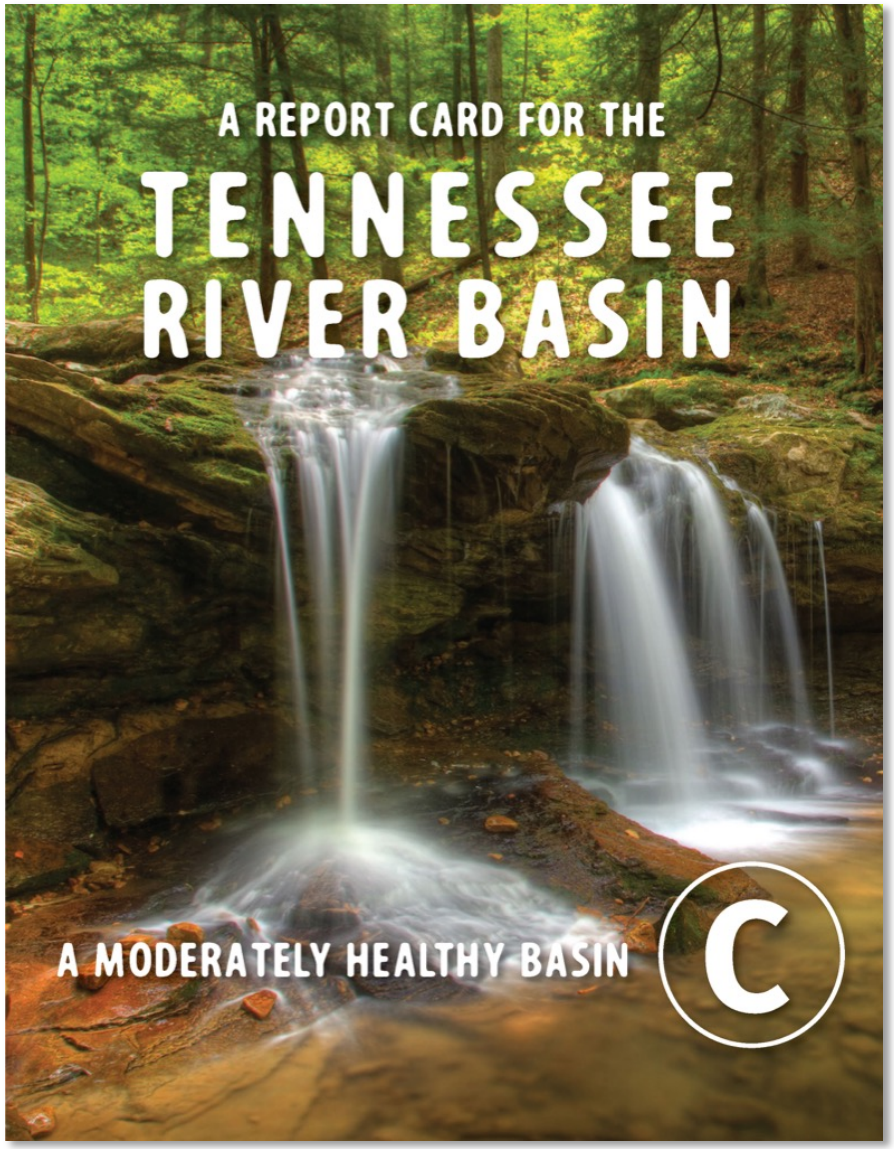


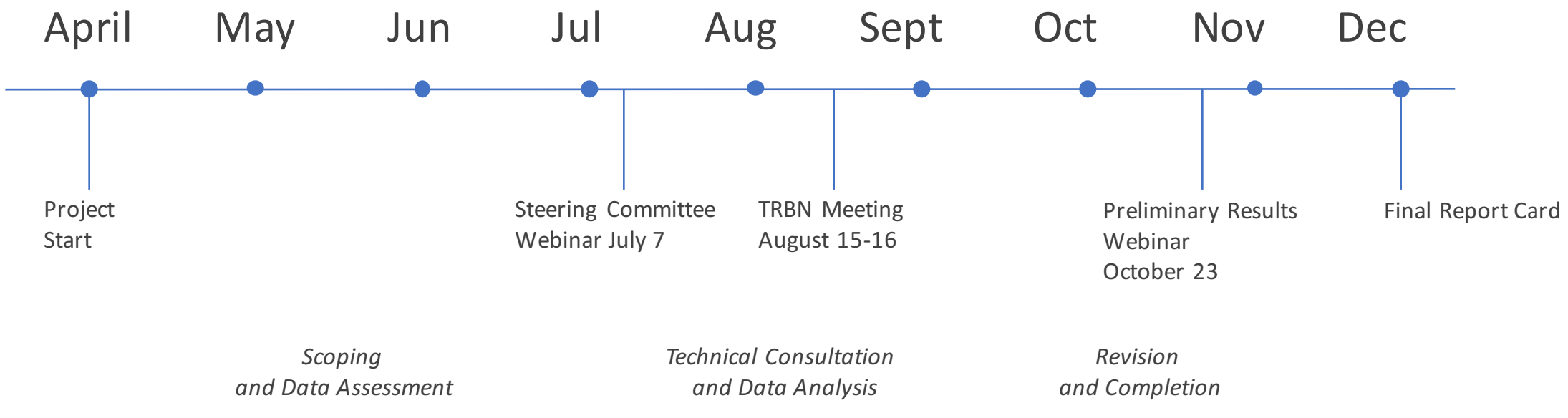
Results from the Tennessee River Basin Ecosystem Health Report Card

