

**Energy and Environment Cabinet  
Department for Environmental Protection  
Division of Water  
August 2015**

**Biological and Water Quality Characteristics of Streams Proposed for  
the Antidegradation Category of Exceptional Waters**

A Supplement to the 2015 Triennial Review Proposed Water Quality Standards  
401 KAR 10:030

Introduction. The following is a compilation of information on 13 streams or stream segments (segments) proposed for Exceptional Water categorization. This brief serves as supporting information and fulfills the applicable elements of 401 KAR 10:030 Section 1(2)(a)3 for categorization based on the exceptional or “excellent” biological community. The procedures for Exceptional Water re-categorization are followed as described in 401 KAR 10:030 Section 2(4)(b) and documented herein. Each proposed stream or segment below has assigned the following designated uses (401 KAR 10:026): OSRW, Warm or Cold Water Aquatic Habitat (WAH or CAH), primary and secondary contact recreation (PCR and SCR) and drinking water supply (DWS).

Each element for re-categorization of a water body or segment is marked by a bullet. The information in this narrative is presented in a consistent manner for each stream or segment.

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- Thompson Fork, Big Sandy River Basin, Floyd County. The current designated uses remain are OSRW, WAH, PCR, SCR and DWS.
  - Please see the attached Map 1 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 98% of the Thompson Fork watershed is forested. A four-wheel drive trail runs along the stream for about 0.25 mile. The watershed for Souders Branch, the receiving stream, is also highly forested. Thompson Fork is a second order stream with an average width of four feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, 60% of the substrate types are gravels and cobbles with sand composing another 25%. Riffles and runs dominate (80%) the available macrohabitats within the sample reach. Stream depth ranges from 0.25 inch to two feet with an average of four inches. The gradient of the watershed is 1.3%. Stream banks are moderately stable and the riparian zone width is good. Thompson Fork has natural flow for approximately five months (December – April). Its 7Q10 flow value is 0 cfs and its mean annual flow is 0.9 cfs. Souders Branch has similar flow characteristics with a 7Q10 of 0 cfs and a mean annual flow of 2.7 cfs at its confluence with Thompson Fork.

Thompson Fork was sampled in 2007 by Division of Water (DOW) intensive survey biologists. It is located within the Central Appalachian ecoregion and the Mountains

bioregion. The catchment area above the sample reach was 0.4 square mile and is considered to be a headwater stream. Thompson Fork is an Exceptional Water candidate because of an excellent macroinvertebrate community. It scored an 83 on the Macroinvertebrate Bioassessment Index (MBI) which is excellent for a headwater mountain stream. This stream had a low Hilsenhoff Biotic Index (HBI) (tolerance) score, high percentages of intolerant taxa (%Ephemeropter, Plecoptera and Trichoptera (EPT) and %Ephemeroptera) and a low percentage of tolerant organisms (%Chironomids+Oligochaetes). Habitat was assessed as good (163). Specific conductivity was measured at 118  $\mu$ S/cm; an indicator of excellent water quality.

The existing uses for Thompson Fork are OSRW, aquatic habitat and recreation, with water quality and habitat exceeding those qualities required to support the basic WAH designated use. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- Souders Branch is the receiving stream. It is designated for WAH, PCR, SCR and DWS. The existing uses are aquatic habitat and recreation.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat. There are no permitted discharges on this stream segment.

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- Unidentified Tributary (UT) of Open Fork Paint Creek, Big Sandy River Basin, Morgan County. The current designated uses are OSRW, WAH, PCR, SCR and DWS.
  - Please see the attached Map 2 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 80% of the UT of Open Fork Paint Creek watershed is forested. About 15% of the watershed is influenced by surface mining with no fills within the watershed and another 5% of the watershed is utilized for agriculture. An electric line right-of-way also passes through the watershed. The watershed in another UT on the opposite side of Open Fork Paint Creek is forested approximately the same as the OSRW and Exceptional Water candidate; however, the remaining watershed is only impacted by agriculture.

UT of Open Fork Paint Creek is a second order stream with an average width of five feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, 80% of the substrate types are gravels and cobbles with sand composing another 10%. Riffles and runs dominate the available macrohabitats within the sampling reach. Stream depth ranges from 0.25 inch to one foot with an average of four inches. The gradient of the watershed is 3.1%. The banks are moderately stable and the riparian zone width good. UT of Open Fork Paint Creek has natural flow for approximately five months (December – April). Its 7Q10 flow value is 0 cfs and its mean annual flow is 0.4

cfs. The neighboring UT has similar flow characteristics with a 7Q10 of 0 cfs and a mean annual flow of 0.5 cfs.

UT of Open Fork Paint Creek was sampled in 2005 by DOW intensive survey biologists. It is located within the Central Appalachian Ecoregion and the Mountains Bioregion. The catchment area above the sample reach was 0.3 square mile and is considered to be a headwater. UT of Open Fork Paint Creek is an Exceptional Water candidate because of an excellent macroinvertebrate community. It scored an 85 on the MBI which is excellent for a headwater mountain stream. This stream had a low HBI (tolerance) score, high percentage of intolerant taxa (%EPT and %Ephemeroptera) and a low percentage of tolerant organisms (%Chironomids+Oligochaetes). The macroinvertebrate community was excellent and habitat quality rated fair (159). Conductivity measured 51  $\mu$ S/cm; indicative of excellent water quality.

The existing uses for UT of Open Fork Paint Creek are OSRW, aquatic habitat and recreation, with water quality and habitat exceeding those qualities required to support WAH designated use. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- Open Fork is the receiving stream. It is designated for WAH, PCR, SCR and DWS. The existing uses are aquatic habitat and recreation.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

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- Bullskin Creek, Kentucky River Basin, Clay County. The current designated uses are OSRW, WAH, PCR, SCR and DWS.
  - Please see the attached Map 3 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 70% of the Bullskin Creek watershed is forested. About 20% of the watershed is influenced by agriculture, 5% residences, 2% contour mining and 3% silviculture.

Bullskin Creek is a fourth order stream with an average stream width of 12 feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, the dominant substrate types are boulders, cobbles and sand. Pools, riffles and runs are equally distributed within the sampling reach. Stream depth ranges from 0.25 inch to several feet. The gradient of the watershed is 0.8%. The banks are moderately stable and the riparian zone width fair. Bullskin Creek is perennial and has natural flow all year. Its 7Q10 flow value is 0.1 cfs and the mean annual flow is 40.3 cfs. At the confluence of Bullskin Creek, the Redbird River has a 7Q10 of 1.5 cfs and a mean annual flow of 668.9 cfs.

The fish community was sampled in Bullskin Creek by the Kentucky Department for Fish and Wildlife Resources in 2007. It is located within the Central Appalachian Ecoregion and the Mountains Bioregion. The catchment area above the sample reach was 20.3 square miles and is considered to be a wadeable stream type. Bullskin Creek is an OSRW and Exceptional Water candidate because of an excellent fish community. It scored a 91 on the KIBI, excellent for a wadeable mountain stream. This stream had high numbers of intolerant taxa (Darter, Madtom and Sculpin (DMS), Intolerants (INT), Simple Lithophils (SL) and % Insectivore (INS)) and low percentages of tolerant taxa (%Tolerants (TOL)). Habitat and water chemistry parameters for this station were not collected during this sample event. Additional data collected in 1998 indicated fair habitat quality (133) and low specific conductivity (188  $\mu\text{S}/\text{cm}$ ), indicative of good water quality.

The existing uses for Bullskin Creek are OSRW, aquatic habitat and recreation, with water quality and habitat exceeding those qualities required to support WAH designated use. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- The Redbird River is the receiving stream. It is designated for WAH, PCR, SCR and DWS; however, 0.2 mile upstream of the mouth of Bullskin Creek the river is designated an OSRW in addition to the aforementioned designated uses. The existing uses are aquatic habitat and recreation.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

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- Joyce Fork, Kentucky River Basin, Owsley County. The current designated uses are OSRW, WAH, PCR and SCR.
  - Please see attached Map 4 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 85% of the Joyce Fork watershed is forested. Approximately 15% of the watershed has been logged. Surface mining occurs in the adjacent watershed and receiving stream, Cortland Fork. Joyce Fork is a first order stream with an average width of four feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, the dominant substrate types are gravels and cobbles. Riffles and runs dominate the available macrohabitats within the sampling reach. Stream depth ranges from 0.25 inch to 1.5 feet and average four inches. The gradient of the watershed is 4.9%. Joyce Fork has natural flow for approximately five months (December – April). Its 7Q10 flow value is 0 cfs and the mean annual flow is 0.8 cfs. The receiving stream, Cortland Fork, has a 7Q10 of 0 cfs and a mean annual flow of 2.0 cfs. It is designated for WAH, PCR, SCR and DWS; however, 0.5 mile downstream of the mouth of Joyce Fork, Laurel Fork is designated an OSRW in addition

to the aforementioned designated uses. The existing uses are aquatic habitat and recreation.

Joyce Fork was sampled for macroinvertebrates by DOW intensive survey biologists in 2008. It is located within the Central Appalachian Ecoregion and the Mountains Bioregion. The catchment area above the sample reach was 0.6 square mile and is considered to be a headwater stream. Joyce Fork is an Exceptional Water candidate because of an excellent macroinvertebrate community. It scored an 83 on the MBI which is excellent for a headwater mountain stream. This stream had a low HBI (tolerance) score, high percentages of intolerant taxa (%EPT and %Ephemeroptera) and a low percentage of tolerant organisms (%Chironomids+Oligochaetes). Habitat quality was not assessed, but specific conductivity at this station was low (38  $\mu$ S/cm), indicative of excellent water quality.

