Fork
I-275
I-71
I-75

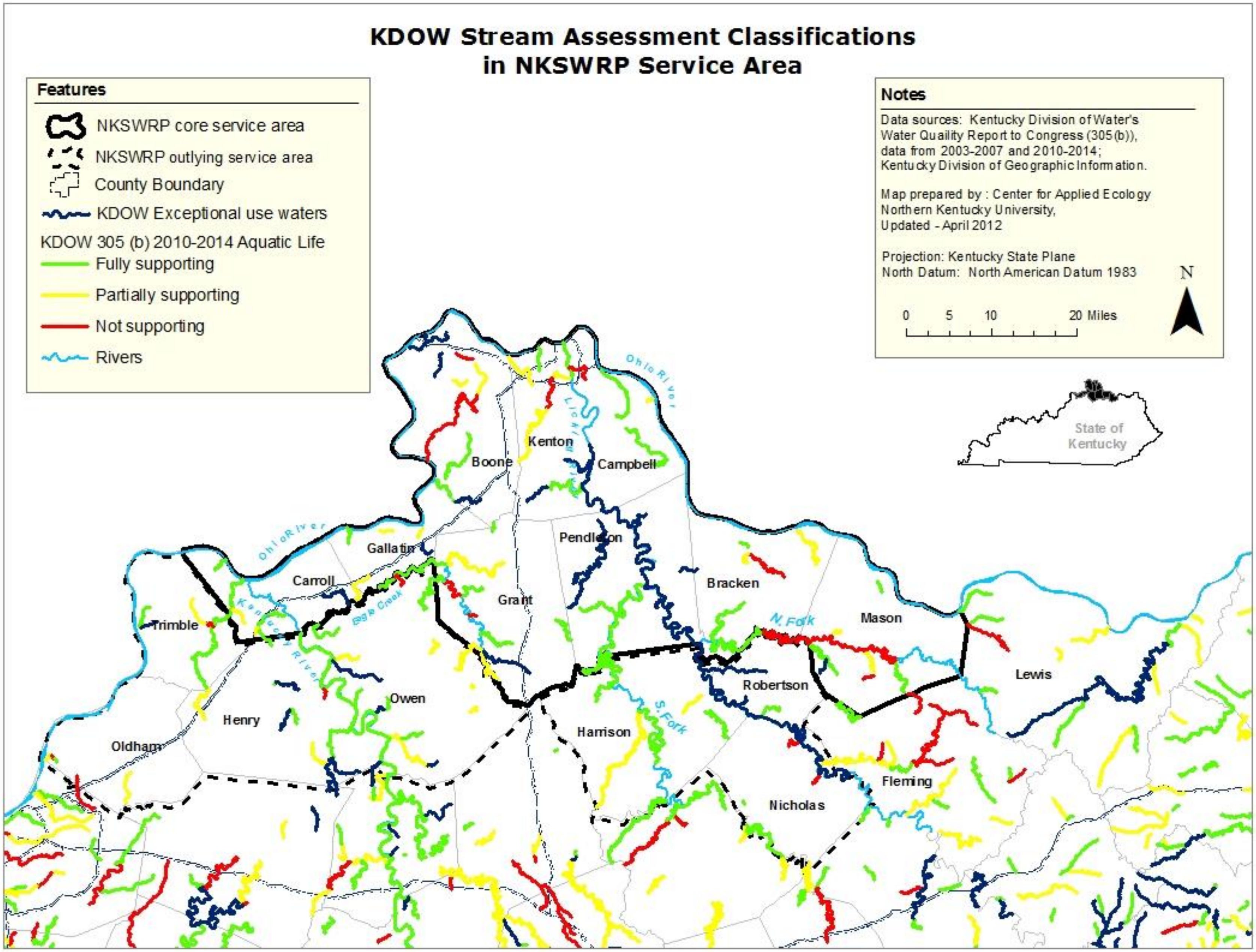


Level IV Ecoregions
in NKSWRP Service Area
Features
NKSWRP core service area
NKSWRP outlying service area
County Boundary
Knobs-Lower Scioto Dissected Plateau - 70d
Outer Bluegrass - 71d
Hills of the Bluegrass - 71k
Rivers
Data Sources
US EPA Western Ecology Division,
Kentucky Division of Geographic
Information, Kentucky Division of Water,
NKU Center for Applied Ecology.
Map prepared by: Center for Applied Ecology
Northern Kentucky University,
Updated - April 2012
Projection: Kentucky State Plane
North Datum: North American Datum 1983
0 3 6 12 Miles
N
State of
Kentucky
Boone
Kenton
Campbell
Gallatin
Carroll
Trimble
Oldham
Henry
Owen
Grant
Pendleton
Bracken
Mason
Lewis
Fleming
Robertson
Nicholas
Harrison
Ohio River
Licking River
Kentucky River
Eagle Creek
N. Fork
S. Fork