February 9, 2018

Tennessee River Basin Planning Network
Heath Kelsey
Andrew Elmore
Dylan Taillie

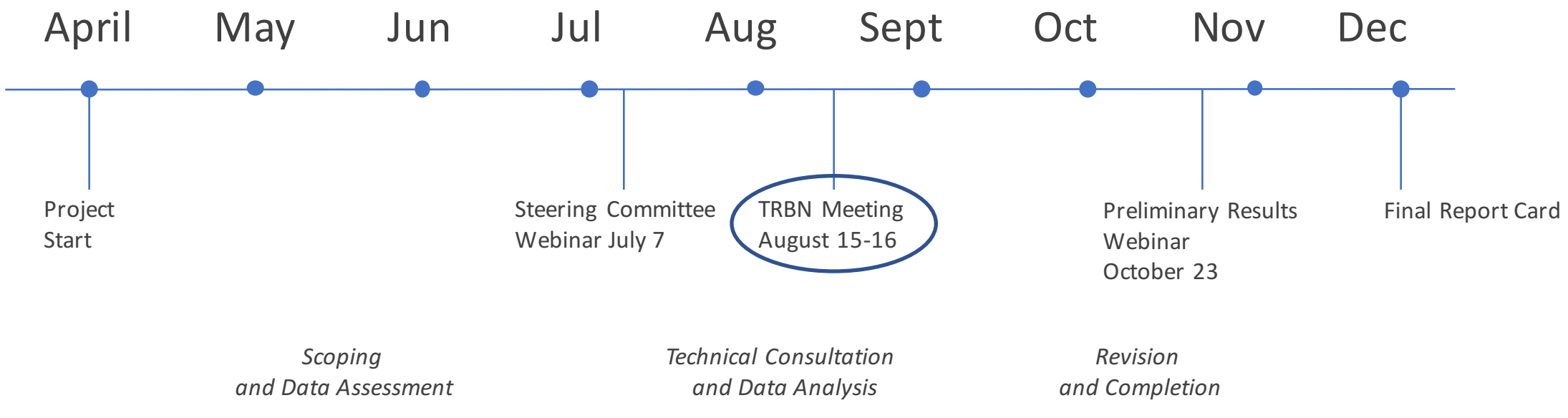
University of Maryland
Center for Environmental Science