The existing uses for Joyce Fork are OSRW, aquatic habitat and recreation, with water quality and habitat exceeding those qualities required to support WAH designated use. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- Cortland Fork is the receiving stream. It is designated for WAH, PCR, SCR and DWS. The existing uses are aquatic habitat and recreation.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

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- Little Sturgeon Creek, Kentucky River basin, Owsley County. The current designated uses are OSRW, WAH, PCR and SCR.
  - Please see attached Map 5 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 55% of the Little Sturgeon Creek watershed within the candidate OSRW segment is forested. About 45% of the watershed is influenced by agriculture and silviculture.

Little Sturgeon Creek is a third order stream with an average stream width of 10 feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, the dominant substrate types are boulders, cobbles and sand. Pools, riffles and runs are equally distributed within the sampling reach. Stream depth ranges from 0.25 inch to several feet. The gradient of the watershed within the candidate Exceptional Water segment is 0.6%. The banks are moderately stable and the riparian zone width fair. Little Sturgeon Creek is perennial and has natural flow all year. Its 7Q10 flow value is 0.2 cfs and the mean annual flow is 30.4 cfs. The receiving stream, Sturgeon Creek, has a 7Q10 of 0.5 cfs and a mean annual flow of 83.5 cfs at the confluence of Little Sturgeon Creek.

Little Sturgeon Creek was sampled for fish species composition by the Kentucky Department of Fish and Wildlife Resources in 2007. It is located within the Western Allegheny Ecoregion and the Mountains Bioregion. The catchment area above the sample reach was 23.05 square miles and is considered a wadeable stream type. Little Sturgeon Creek is an Exceptional Water candidate because of an excellent fish community. It scored an 82 on the KIBI; that is in the excellent category for a wadeable mountain stream. This stream had high numbers of intolerant taxa (DMS, INT, SL and %INS) and low percentage of tolerant taxa (%TOL). Habitat quality and water chemistry were not collected for this station.

The existing uses for Little Sturgeon Creek are OSRW, aquatic habitat and recreation, with water quality and habitat exceeding those qualities required to support WAH designated use. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- Sturgeon Creek is the receiving stream. It is designated for WAH, PCR, SCR, DWS and OSRW. The existing uses are aquatic habitat and recreation.
- For any potential users (community or individual entities) streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

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- Lower Devil Creek, Kentucky River Basin, Lee County. The current designated uses are OSRW, WAH, PCR and SCR.
  - Please see attached Map 6 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 70% of the Lower Devil Creek watershed within the Exceptional Water segment is forested. About 25% of the watershed is influenced by agriculture and silviculture, while approximately 5% is impacted by resource extraction.

Lower Devil Creek is a fourth order stream with an average stream width of 10 feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, the dominant substrate types are boulders, cobbles and sand. Pools, riffles and runs are equally distributed within the sampling reach. Stream depth ranges from 0.25 inch to two feet. The gradient of the watershed within the candidate OSRW and Exceptional Water segment is 0.9%. The riparian zone of the watershed is well-developed and not fractured. Lower Devil Creek is perennial and has natural flow all year. Its 7Q10 flow value is 0.1 cfs and the mean annual flow is 23.8 cfs. The receiving stream, North Fork Kentucky River, has a 7Q10 of 4.5 cfs and a mean annual flow of 1710.7 cfs at the confluence of Lower Devil Creek.

The fish community at Lower Devil Creek was sampled by the Kentucky Department of Fish and Wildlife Resources in 1998. It is located within the Western Allegheny Ecoregion and the Mountains Bioregion. The catchment area above the sample reach was 17.2 square miles and is considered a wadeable stream type. Lower Devil Creek is an Exceptional Water candidate because of its fish community score of 82 on the KIBI, excellent for wadeable mountain streams. This stream had high numbers of intolerant taxa (DMS, INT, SL and %INS) and low percentage of tolerant taxa (%TOL). Habitat quality was assessed as fair (159), on the cusp of good. Water chemistry measurements indicated good dissolved oxygen concentrations (8.6 mg/L) and slightly elevated specific conductivity level (300  $\mu$ S/cm).

The existing uses for Lower Devil Creek are OSRW, aquatic habitat and recreation. The water quality and habitat quality support WAH designated use and support a fish community that exceed the composition characteristics considered the base-level for WAH. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- The North Fork Kentucky River is the receiving stream. It is designated for WAH, PCR, SCR and DWS. The existing uses are aquatic habitat, recreation and drinking water.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

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- Clear Creek, Upper Cumberland River basin, Rockcastle County. The current designated uses are OSRW, WAH, PCR, SCR and DWS.
  - Please see attached Map 7 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 75% of the Clear Creek watershed within the candidate Exceptional Water segment is forested. About 25% of the watershed is influenced by agricultural and residential land use. In comparison the receiving stream, Roundstone Creek, has a greater percentage of agricultural and residential land uses than Clear Creek.

Clear Creek is a fourth order stream with an average stream width of 20 feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, the dominant substrate types are boulders, cobbles and sand. Pools, riffles and runs are equally distributed within the sampling reach. Stream depth ranges from 0.25 inch to several feet. The gradient of the watershed within the proposed Exceptional Water segment is 0.3%. Stream banks are moderately stable. The riparian zone of the watershed is not well-developed and is commonly fractured. Clear Creek has natural flow almost all year; the 7Q10 flow value is 0 cfs and the mean annual flow is 22.9 cfs. The receiving stream, Roundstone Creek, has a 7Q10 of 0.1 cfs and a mean annual flow of 35.3 cfs at the confluence of Clear Creek.

Clear Creek was sampled for fish by the Kentucky Department of Fish and Wildlife Resources in 2007. It is located within the Southwestern Appalachian Ecoregion and the Mountains Bioregion. The catchment area above the sample reach was 11.6 square miles and is considered a wadeable stream type. Clear Creek is an Exceptional Water candidate because of an excellent fish community. It scored a 74 on the KIBI; that is in the excellent category for a wadeable mountain stream. This stream had high numbers of intolerant taxa (DMS, INT, SL and %INS) and low percentage of tolerant taxa (%TOL). Habitat within the stream reach was determined as fair (139). Water chemistry at this station was not assessed.

The existing uses for Clear Creek are OSRW, aquatic habitat and recreation. The fish KIBI score had an exceptional species composition indicating the water and habitat quality exceeded the base-level needed to sustain the WAH designated use. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- Roundstone Creek is the receiving stream. It is designated for WAH, PCR, SCR, DWS and OSRW. The existing uses are aquatic habitat and recreation.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

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- Kettle Creek, upper Cumberland River basin, Monroe County. The current designated uses are OSRW, WAH, PCR, SCR and DWS.
  - Please see attached Map 8 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 80% of the Kettle Creek watershed within the Exceptional Water segment is forested. About 20% of the watershed is influenced by agricultural and residential land use. McFarland Creek, an adjacent OSRW and Exceptional watershed, has similar land uses to Kettle Creek.

Kettle Creek is a fourth order stream with an average stream width of 12 feet. The predominant geology of the watershed is Mississippian-aged limestone. Within the stream channel, the dominant substrate types are gravel, sand and fines. Pools and runs are the dominant macrohabitat types within the sampling reach. Stream depth ranges from 0.25 inch to several feet. The gradient of the watershed within the candidate Exceptional Water segment is 0.7%. Stream banks are stable and the riparian zone adequately developed within the reach. Kettle Creek has natural flow almost all year; the 7Q10 flow value is 0.2 cfs and the mean annual flow is 42.8 cfs. An adjacent stream, McFarland Creek, has similar flow characteristics with a 7Q10 of 0.2 cfs and a mean annual flow of 33 cfs.

Kettle Creek was sampled for fish by the Kentucky Department for Fish and Wildlife Resources in 2005. It is located within the Interior Plateau Ecoregion and the Pennyroyal Bioregion. The catchment area above the sample reach was 24.8 square miles and is considered a wadeable stream type. Kettle Creek is an Exceptional Water candidate because of an excellent fish community. It scored a 72 on the KIBI; that is in the excellent category for a wadeable Pennyroyal stream. This stream had high numbers of intolerant taxa (INT, SL and %INS) and low percentage of tolerant taxa (%TOL). Habitat within the stream reach was determined as fair (141). Dissolved oxygen concentration was good at 10.7 mg/L, while specific conductivity levels were low compared to other Pennyroyal streams (390  $\mu$ S/cm).

The existing uses for Kettle Creek are OSRW, aquatic habitat and recreation. The fish community as indicated by the KIBI exceeded the base-level community structure of a stream of good or average aquatic habitat. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- The Cumberland River receives Kettle Creek just south of the state line in Clay County, Tennessee. It is designated for CAH, PCR, SCR, DWS and OSRW. The existing uses of the Cumberland River are aquatic habitat, recreation and drinking water.
- Streams designated as an OSRW have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.
- Little White Oak Creek, upper Cumberland River basin, Laurel County. The current designated uses are OSRW, CAH, PCR, SCR and DWS.
- Please see attached Map 9 for relative location of the proposed stream segment.
- According to 2010 FSA Color Ortho Imagery, 50% of the Little White Oak Creek watershed is forested. The other 50% of the watershed is influenced by agricultural and residential land use. White Oak Creek, the receiving stream, is more forested than Little White Oak Creek (65%).

Little White Oak Creek is a third order stream with an average stream width of 10 feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, the dominant substrate types are cobbles and gravels (65%) with boulders common comprising 20%. Pools, riffles and runs are equally distributed with slightly more pool macrohabitat (40%) within the stream reach. Stream depth ranges from 0.25 inch to two feet. The gradient of the watershed is 2.1%. Stream banks are stable, but the riparian zone of the watershed is only marginally developed and is commonly disrupted. Little White Oak Creek flows intermittently typically from December to April. Its 7Q10 flow value is 0 cfs and the mean annual flow is 3.0 cfs. The receiving stream, White Oak Creek, has a 7Q10 of 0.1 cfs and a mean annual flow of 9.8 cfs at the confluence of Little White Oak Creek.