Hydric and Partially Hydric Soil in NKSWRP Service Area
Features
NKSWRP core service area
NKSWRP outlying service area
County Boundary
Hydric/Partially hydric soils
Data Sources
Base map data were provided by Kentucky Division of Geographic Information. Soils data were provided by the USDS-NRCS.
Map prepared by : Center for Applied Ecology
Northern Kentucky University,
Updated - April 2012.
Projection: Kentucky State Plane
North Datum: North American Datum 1983
0 3.5 7 14 Miles
N
State of Kentucky
Boone
Kenton
Campbell
Gallatin
Carroll
Trimble
Grant
Pendleton
Bracken
Mason
Lewis
Owen
Henry
Oldham
Harrison
Robertson
Fleming
Nicholas


Land Cover in NKSWRP Service Area
Features
NKSWRP Core Service Area
NKSWRP outlying service area
County Boundary
Major Roads & Interstate Hwys
Land Use
Forest Land
Agricultural Land
Urban
Water
Notes
Data Sources: Kentucky Division of Geographic Information. Kentucky Land Cover Database (KLCD) 2001 Level III Land Cover map.
Map prepared by: Center for Applied Ecology Northern Kentucky University. Updated - April 2010
Projection: Kentucky State Plan North Datum: North American Datum 1983
0 5 10 20 Miles
N
State of Kentucky
Metro Cincinnati
Boone
Kenton
Campbell
Gallatin
Grant
Pendleton
Bracken
Mason
Lewis
Fleming
Robertson
Nicholas
Harrison
Owen
Carroll
Trimble
Henry
Oldham


Wildlife Priority Areas and Occurrences for
Threatened, Endangered, and Special Concern Species
in NKSWRP Service Area
Features
NKSWRP core service area
NKSWRP outlying service area
KDFWR Amphibian Priority Areas
KDFWR Forest Bird Priority Areas
KDFWR Wetland Bird Priority Areas
Rivers
Species Occurrence
Insect
Mammal
Amphibian
Bird
Fish
Mussel
Plant
Snail
Date Sources and Notes
Data sources: Kentucky State Nature Preserves Commission (provided species occurrence data within 200ft of streams, May 2010), Kentucky Division of Water, Kentucky Department of Fish and Wildlife Resources, Kentucky Division of Geographic Information.
Map prepared by: Center for Applied Ecology, Northern Kentucky University, April 2012.
Notes: Priority Areas taken from Kentucky's Comprehensive Wildlife Conservation Strategy, 2005. Location precision of species occurence data varies from very precise to within several miles.
Projection: Kentucky State Plane North
Datum: North American Datum 1983
0 3.75 7.5 15 Miles
N
State of Kentucky
Species occurance data for Lewis and Fleming not shown
Ohio River
Licking River
N. Fork
S. Fork
Kentucky River
Eagle Creek
Boone
Kenton
Campbell
Pendleton
Bracken
Mason
Lewis
Fleming
Robertson
Nicholas
Harrison
Grant
Gallatin
Owen
Carroll
Henry
Trimble
Oldham



KDOW Stream Assessment Classifications
in NKSWRP Service Area
Features
NKSWRP core service area
NKSWRP outlying service area
County Boundary
KDOW Exceptional use waters
KDOW 305 (b) 2010-2014 Aquatic Life
Fully supporting
Partially supporting
Not supporting
Rivers
Notes
Data sources: Kentucky Division of Water's Water Quality Report to Congress (305(b)), data from 2003-2007 and 2010-2014; Kentucky Division of Geographic Information.
Map prepared by : Center for Applied Ecology Northern Kentucky University, Updated - April 2012
Projection: Kentucky State Plane
North Datum: North American Datum 1983
N
0
5
10
20 Miles
State of Kentucky
Ohio River
Ohio River
Kentucky River
Eagle Creek
N. Fork
S. Fork
Boone
Kenton
Campbell
Gallatin
Carroll
Trimble
Grant
Pendleton
Bracken
Mason
Lewis
Robertson
Owen
Henry
Oldham
Harrison
Nicholas
Fleming

Summary Information from 2010 303(d) Listed Streams in Northern Kentucky (Excludes Rivers)