Tennessee River Basin Report Card Timeline



Tennessee River Basin Report Card Timeline

The TRBN meeting in Chattanooga was a significant milestone

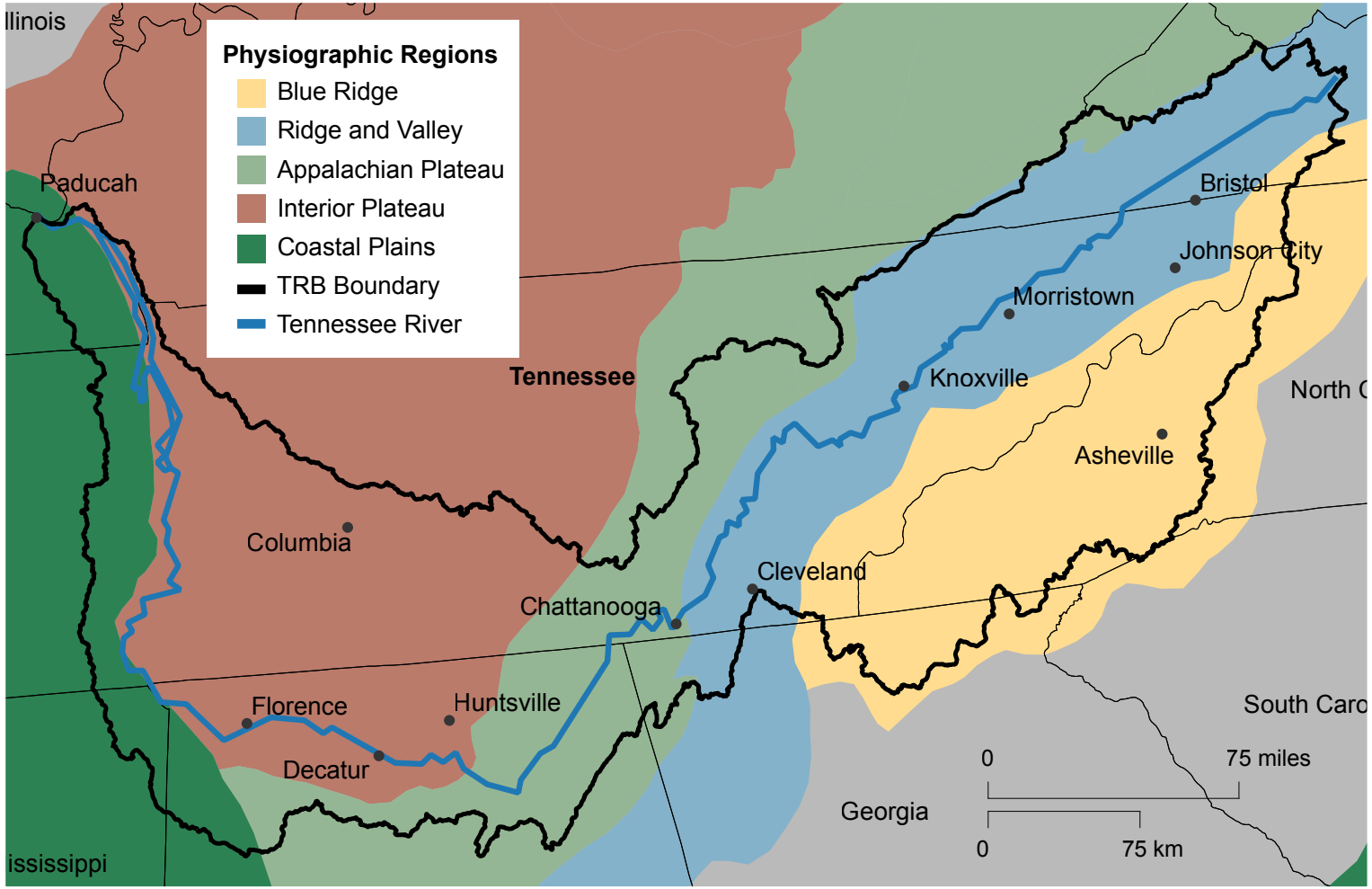


Participants identified key values and stressors in the basin

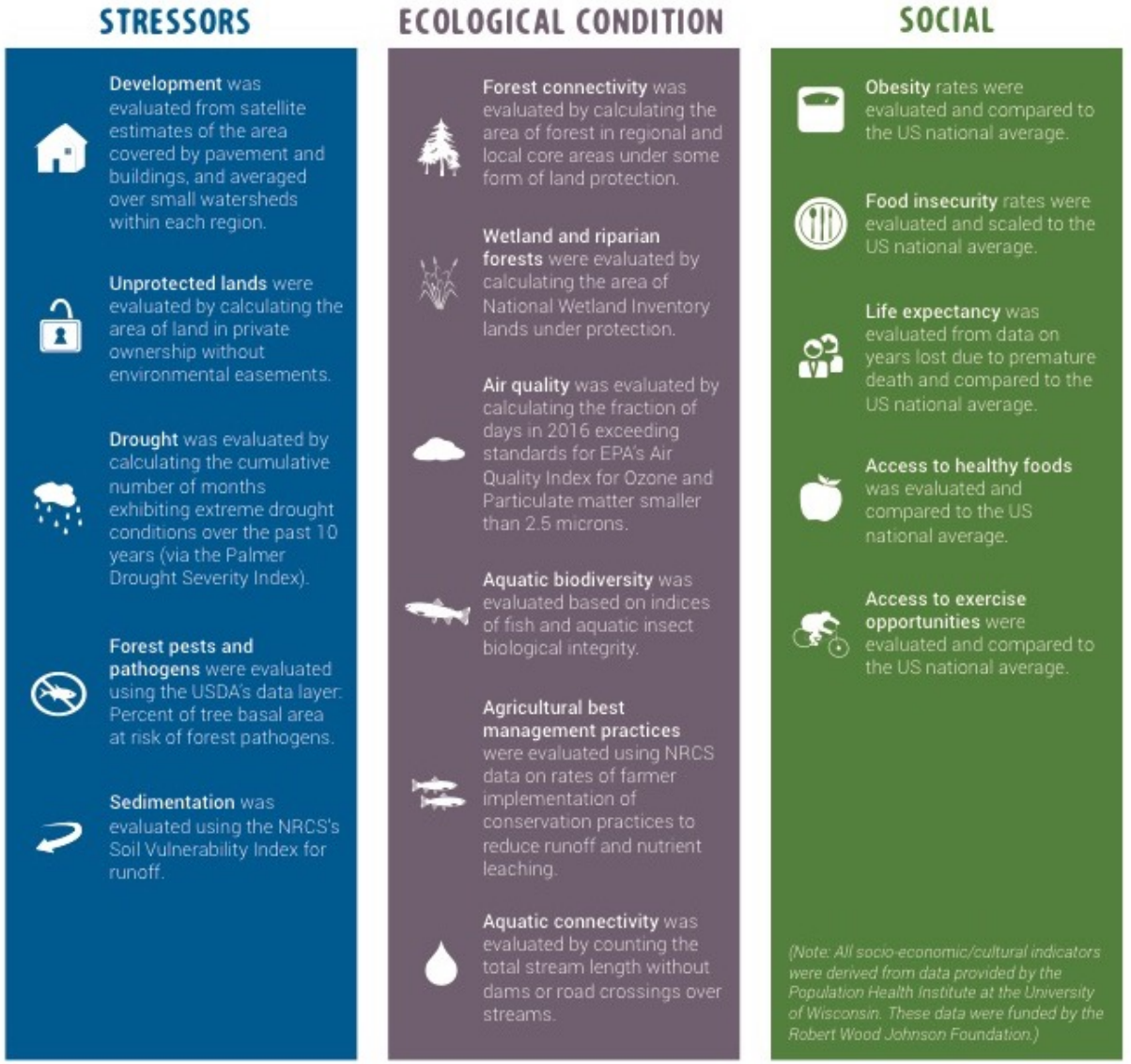
Four big stories were identified for the Tennessee River Basin

- Forest habitat connectivity
- Dams, climate change, and aquatic habitat
- Land based sources of pollution to streams and rivers: Sedimentation
- Development

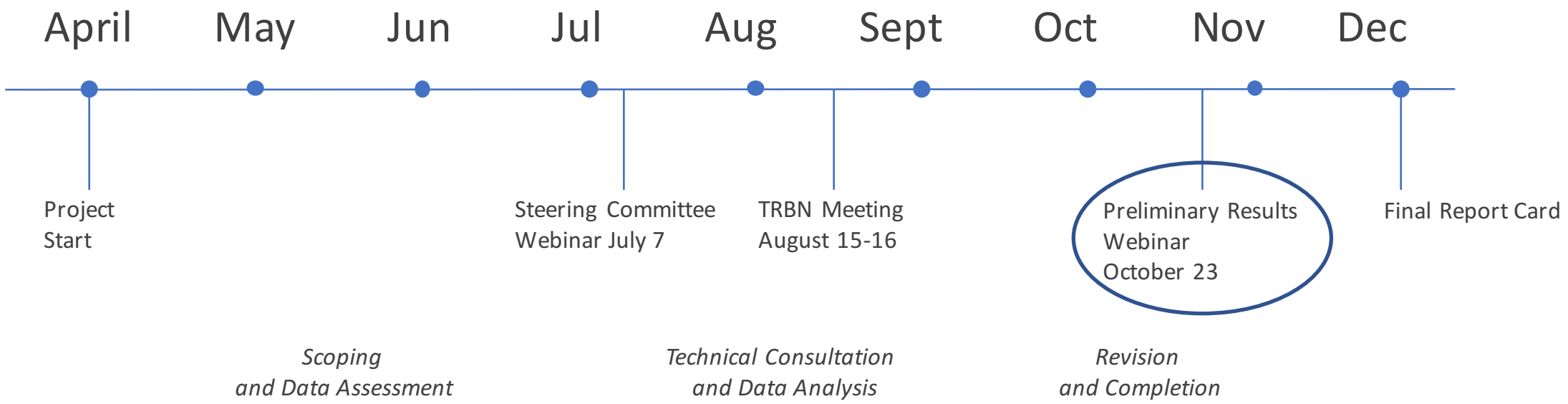
We decided how to split up the basin into smaller regions