Little White Oak Creek was sampled in 2006 by DOW NPS Section biologists. It is located within the Southwestern Appalachian Ecoregion and the Mountains Bioregion. The catchment area above the sample reach is 2.1 square miles and is considered a headwater stream type. Little White Oak Creek is an Exceptional Water candidate because of an excellent macroinvertebrate community. It scored an 83 on the MBI which is excellent for a headwater mountain stream. This stream had a low HBI (tolerance) score, high percentages of intolerant taxa (%EPT and %Ephemeroptera) and a low percentage of tolerant organisms (%Chironomids+Oligochaetes). The habitat at this stream reach was assessed as good (164). Specific conductivity measured 41  $\mu\text{S}/\text{cm}$  and dissolved oxygen concentration was 9.9 mg/L, indicating excellent water quality.

The existing uses for Little White Oak Creek are OSRW, aquatic habitat and recreation. The macroinvertebrate community exceeded the base-level community structure of a stream of good or average aquatic habitat. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- White Oak Creek is the receiving stream of Little White Oak Creek. It is designated for CAH (basin above and including Little White Oak Creek), PCR, SCR, DWS and OSRW. The existing uses are aquatic habitat and recreation.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

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- UT of Cane Creek, upper Cumberland River basin, Laurel County. The current designated uses are OSRW, WAH, PCR, SCR and DWS.
  - Please see attached Map 10 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 85% of the UT of Cane Creek watershed is forested. Approximately 15% of the watershed has been logged. An adjacent UT of Cane Creek has similar land use to the OSRW and Exceptional Water candidate.

UT of Cane Creek is a second order stream with an average width of six feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, the dominant substrate types are bedrock, boulders and cobbles (90%). Riffles and pools dominate the available macrohabitats within the sampling reach. Stream depth ranges from 0.25 inch to two feet with an average of four inches. The gradient of the watershed is 3.1%. The stream banks are very stable and the riparian zone width is excellent. UT of Cane Creek has natural flow for approximately five months (December – April). Its 7Q10 flow value is 0 cfs and the mean annual flow is 0.9 cfs. The receiving stream, Cane Creek, has a 7Q10 of 0 cfs and a mean annual flow of 2.1 cfs.

UT of Cane Creek was sampled in 2010 by DOW probabilistic biologists. It is located within the Southwestern Appalachian Ecoregion and the Mountains Bioregion. The catchment area above the sample reach is 0.35 square mile and is considered to be a headwater stream. UT of Cane Creek is an Exceptional Water candidate because of an excellent macroinvertebrate community. It scored an 86 on the MBI, considered excellent for a headwater mountain stream. This stream had a low HBI (tolerance) score, high percentages of intolerant taxa (%EPT and %Ephemeroptera) and a low percentage of tolerant organisms (%Chironomids+Oligochaetes). Habitat quality and water chemistry were not assessed or collected for this location.

The existing uses for UT of Cane Creek are aquatic habitat and recreation. The macroinvertebrate community exceeded the base-level community structure of a stream of good or average aquatic habitat, rating excellent on the MBI. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- Cane Creek is the receiving stream of UT of Cane Creek. Its designated uses are WAH, PCR, SCR, DWS and OSRW. The existing uses are aquatic habitat and recreation.
  - Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.
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- Ashbys Fork, Ohio River basin, Boone County. The current designated uses are OSRW, WAH, PCR, SCR and DWS.
  - Please see attached Map 11 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 65% of the Ashbys Fork watershed within the proposed Exceptional Water segment is forested. About 35% of the watershed is influenced by agricultural and residential land use. Taylor Creek, an adjacent watershed, has similar land uses to Ashbys Fork; however, only about 40% of its watershed is forested.

Ashbys Fork is a third order stream with an average stream width of 12 feet. The predominant geology of the watershed is Ordovician-aged limestone. Within the stream channel, the dominant substrate types are gravel and cobble (80%). Runs are the dominant macrohabitat type within the sampling reach. Stream depth ranges from 0.25 inch to three feet. The gradient of the watershed within the proposed Exceptional Water segment is 0.9%. Stream banks are moderately stable and the riparian zone was adequately developed within the reach. Ashbys Fork is an intermittent stream, typically flowing between the months of December to May. Its 7Q10 flow value is 0 cfs and the mean annual flow is 6.2 cfs. An adjacent stream, Taylor Creek, has similar flow characteristics with a 7Q10 of 0 cfs and a mean annual flow of 4.0 cfs.

Ashbys Fork was sampled for macroinvertebrates by DOW intensive survey biologists in 2009. It is located within the Interior Plateau ecoregion and the Bluegrass bioregion. The catchment area above the sample reach is 2.2 square miles and is considered a headwater stream type. Ashbys Fork is an Exceptional Water candidate because of an excellent macroinvertebrate community. It scored 65 on the MBI; that translates to excellent for a headwater Bluegrass stream. This stream had a low HBI (tolerance) score, high percentages of intolerant taxa (%EPT and %Ephemeroptera) and a low percentage of tolerant organisms (%Chironomids+Oligochaetes). Habitat quality was assessed as good (157), and conductivity measured was slightly above average for the Bluegrass bioregion (680  $\mu$ S/cm).

The existing uses for Ashbys Fork are aquatic habitat and recreation. The macroinvertebrate community exceeded the base-level community structure for a stream of good or average aquatic habitat, rating excellent on the MBI. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- Woolper Creek is the receiving stream of Ashbys Fork. It has designated uses for WAH, PCR, SCR and DWS. The existing uses are aquatic habitat, recreation and drinking water. Double Lick Creek is within this watershed and is an OSRW.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

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- Low Gap Branch, Kentucky River basin, Letcher County. The current designated uses remain are OSRW, WAH, PCR, SCR and OSRW.
  - Please see attached Map 12 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 70% of the Low Gap Branch watershed is forested. Twenty percent of the watershed has been mined and about 10% of the watershed is influenced by agricultural and residential land uses. Roads also pass through the watershed. Elk Creek, the receiving stream, has been impacted by surface mining in approximately 85% of its watershed above Low Gap Branch.

Low Gap Branch is a second order stream with an average width of three feet. The predominant geology of the watershed is Pennsylvanian-aged sandstone. Within the stream channel, 50% of the substrate types are boulders and cobbles with bedrock composing another 20%. Riffles dominate the available macrohabitats within the sampling reach (75%). Stream depth ranges from 0.25 inch to two feet with an average of four inches. The gradient of the watershed is 10.8%. The banks are stable and the riparian zone width good. Low Gap Branch is an intermittent stream having flow for approximately five months (December through April). Its 7Q10 flow value is 0 cfs and

its mean annual flow is 0.6 cfs. Elk Creek has a 7Q10 of 0 cfs and a mean annual flow of 3.5 cfs at its confluence with Low Gap Branch.

Low Gap Branch was sampled for macroinvertebrates by DOW intensive survey biologists in 2005. It is located within the Central Appalachian Ecoregion and the Mountains Bioregion. The catchment area above the sample reach is 0.2 square mile. Low Gap Branch is an Exceptional Water candidate because of an excellent macroinvertebrate community. It scored an 83 on the MBI indicating the community is excellent for a headwater mountain stream. This stream had a low HBI (tolerance) score, high percentages of intolerant taxa (%EPT and %Ephemeroptera) and a low percentage of tolerant organisms (%Chironomids+Oligochaetes). Habitat quality was assessed as fair (150), while specific conductivity was on the high side of what is considered good for the Mountains (284  $\mu\text{S}/\text{cm}$ ).

The existing uses for Low Gap Branch are aquatic habitat and recreation. The macroinvertebrate community exceeded the base-level community structure of a stream of good or average aquatic habitat, rating excellent on the MBI. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- Elk Creek is the receiving stream of Low Gap Branch. It has designated uses for WAH, PCR, SCR and DWS. The existing uses are aquatic habitat and recreation.
  - Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.
- 
- West Fork Red River, Lower Cumberland River basin, Christian County. The designated use is OSRW; this is an amendment that rectifies the discrepancy in 401 KAR 10:026 that list the entire segment that is a CAH as an OSRW, too. The OSRW segment terminates at stream mile 26.85 (mouth of Montgomery Creek); whereas, the CAH segment continues upstream to stream mile 32.2. The current designated uses remain; they are CAH, OSRW, PCR, SCR and DWS.
  - Please see attached Map 17 for relative location of the proposed stream segment.
  - According to 2010 FSA Color Ortho Imagery, 40% of the West Fork Red River watershed is forested within the Exceptional Water segment. The remaining 60% of the watershed is influenced by row cropping and residential land use. Red River, the receiving stream, has similar land uses to the West Fork Red River.
  - West Fork Red River is a fifth order stream with an average width of 50 feet. The predominant geology of the watershed is Mississippian-aged limestone. Within the stream channel, 67% of the substrate types are cobbles, boulders and gravels with sand composing another 17%. Pools dominate the available macrohabitats within the

sampling reach (70%). Stream depth ranges from one inch to 3.5 feet with an average of 1.5 feet. The gradient of the watershed within the Exceptional Water segment is 0.7%. The banks are moderately stable and the riparian zone width good at the sampling reach. West Fork Red River is a perennial stream with groundwater-fed flow throughout the year. Its 7Q10 flow value is 6.7 cfs and its mean annual flow is 221.4 cfs. Montgomery Creek, which feeds the West Fork Red River at the most upstream portion of the Exceptional Water segment, has a 7Q10 of 1.8 cfs and a mean annual flow of 51.4 cfs.