Stream	County	Pollutants	Suspected Sources
Gunpowder Creek	Boone	Sediment, Nutrients, Sewage	Land development, Urban stormwater, Agriculture, Streambank modification, Loss of riparian vegetation
S Fork of Gunpowder	Boone	Fecal coliform, Sediment, Nutrients, Sewage	Agriculture, Land development, Package plant, Unknown
Woolper Creek	Boone	Fecal coliform, Nutrients, Sewage, Sediment, Total suspended solids	Agriculture, Inappropriate waste disposal, Hydromodification, Urban runoff,
Allen Fork of Woolper	Boone	Nutrients, Sediment	Urban stormwater, Habitat modification
Middle Creek	Boone	Nutrients, Sediment	Agriculture, Land development
Dry Creek of Ohio	Boone	Nutrients, Sewage	Agriculture, Municipal point source, Urban stormwater
Banklick Creek	Kenton	Fecal coliform, Sediment, Nutrients, Sewage	Land development, Urban runoff, Sewage (municipal and on-site), Agriculture
Threemile Creek of Licking	Campbell	Fecal coliform, Sediment, Nutrients, Sewage	Sanitary sewer overflows, Unknown
Tenmile Creek	Campbell	Sediment, Nutrients	Crop production, Livestock, Land development
Lick Creek	Carroll	Total Dissolved Solids	Urban runoff
West Fork of Mill Creek	Carroll	Sediment	Road and urban runoff, Streambank modification, Loss of riparian vegetation
Mellins Branch	Carrol	Nutrients	Crop production, Livestock
Big Sugar Creek of Ohio	Gallatin	Nutrients, Sewage, Sediment	Crop production, Road runoff, Land development
Dry Creek	Gallatin	Nutrients, Sewage, Sediment	Crop production, Livestock, Urban runoff
Eagle Creek	Grant	Sediment, Nutrients	Crop production, Livestock
Arnolds Creek of Ten Mile	Grant	Sediment	Crop production, Streambank modification
Rattlesnake Creek of Eagle	Grant	Unknown	Unknown
Ten Mile Creek	Grant	Unknown	Unkown
Three Forks Creek of Eagle	Grant	Sediment	Unknown
Brushy Fork	Pendleton	Sediment	Crop production, Streambank modification
Bracken Creek of Ohio	Bracken	Nutrients	Crop production, Livestock
Goose Creek	Bracken	Unknown	Natural sources, Surface mining
Locust Creek	Bracken	Unknown	Unknown
Cabin Crk of Ohio	Mason	Sediment	Agriculture, Habitat modification
Lees Creek of N Fork Licking	Mason	Sediment, Nutrients	Crop production, Livestock
UT to UT of Lees	Mason	Sediment, Nutrients	Livestock, Loss of riparian vegetation

Stream	County	Pollutants	Suspected Sources
Allison Creek	Fleming	Nutrients, Sewage, Phosphorus	Livestock
Craintown Branch	Fleming	Phosphorus	Livestock
Crane Creek	Fleming	Sediment	Agriculture, Livestock, Loss of riparian vegetation, Mining/Quarries, Streambank modification
Doty Creek	Fleming	Nutrients	Agriculture, Animal feeding operations
Fleming Creek	Fleming	Nutrients, Phosphorus, Sewage	Agriculture, Livestock, Urban runoff
Fox Creek	Fleming	Fecal coliform, Sediment, Nutrients,	Unknown, Livestock, Dredging
Locust Creek	Fleming	Nutrients, Sediment	Crop production
Logan Run	Fleming	Nutrients	Agriculture
UT to Mill Creek	Fleming	Sediment, Nitrogen	Livestock, Loss of riparian habitat, Road runoff
Little Beaver Creek	Harrison	Nutrients, Sediment	Crop production , Livestock, Urban runoff
Mill Creek	Harrison	Nutrients, Sediment	Crop production , Livestock, Land development
Little Kentucky River	Henry	Nutrients, Sediment	Agriculture, Livestock
Salt River of Sixmile Creek	Henry	Sediment	Agriculture, Habitat modification
Sulphur Creek	Henry	Nutrients, Sediment	Agriculture, Habitat modification
Briery Branch	Lewis	Nutrients	Crop production , Livestock, Land development
Clary Branch	Lewis	Sediment	Dredging, Urban runoff
Laurel Fork	Lewis	Nutrients, Sediment	Crop production , Dredging, Livestock
Montgomery Creek	Lewis	Nutrients, Sewage, Sediment	Crop production, Dredging, Livestock, Land development
Salt Lick Creek	Lewis	Sediment	Urban runoff, Loss of riparian habitat
Trace Creek	Lewis	Nutrients, Sewage, Sediment	Crop production, Livestock, Land development
Crooked Creek	Nicholas	Fecal coliform	Unknown
Scrubgrass Creek	Nicholas	Unknown	Unknown
Stony Creek	Nicholas	Unknown	Unknown
Currys Fork	Oldham	Nutrients, Dissolved Oxygen, Sediment	Agriculture, Habitat modification, Land development
Harrods Creek	Oldham	Fecal coliform, Nutrients	Urban runoff
Pond Creek	Oldham	Nutrients, Sewage	Municipal point source discharges
UT to Pond Creek	Oldham	Chlorine, Nutrients, Sewage	Package plant discharge,
Big Twin Creek	Owen	Sediment	Agriculture, Habitat modification
Caney Creek	Owen	Nutrients, Sewage, Sediment	Channelization, Loss of riparian habitat, Livestock
Cedar Creek	Owen	Nutrients, Sediment	Livestock, Highway runoff
Elk Creek	Owen	Unknown	Unknown
Kentucky River	Owen	Methylmercury	Atmospheric deposition – toxics source unknown
Moseby Branch	Owen	Unknown	Unknown
Richland Creek	Owen	Sediment	Crop production
Stevens Creek	Owen	Nutrients, Sediment	Livestock
Johnson Creek	Robertson	Fecal coliform	Unknown
Hardy Creek	Trimble	Nutrients, Sewage	Crop production, Livestock, Runoff, Loss of riparian habitat, Hydromodification,