We talked about three key themes for indicators

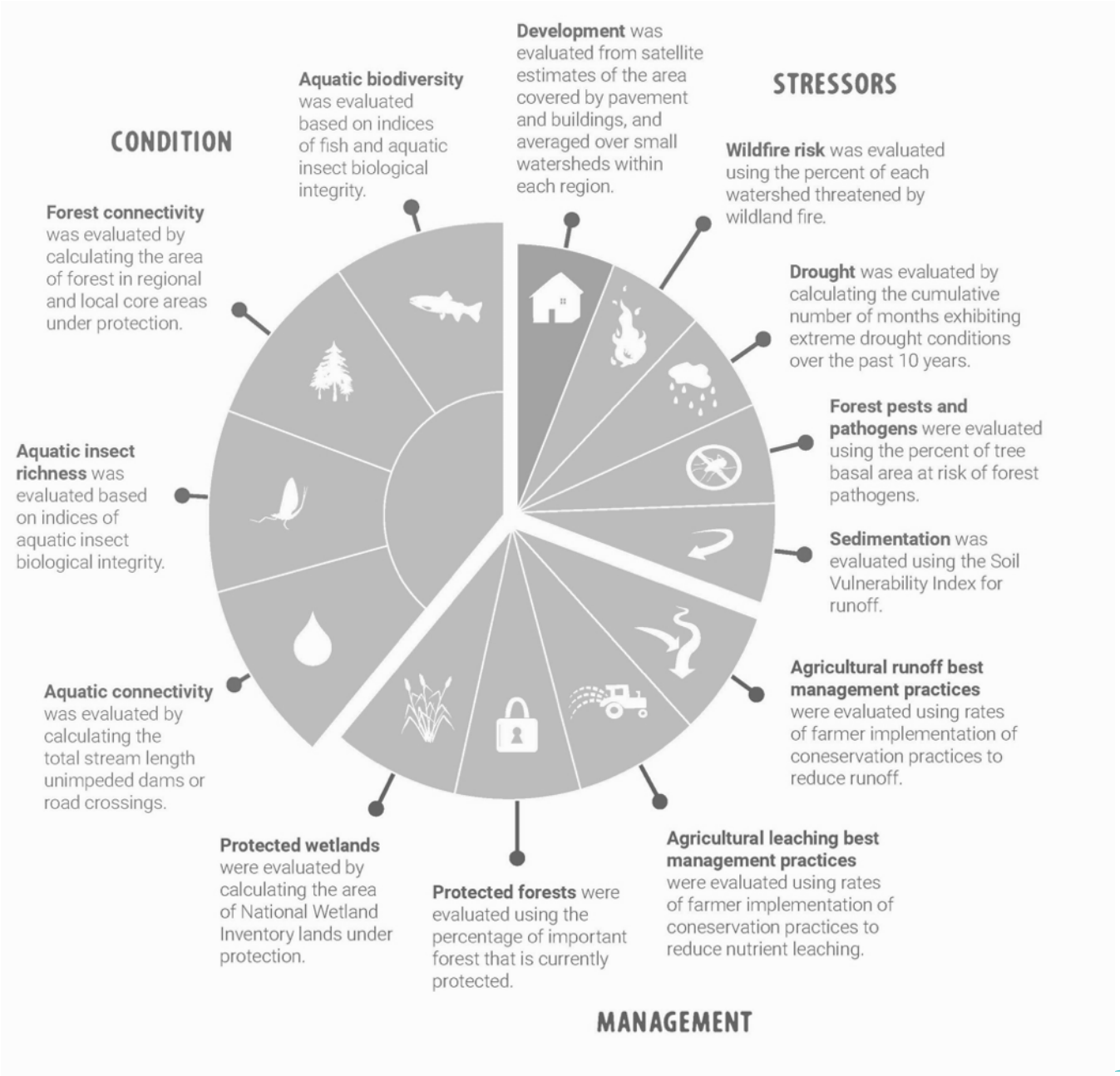


Preliminary results were presented at a webinar in October

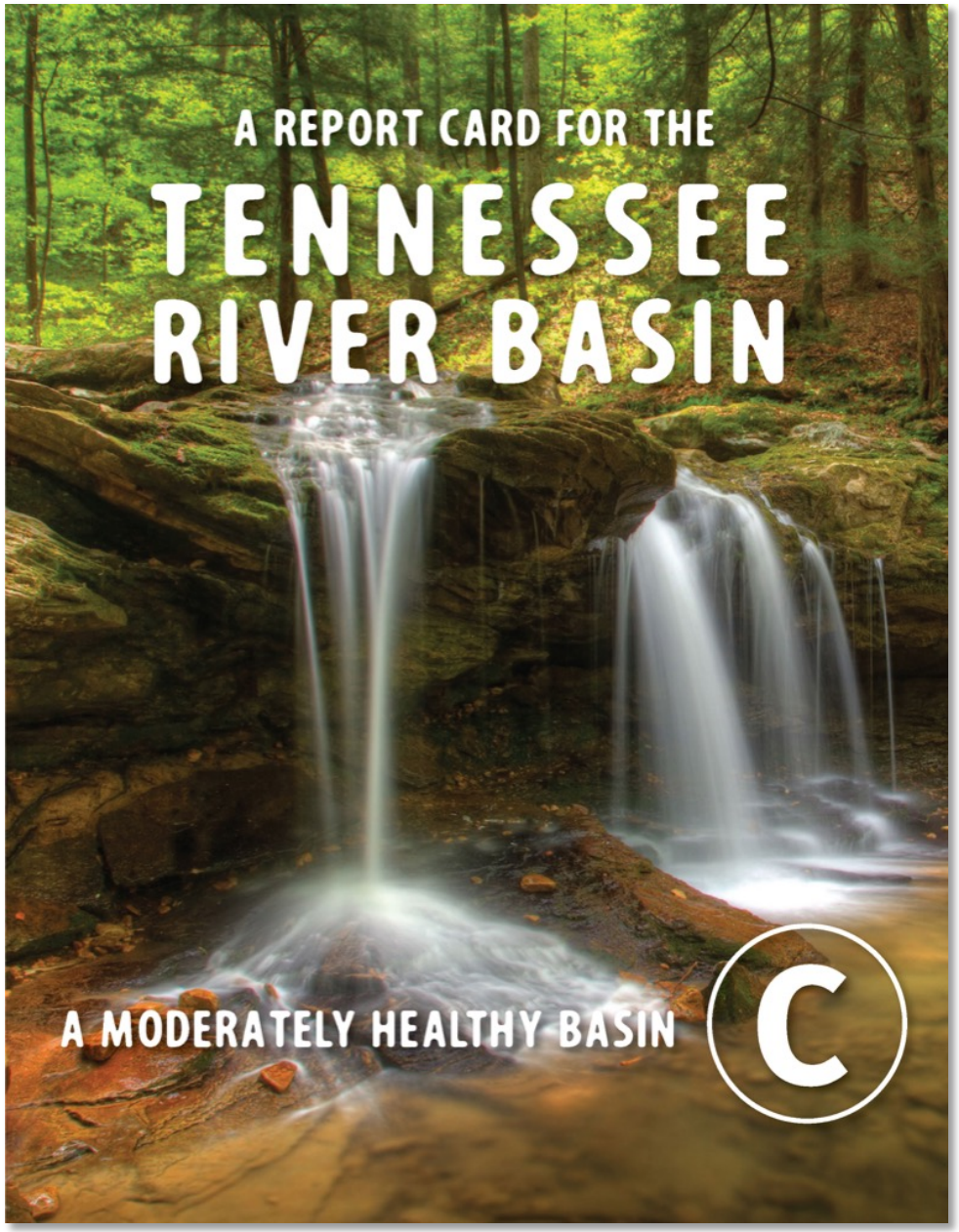


Revised to:

- Condition
- Stressors
- Management



Front page

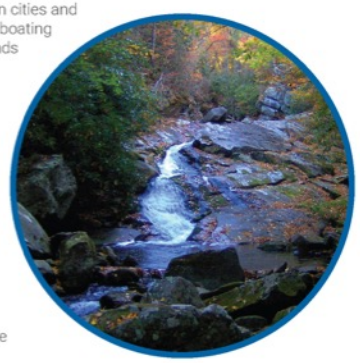

A REPORT CARD FOR THE
TENNESSEE
RIVER BASIN
A MODERATELY HEALTHY BASIN
C

First two pages inside

A UNIQUE AND VALUED BASIN

THE TENNESSEE RIVER BASIN IS WILD AND DIVERSE

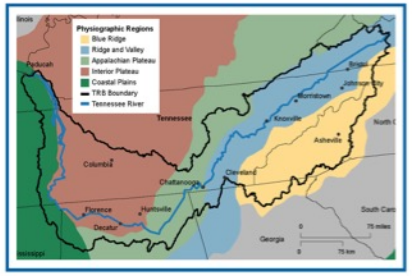
The Tennessee River Basin is home to over 5 million people in cities and small rural communities. Hunting, fishing, hiking, biking, and boating are popular outdoor activities in the amazing recreational lands of the Blue Ridge mountains. Flowing out of the Blue Ridge headwaters are thousands of streams that support some of the most diverse aquatic life in the world. However, the many dams here and throughout the basin restrict the movement of fish and other aquatic organisms, limiting dispersal and threatening population stability. The Tennessee River is one of the most impounded rivers in the world. Activities like boating and fishing on lakes created by dams are a way of life in the basin, garnering millions of dollars in economic activity through tourism. Through the ridge and valley and interior plateau, the river and its network of lakes is an important transportation corridor for shipping goods produced throughout the basin. Dams are also a source of carbon-neutral electricity, which attracts businesses dependent on clean electricity. The rich cultural heritage of Tennessee leads to the state being entirely designated as a National Heritage Area; Civil War sites throughout the state recall and remember the past.