West Fork Red River was last sampled in 2010 by DOW reference reach biologists. It is located within the Interior Plateau Ecoregion and the Pennyroyal Bioregion. The catchment area above the sample reach was 158.9 square miles and is considered to be a wadeable. West Fork Red River is an Exceptional Water candidate because of an excellent macroinvertebrate community. It scored an 81 on the MBI which is excellent for a wadeable stream in the Pennyroyal bioregion. This stream had a moderately low HBI (tolerance) score, high percentages of intolerant taxa (%EPT and %Ephemeroptera) and a low percentage of tolerant organisms (%Chironomids+Oligochaetes). The macroinvertebrate community was excellent despite fair habitat quality (136). Conductivity was measured at 429  $\mu\text{S}/\text{cm}$ ; indicative of good water quality within this region of the state.

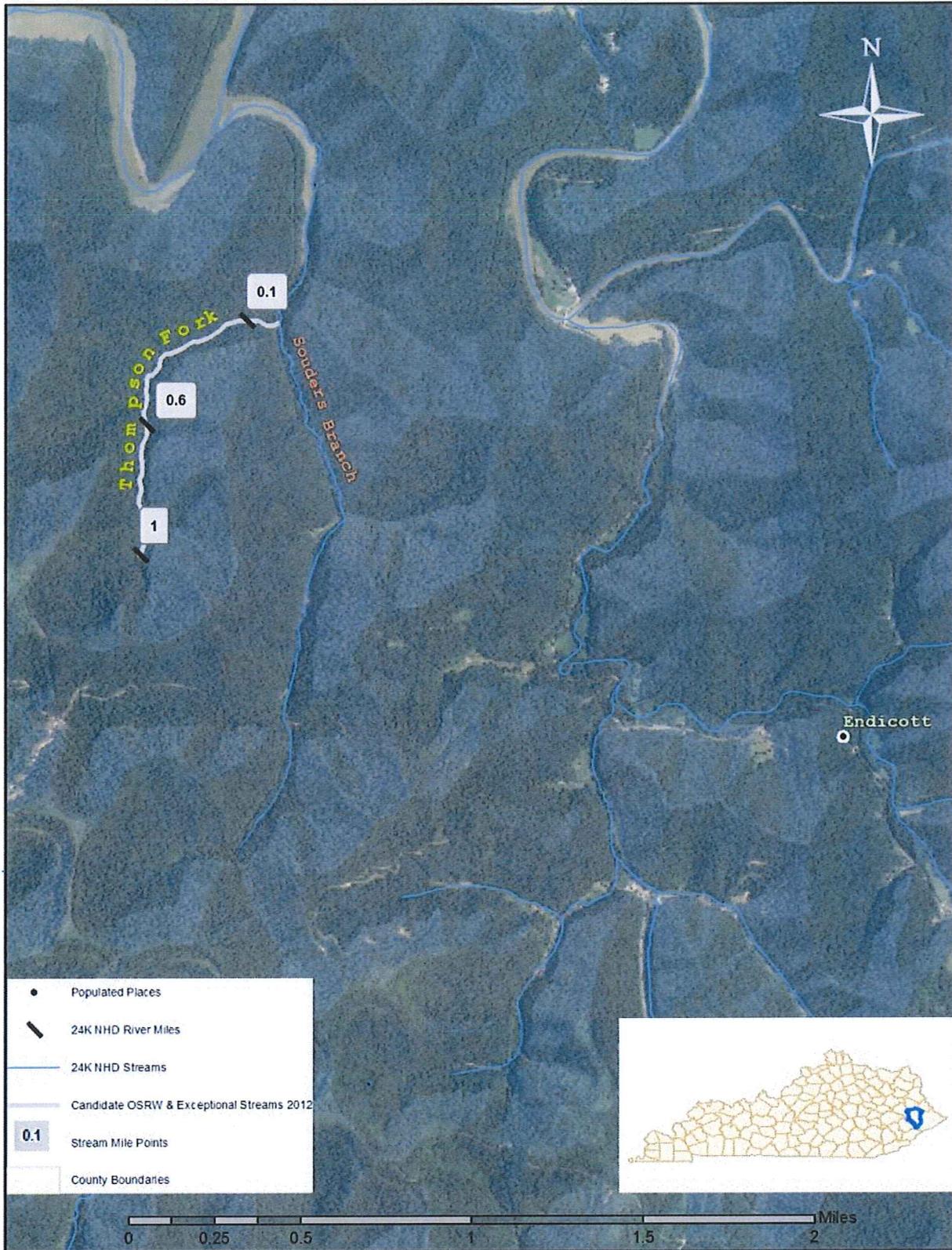
The existing uses for West Fork Red River are OSRW, aquatic habitat, recreation and drinking water. The macroinvertebrate community exceeded the base-level community structure of a stream of good or average aquatic habitat, rating excellent on the MBI. The water quality shall be maintained per the criteria in 401 KAR 10:031 and particularly those unique to OSRWs found in Sections 4 and 8.

- The Red River is the receiving stream of West Fork Red River in Tennessee, prior to it discharging to the Cumberland River. The existing uses are aquatic habitat, recreation and drinking water.
- Streams designated as an OSRW-Exceptional have more stringent criteria for minimum concentration of dissolved oxygen, as set by the Kentucky Division of Water (DOW), than streams that support the default aquatic life designation of warm water aquatic habitat.

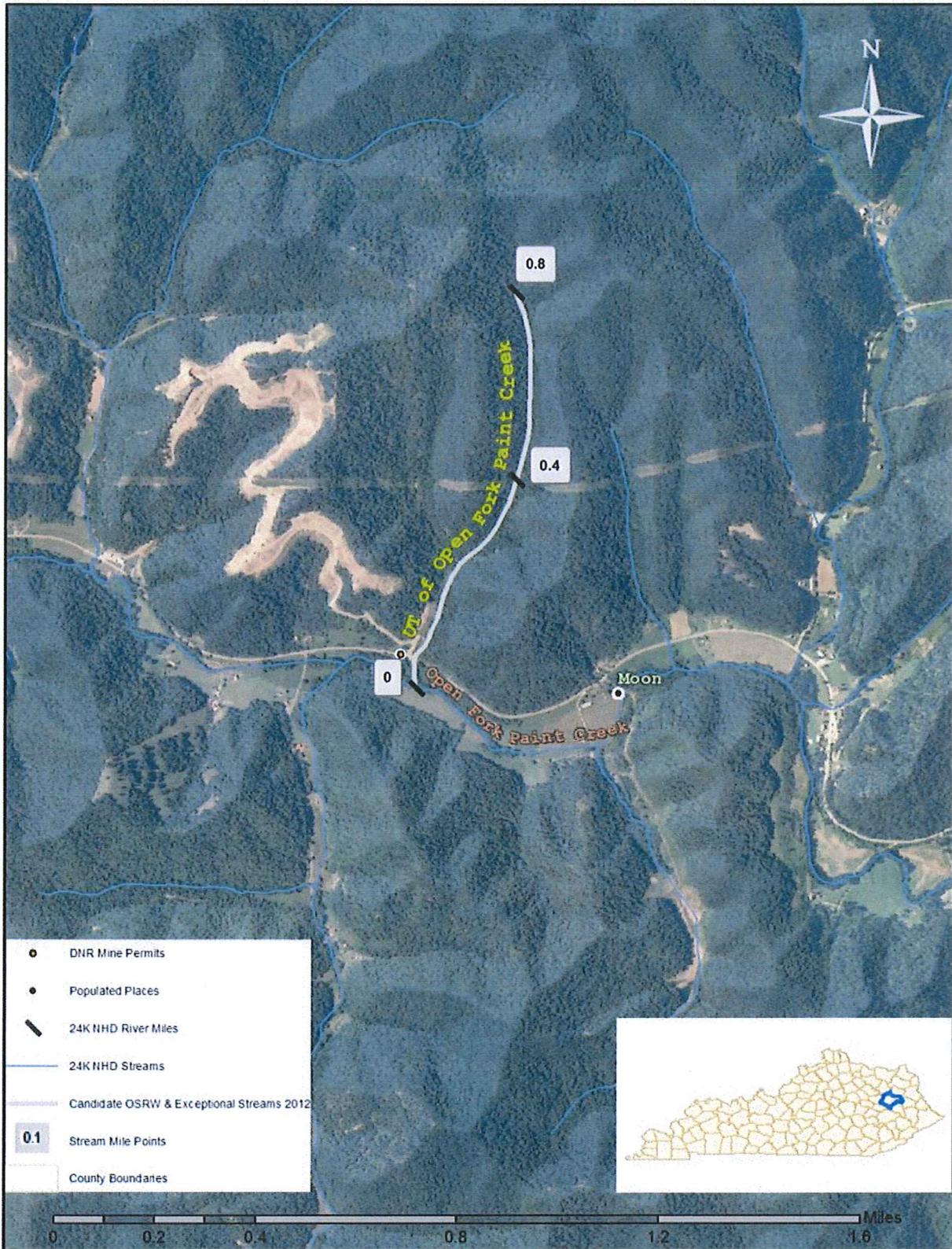
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Following are maps depicting the proposed stream location relative to county, a portion of the receiving stream and land cover. Note, due to formatting limitations of Map 7 (Clear Creek) the receiving stream, Roundstone Creek, was not shown given its downstream distance from the proposed Exceptional Water segment.