Data Source:
http://www.water.ky.gov/NR/rdonlyres/58E97683-C9B7-4F9F-BA87-93671E6A02D9/0/2008volume2final.pdf

Notes Regarding Summary Information:

Sediment = Sediment/Siltation or Turbidity
Nutrients = Nutrients/Eutrophication
Sewage = Sewage/Organic Enrichment
Livestock – Grazing, Feedlots, Dairies
~~**Bold** – TMDL to be released 2009~~
~~*Italics* – TMDL being developed~~
~~No TMDL targets have been developed for Nutrients and Sewage~~
~~Strikethrough – Omits streams listed only for bacteria (fecal coliform).~~

	MAMMALS		MUSSELS								PLANTS			
	Myotis sodalis	Myotis grisescens	*Pleurobema clava*	*Cyprogenia stegaria*	*Plethobasus cooperianus*	*Lampsilis abrupta*	*Pleurobema plenm*	*Epioblasma torulosa rangiana*	*Obovaria retusa*	*Epioblasma o. obliquata*	*Trifolium stoloniferum*	*Arabis perstellata*	*Solidago shortii*	*Arabis perstellanta*
	Indiana bat	gray bat	clubshell	fanshell	orangefoot pimpleback	pink mucket	rough pigtoe	northern riffleshell	ring pink	purple catspaw pearlymussel	running buffalo clover	Braun's rockcress	Short's goldenrod	Braun's rockcress
	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered
Boone	Potential		Potential	Potential	Potential	**Known**	Potential		Potential		**Known**			
Bracken	Potential		**Known**	**Known**	Potential	Potential	Potential	Potential	Potential		Potential			
Campbell	Potential		**Known**	**Known**	**Known**	**Known**	**Known**	Potential	Potential		Potential			
Carroll	Potential		Potential	Potential	**Known**	**Known**	Potential		Potential		Potential			
Gallatin	Potential		**Known**	Potential	Potential	Potential	Potential		Potential		Potential			
Grant	Potential		Potential								Potential			
Kenton	Potential		**Known**	**Known**	**Known**	**Known**	**Known**	**Known**	**Known**	**Known**	**Known**			
Mason	**Known**		**Known**	Known	Potential	Potential	Potential		Potential		Potential			
Pendleton	Potential		**Known**	**Known**	Potential	**Known**	**Known**	**Known**	Potential		Potential			
Harrison	Potential		**Known**	**Known**		Potential	Potential	Potential			**Known**			
Henry	Potential			**Known**							Potential	**Known**		**Known**
Lewis	Potential		Potential	**Known**	**Known**	**Known**	**Known**			**Known**	**Known**			
Nicholas	Potential		Potential	**Known**		Potential	Potential	Potential			Potential		**Known**	
Oldham	Potential	**Known**	Potential	Potential	Potential	Potential	Potential		Potential		Potential			
Owen	Potential		**Known**	**Known**							Potential			**Known**
Robertson	Potential		**Known**	**Known**		Potential	Potential	Potential			Potential		**Known**	
Trimble	**Known**		Potential	Potential	**Known**	Potential	Potential		Potential		Potential			

source: http://www.fws.gov/frankfort/EndangeredSpecies.html

Jan-12