Lynn Camp Prong Falls, Great Smoky Mountains, TN.
Brian Stansberry.

REPORT CARD REGIONS ARE BASED ON GEOLOGY AND BIOLOGY

Tennessee River Basin stakeholders divided the basin into six regions based on the geology and biology of the landscape. The headwaters of the Tennessee River are in the Blue Ridge mountains and Ridge and Valley regions. While the Blue Ridge enjoys considerable land protection and a dense network of forests, the valleys of the Ridge and Valley region are more densely populated, including the cities of Knoxville and Chattanooga, and land is used extensively for grazing. Agricultural activities intensify in the Appalachian and Interior Plateaus, where the topography is more conducive to agriculture. At the most western edge of the Tennessee River Basin is the Coastal Plain, which is a remarkably flat region dominated by cultivated agriculture. The reporting regions of this report card largely follow these physiographic boundaries, although the Appalachian Plateau is divided into a northern and southern region. Each region was evaluated independently, based on relevant data for indicators measuring important stressors, environmental condition, and management activities.



Six physiographic provinces in the Tennessee River Basin are based on physiographic characters of the landscape.

STRESSORS IN THE BASIN

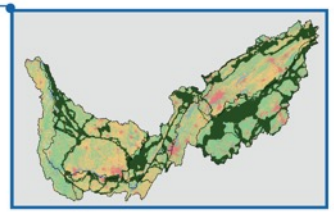
A BASIN UNDER THREAT

The Tennessee River Basin faces many stressors that threaten the basin's health. Main stressors to the basin include habitat fragmentation, climate change and its effects on aquatic habitats, pollution, and development in the basin. These major threats are outlined below. Indicators were chosen to reflect these stressors in the report card.