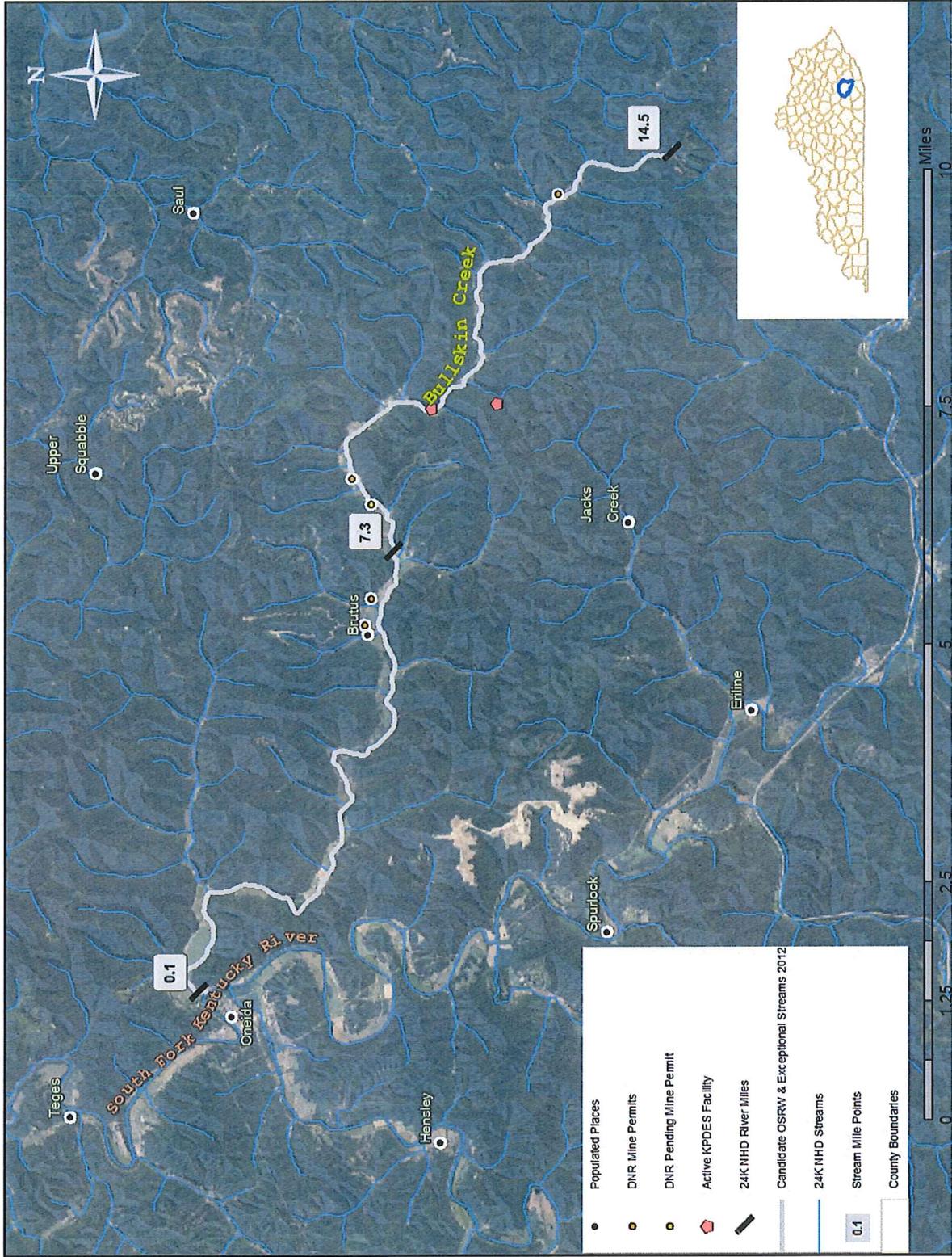
Map 1. Thompson Fork, a tributary of Sounders Branch, Big Sandy River Basin, Floyd County.



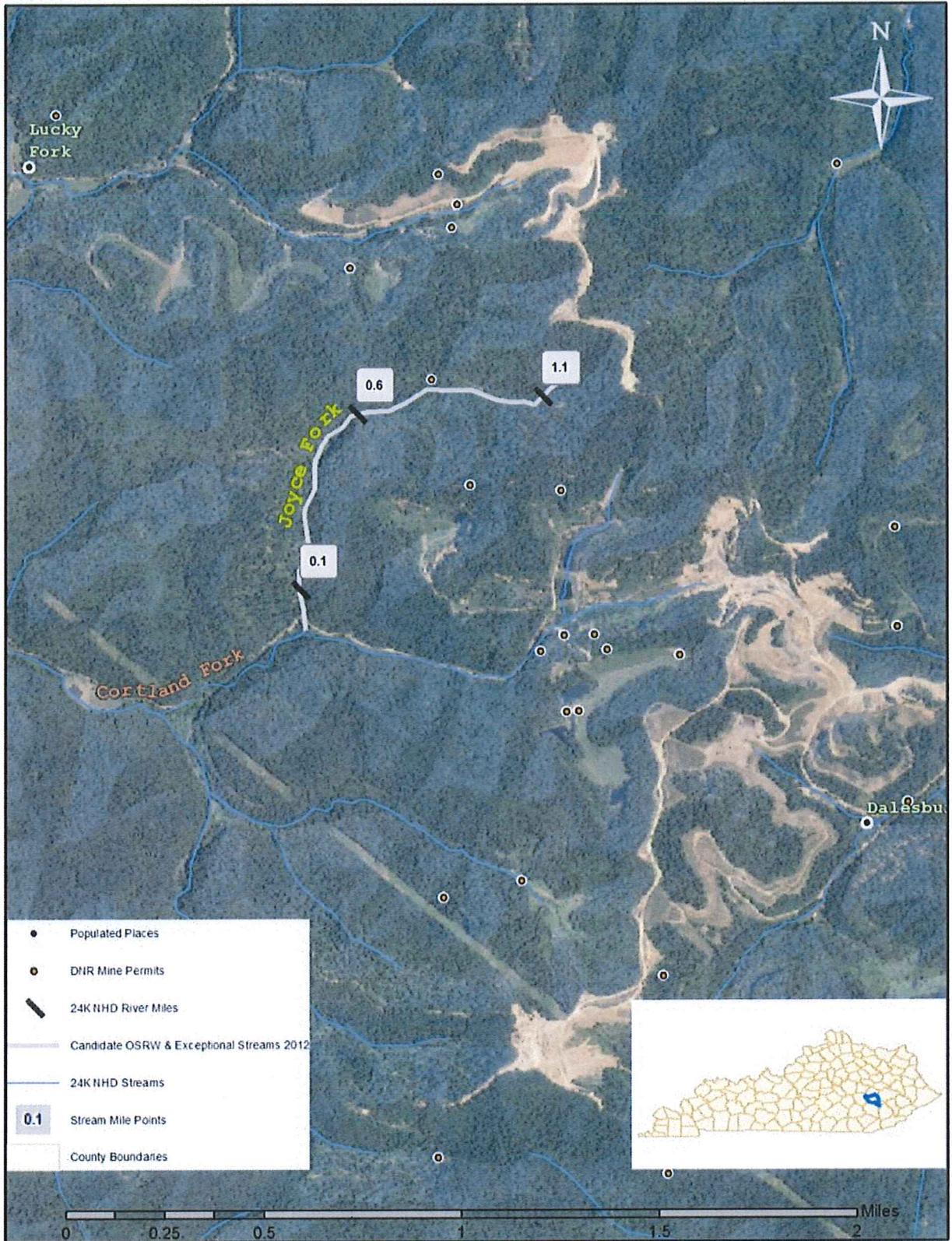
Map 2. Unidentified Tributary (UT) of Open Fork Paint Creek, a tributary of Open Fork Paint Creek, Big Sandy River Basin, Morgan County.



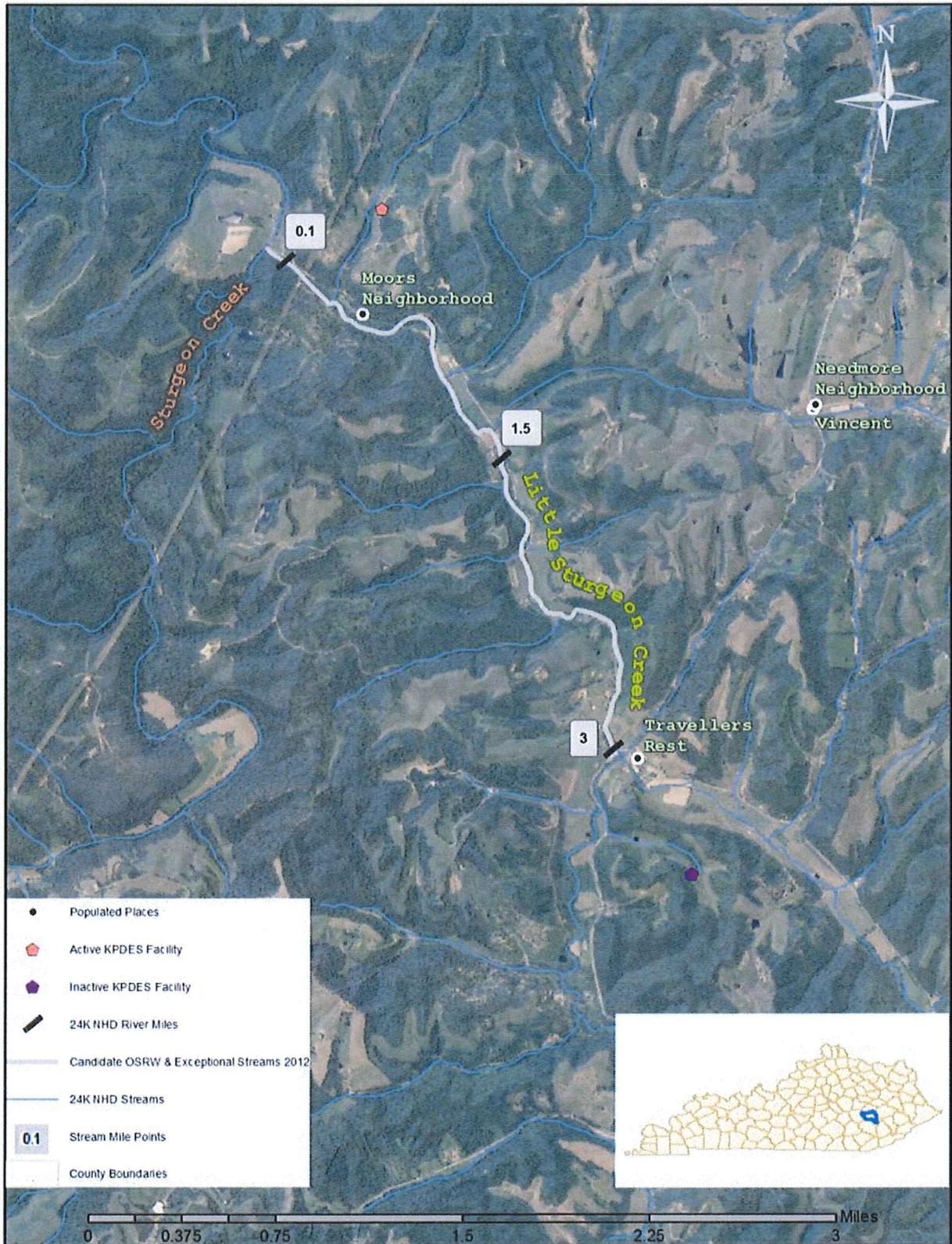
Map 3. Bullskin Creek, a tributary of the Redbird River, Kentucky River Basin, Clay County.