Forest habitat fragmentation

An important strategy of landscape conservation is to protect a network of densely forested areas, each connected by forest corridors that permit the movement of plants and animals to new and better habitat. Outside of the region's state and national parks and forests, timber production companies have historically owned many of these important core and corridor forests. However, recent trends in land ownership have opened the potential for non-forest land uses. Thus, unprotected core and corridor forests have become a significant stress on the basin, potentially leading to lower quality, fragmented forests in the future.

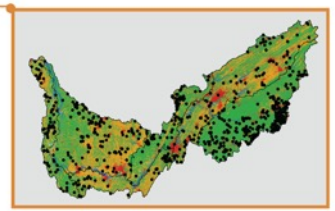
The Tennessee River Basin forests (dark green) are most heavily fragmented in the Blue Ridge, North Appalachain Plateau, and Interior Plateau regions.



Dams, climate change, and aquatic habitat fragmentation

The Tennessee River Basin is one of the most impounded river networks in the world, which poses challenges to aquatic organisms attempting to disperse, find habitat, spawn, and thrive. As the climate warms and precipitation variability becomes more extreme, droughts are becoming more common. Drought, and the associated low stream flow, further reduce aquatic habitat area and connectivity. Drought has also contributed substantially to forest health and the risk of wild fire, notably contributing to the devastating 2017 wildfires in Gatlinburg, TN.

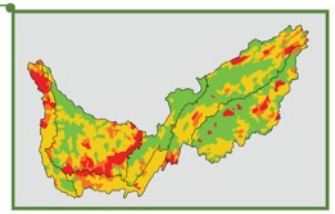
Dams (black) in the Tennessee River Basin are most heavily concentrated in the Blue Ridge region.



Land-based sources of pollution to streams and rivers

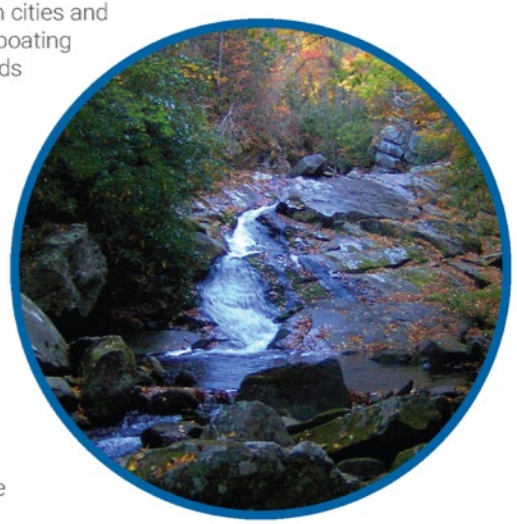
River and stream pollution can originate from urban land, but sedimentation and nutrients from agricultural lands is the dominant pathway in the basin. Highly erodible soils located in hilly terrain are the biggest source of sediment. While agricultural best management practices such as cover cropping and buffers can reduce runoff and leaching of polluted waters to streams and groundwater, these practices have not been implemented everywhere.

Highest levels of sedimentation (red) occur in the Interior Plateau and Coastal Plains regions of the Tennessee River Basin.



THE TENNESSEE RIVER BASIN IS WILD AND DIVERSE

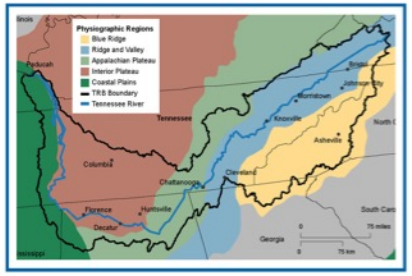
The Tennessee River Basin is home to over 5 million people in cities and small rural communities. Hunting, fishing, hiking, biking, and boating are popular outdoor activities in the amazing recreational lands of the Blue Ridge mountains. Flowing out of the Blue Ridge headwaters are thousands of streams that support some of the most diverse aquatic life in the world. However, the many dams here and throughout the basin restrict the movement of fish and other aquatic organisms, limiting dispersal and threatening population stability. The Tennessee River is one of the most impounded rivers in the world. Activities like boating and fishing on lakes created by dams are a way of life in the basin, garnering millions of dollars in economic activity through tourism. Through the ridge and valley and interior plateau, the river and its network of lakes is an important transportation corridor for shipping goods produced throughout the basin. Dams are also a source of carbon-neutral electricity, which attracts businesses dependent on clean electricity. The rich cultural heritage of Tennessee leads to the state being entirely designated as a National Heritage Area; Civil War sites throughout the state recall and remember the past.



Lynn Camp Prong Falls, Great Smoky Mountains, TN.
Brian Stansberry.

REPORT CARD REGIONS ARE BASED ON GEOLOGY AND BIOLOGY

Tennessee River Basin stakeholders divided the basin into six regions based on the geology and biology of the landscape. The headwaters of the Tennessee River are in the Blue Ridge mountains and Ridge and Valley regions. While the Blue Ridge enjoys considerable land protection and a dense network of forests, the valleys of the Ridge and Valley region are more densely populated, including the cities of Knoxville and Chattanooga, and land is used extensively for grazing. Agricultural activities intensify in the Appalachian and Interior Plateaus, where the topography is more conducive to agriculture. At the most western edge of the Tennessee River Basin is the Coastal Plain, which is a remarkably flat region dominated by cultivated agriculture. The reporting regions of this report card largely follow these physiographic boundaries, although the Appalachian Plateau is divided into a northern and southern region. Each region was evaluated independently, based on relevant data for indicators measuring important stressors, environmental condition, and management activities.



Six physiographic provinces in the Tennessee River Basin are based on physiographic characters of the landscape.

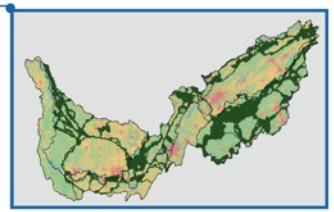
STRESSORS IN THE BASIN

A BASIN UNDER THREAT

The Tennessee River Basin faces many stressors that threaten the basin's health. Main stressors to the basin include habitat fragmentation, climate change and its effects on aquatic habitats, pollution, and development in the basin. These major threats are outlined below. Indicators were chosen to reflect these stressors in the report card.

Forest habitat fragmentation

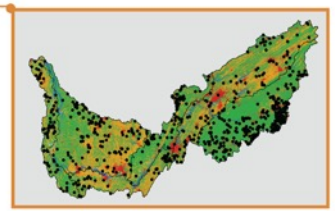
An important strategy of landscape conservation is to protect a network of densely forested areas, each connected by forest corridors that permit the movement of plants and animals to new and better habitat. Outside of the region's state and national parks and forests, timber production companies have historically owned many of these important core and corridor forests. However, recent trends in land ownership have opened the potential for non-forest land uses. Thus, unprotected core and corridor forests have become a significant stress on the basin, potentially leading to lower quality, fragmented forests in the future.



The Tennessee River Basin forests (dark green) are most heavily fragmented in the Blue Ridge, North Appalachain Plateau, and Interior Plateau regions.

Dams, climate change, and aquatic habitat fragmentation

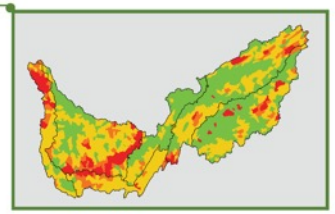
The Tennessee River Basin is one of the most impounded river networks in the world, which poses challenges to aquatic organisms attempting to disperse, find habitat, spawn, and thrive. As the climate warms and precipitation variability becomes more extreme, droughts are becoming more common. Drought, and the associated low stream flow, further reduce aquatic habitat area and connectivity. Drought has also contributed substantially to forest health and the risk of wild fire, notably contributing to the devastating 2017 wildfires in Gatlinburg, TN.



Dams (black) in the Tennessee River Basin are most heavily concentrated in the Blue Ridge region.

Land-based sources of pollution to streams and rivers

River and stream pollution can originate from urban land, but sedimentation and nutrients from agricultural lands is the dominant pathway in the basin. Highly erodible soils located in hilly terrain are the biggest source of sediment. While agricultural best management practices such as cover cropping and buffers can reduce runoff and leaching of polluted waters to streams and groundwater, these practices have not been implemented everywhere.

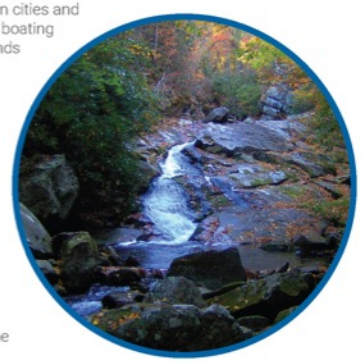


Highest levels of sedimentation (red) occur in the Interior Plateau and Coastal Plains regions of the Tennessee River Basin.

A UNIQUE AND VALUED BASIN

THE TENNESSEE RIVER BASIN IS WILD AND DIVERSE

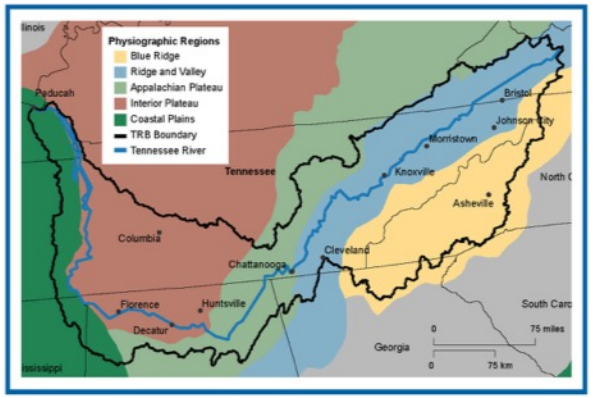
The Tennessee River Basin is home to over 5 million people in cities and small rural communities. Hunting, fishing, hiking, biking, and boating are popular outdoor activities in the amazing recreational lands of the Blue Ridge mountains. Flowing out of the Blue Ridge headwaters are thousands of streams that support some of the most diverse aquatic life in the world. However, the many dams here and throughout the basin restrict the movement of fish and other aquatic organisms, limiting dispersal and threatening population stability. The Tennessee River is one of the most impounded rivers in the world. Activities like boating and fishing on lakes created by dams are a way of life in the basin, garnering millions of dollars in economic activity through tourism. Through the ridge and valley and interior plateau, the river and its network of lakes is an important transportation corridor for shipping goods produced throughout the basin. Dams are also a source of carbon-neutral electricity, which attracts businesses dependent on clean electricity. The rich cultural heritage of Tennessee leads to the state being entirely designated as a National Heritage Area; Civil War sites throughout the state recall and remember the past.



Lynn Camp Prong Falls, Great Smoky Mountains, TN.
Brian Stansberry.

REPORT CARD REGIONS ARE BASED ON GEOLOGY AND BIOLOGY

Tennessee River Basin stakeholders divided the basin into six regions based on the geology and biology of the landscape. The headwaters of the Tennessee River are in the Blue Ridge mountains and Ridge and Valley regions. While the Blue Ridge enjoys considerable land protection and a dense network of forests, the valleys of the Ridge and Valley region are more densely populated, including the cities of Knoxville and Chattanooga, and land is used extensively for grazing. Agricultural activities intensify in the Appalachian and Interior Plateaus, where the topography is more conducive to agriculture. At the most western edge of the Tennessee River Basin is the Coastal Plain, which is a remarkably flat region dominated by cultivated agriculture. The reporting regions of this report card largely follow these physiographic boundaries, although the Appalachian Plateau is divided into a northern and southern region. Each region was evaluated independently, based on relevant data for indicators measuring important stressors, environmental condition, and management activities.