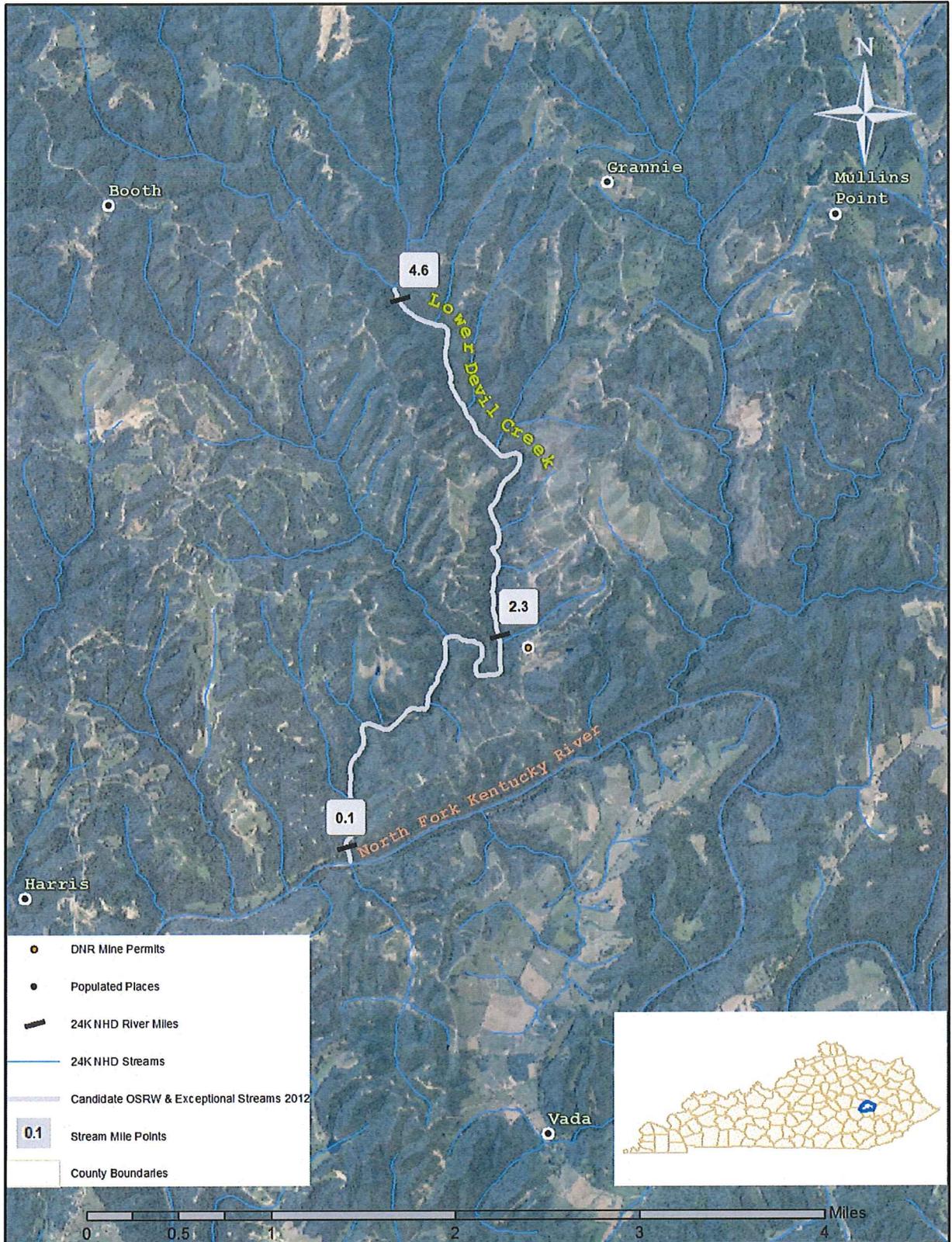
Map 4. Joyce Fork, a tributary of Cortland Fork, Kentucky River Basin, Owsley County.



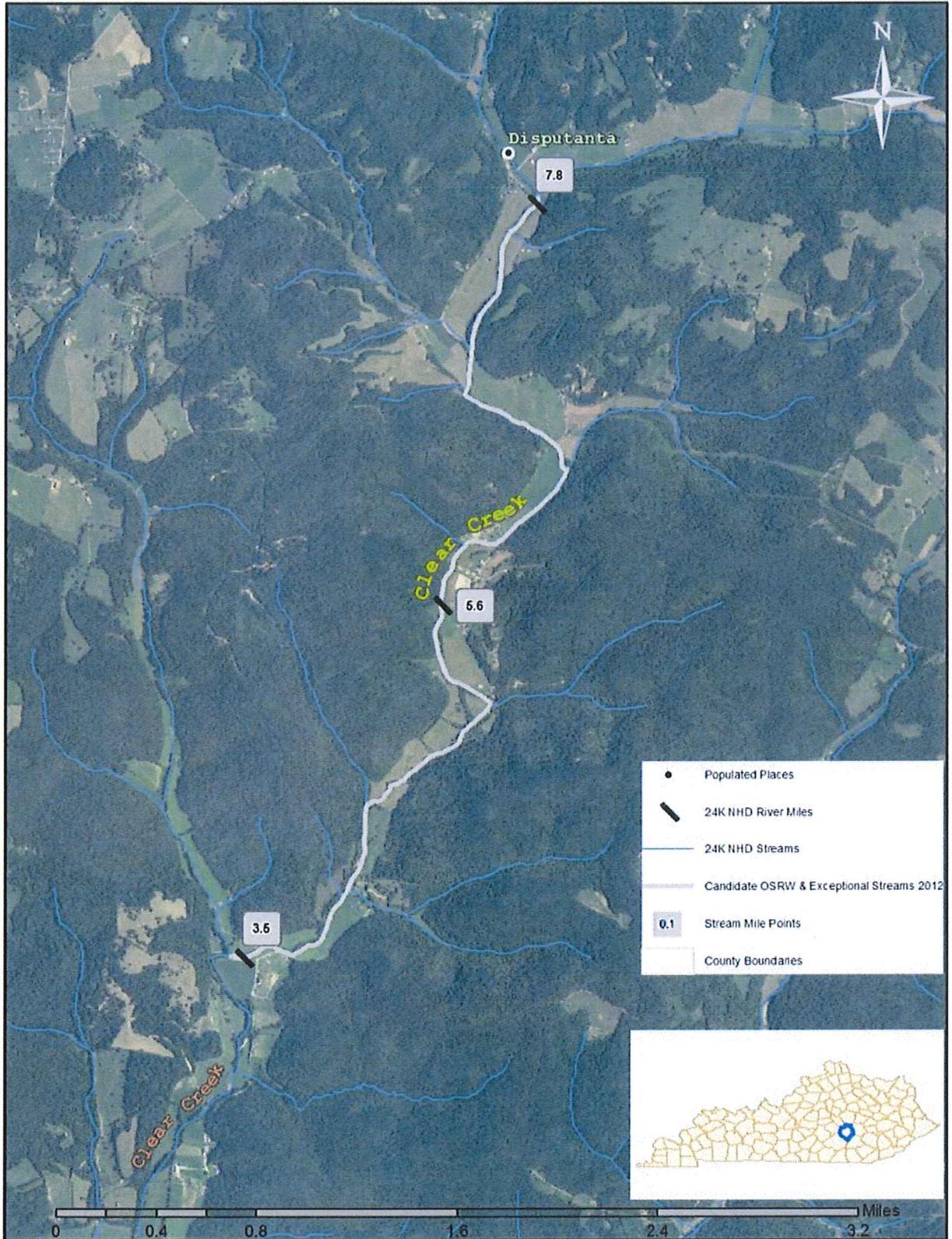
Map 5. Little Sturgeon Creek, a tributary of Sturgeon Creek, Kentucky River Basin, Owsley County.



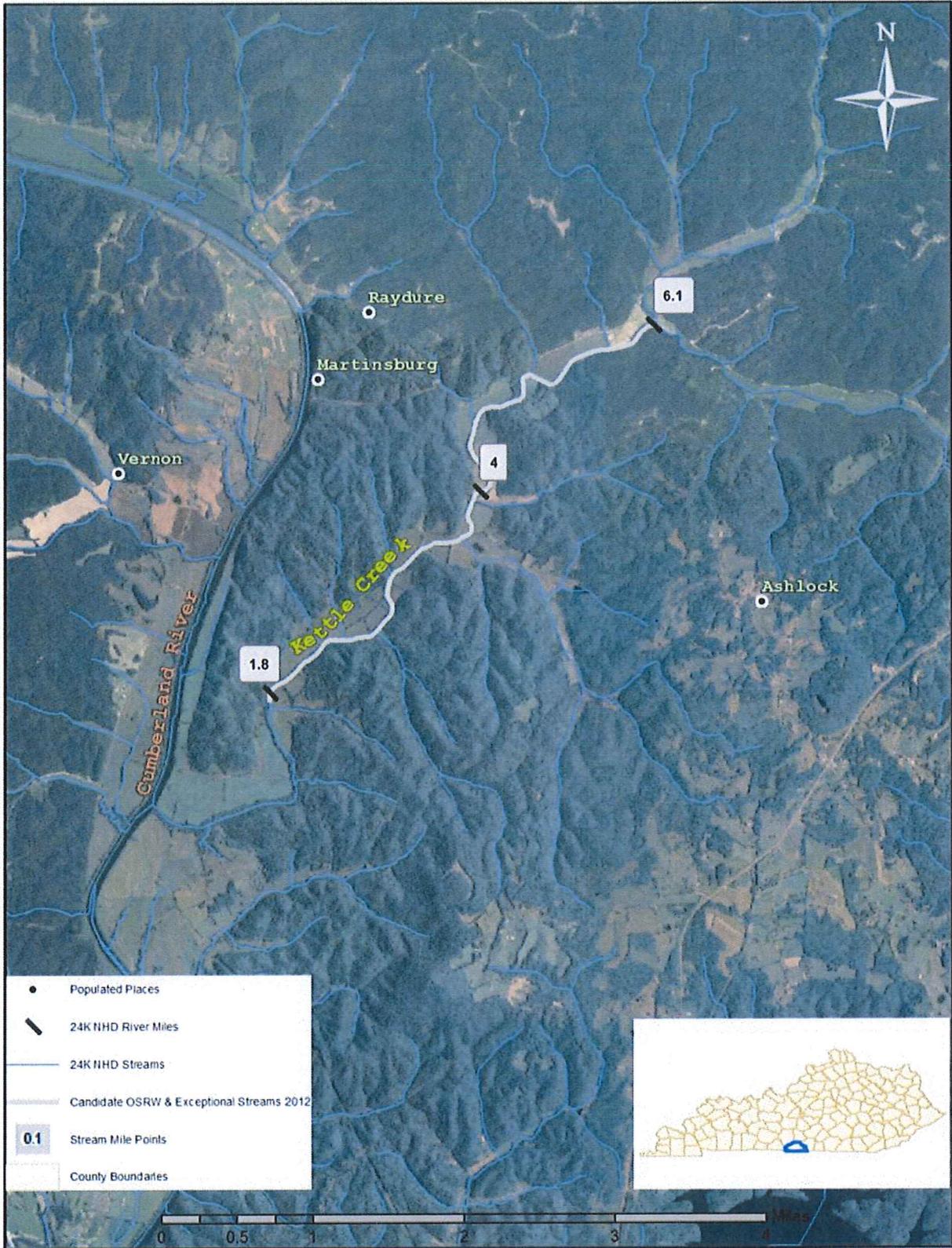
Map 6. Lower Devil Creek, a tributary of North Fork Kentucky River, Kentucky River Basin, Lee County.



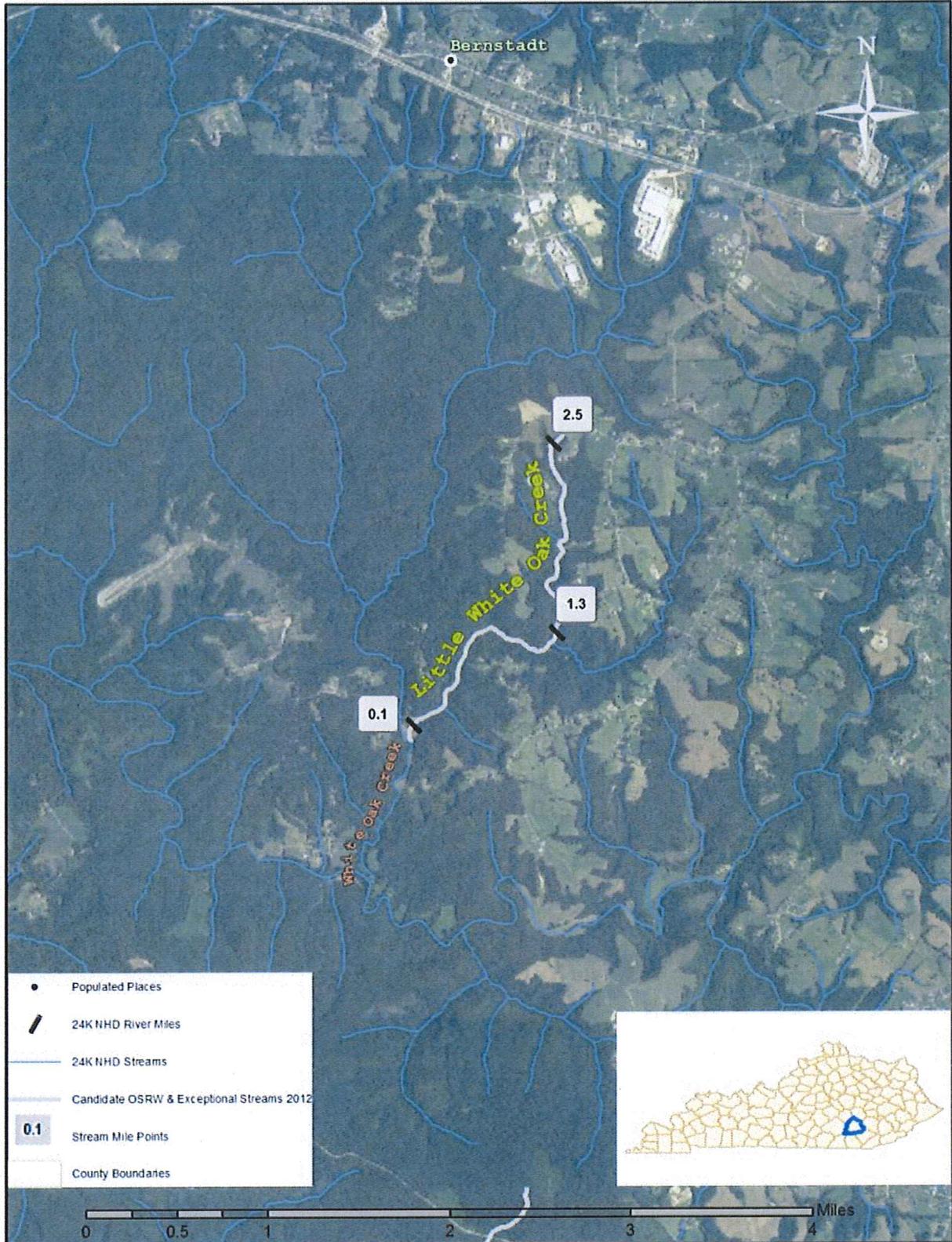
Map 7. Clear Creek, a tributary of Roundstone Creek, Upper Cumberland River Basin, Rockcastle County.



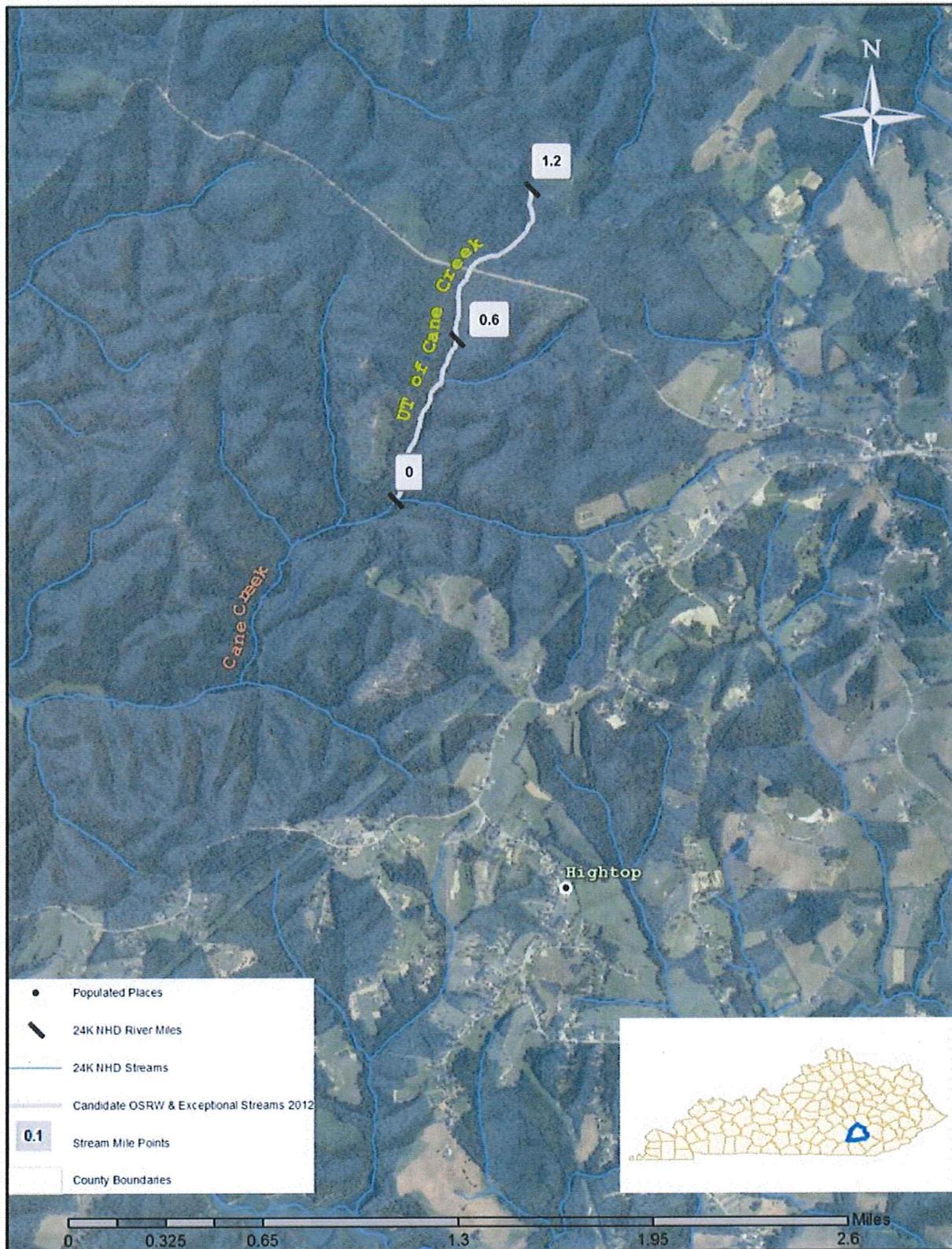
Map 8. Kettle Creek, a tributary of the Cumberland River, Upper Cumberland River Basin, Monroe County.



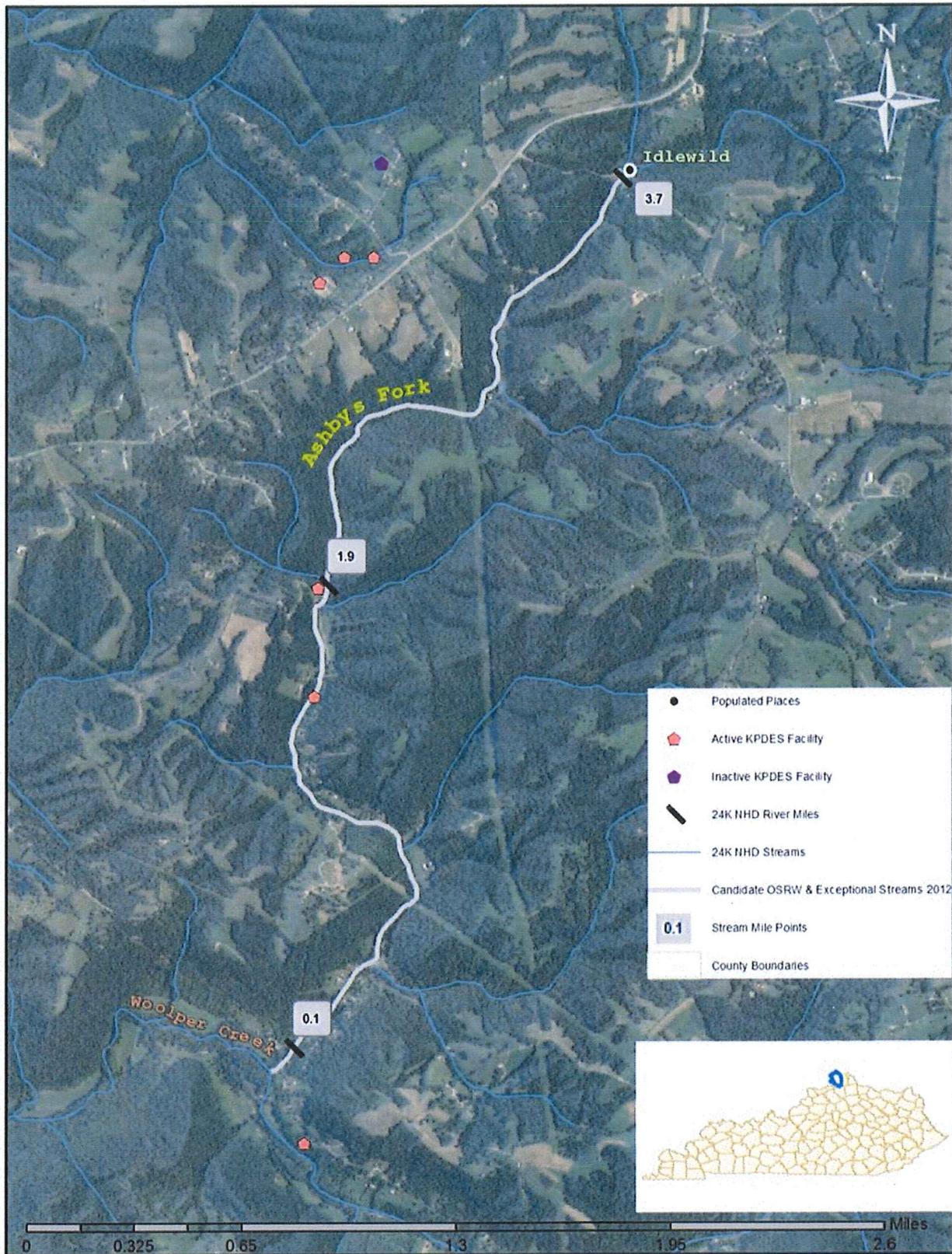
Map 9. Little White Oak Creek, a tributary of White Oak Creek, Upper Cumberland River Basin, Laurel County.



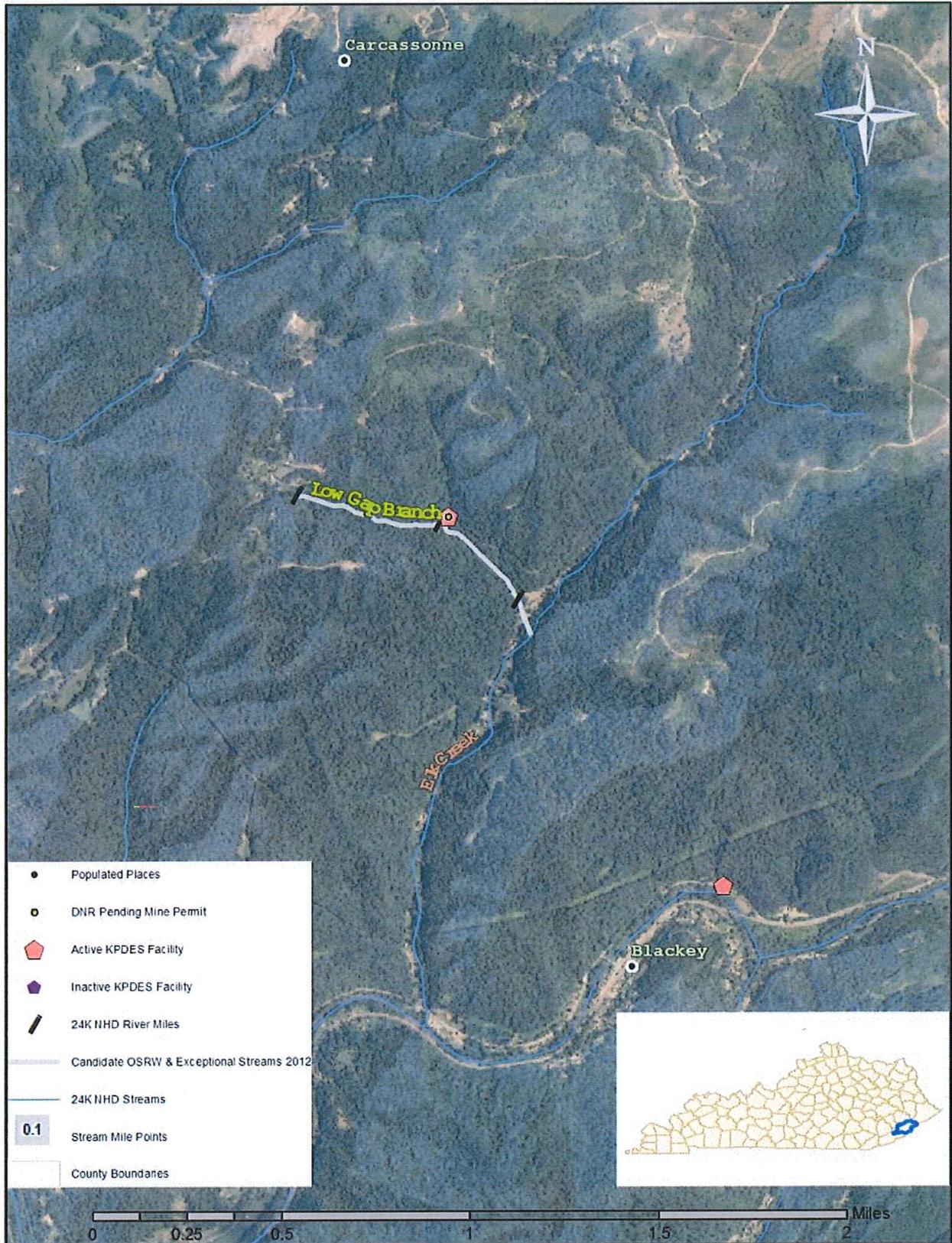
Map 10. Unnamed Tributary of Cane Creek, a tributary of Cane Creek, Upper Cumberland River Basin, Laurel County.



Map 11. Ashbys Fork, a tributary of Woolper Creek, Ohio River Basin, Boone County.



Map 12. Low Gap Branch, a tributary of Elk Creek, Kentucky River Basin, Letcher County.



Map 13. West Fork Red River, Lower Cumberland River basin, Christian County.