Six physiographic provinces in the Tennessee River Basin are based on physiographic characters of the landscape.

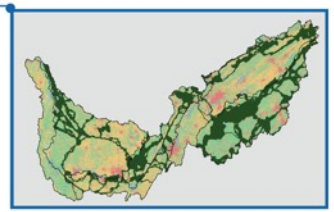
STRESSORS IN THE BASIN

A BASIN UNDER THREAT

The Tennessee River Basin faces many stressors that threaten the basin's health. Main stressors to the basin include habitat fragmentation, climate change and its effects on aquatic habitats, pollution, and development in the basin. These major threats are outlined below. Indicators were chosen to reflect these stressors in the report card.

Forest habitat fragmentation

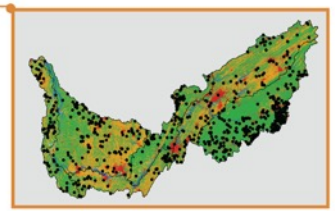
An important strategy of landscape conservation is to protect a network of densely forested areas, each connected by forest corridors that permit the movement of plants and animals to new and better habitat. Outside of the region's state and national parks and forests, timber production companies have historically owned many of these important core and corridor forests. However, recent trends in land ownership have opened the potential for non-forest land uses. Thus, unprotected core and corridor forests have become a significant stress on the basin, potentially leading to lower quality, fragmented forests in the future.



The Tennessee River Basin forests (dark green) are most heavily fragmented in the Blue Ridge, North Appalachain Plateau, and Interior Plateau regions.

Dams, climate change, and aquatic habitat fragmentation

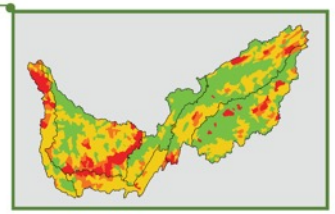
The Tennessee River Basin is one of the most impounded river networks in the world, which poses challenges to aquatic organisms attempting to disperse, find habitat, spawn, and thrive. As the climate warms and precipitation variability becomes more extreme, droughts are becoming more common. Drought, and the associated low stream flow, further reduce aquatic habitat area and connectivity. Drought has also contributed substantially to forest health and the risk of wild fire, notably contributing to the devastating 2017 wildfires in Gatlinburg, TN.



Dams (black) in the Tennessee River Basin are most heavily concentrated in the Blue Ridge region.

Land-based sources of pollution to streams and rivers

River and stream pollution can originate from urban land, but sedimentation and nutrients from agricultural lands is the dominant pathway in the basin. Highly erodible soils located in hilly terrain are the biggest source of sediment. While agricultural best management practices such as cover cropping and buffers can reduce runoff and leaching of polluted waters to streams and groundwater, these practices have not been implemented everywhere.

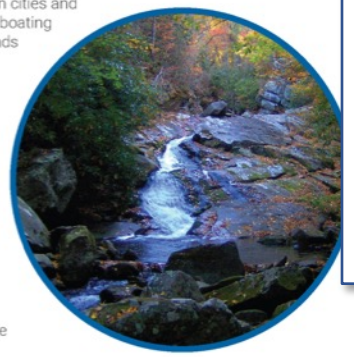


Highest levels of sedimentation (red) occur in the Interior Plateau and Coastal Plains regions of the Tennessee River Basin.

A UNIQUE AND VALUED BASIN

THE TENNESSEE RIVER BASIN IS WILD AND DIVERSE

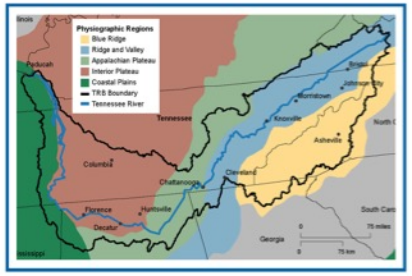
The Tennessee River Basin is home to over 5 million people in cities and small rural communities. Hunting, fishing, hiking, biking, and boating are popular outdoor activities in the amazing recreational lands of the Blue Ridge mountains. Flowing out of the Blue Ridge headwaters are thousands of streams that support some of the most diverse aquatic life in the world. However, the many dams here and throughout the basin restrict the movement of fish and other aquatic organisms, limiting dispersal and threatening population stability. The Tennessee River is one of the most impounded rivers in the world. Activities like boating and fishing on lakes created by dams are a way of life in the basin, garnering millions of dollars in economic activity through tourism. Through the ridge and valley and interior plateau, the river and its network of lakes is an important transportation corridor for shipping goods produced throughout the basin. Dams are also a source of carbon-neutral electricity, which attracts businesses dependent on clean electricity. The rich cultural heritage of Tennessee leads to the state being entirely designated as a National Heritage Area; Civil War sites throughout the state recall and remember the past.



Lynn Camp Prong Falls, Great Smoky Mountains, TN.
Brian Stansberry.

REPORT CARD REGIONS ARE BASED ON GEOLOGY AND BIOLOGY

Tennessee River Basin stakeholders divided the basin into six regions based on the geology and biology of the landscape. The headwaters of the Tennessee River are in the Blue Ridge mountains and Ridge and Valley regions. While the Blue Ridge enjoys considerable land protection and a dense network of forests, the valleys of the Ridge and Valley region are more densely populated, including the cities of Knoxville and Chattanooga, and land is used extensively for grazing. Agricultural activities intensify in the Appalachian and Interior Plateaus, where the topography is more conducive to agriculture. At the most western edge of the Tennessee River Basin is the Coastal Plain, which is a remarkably flat region dominated by cultivated agriculture. The reporting regions of this report card largely follow these physiographic boundaries, although the Appalachian Plateau is divided into a northern and southern region. Each region was evaluated independently, based on relevant data for indicators measuring important stressors, environmental condition, and management activities.



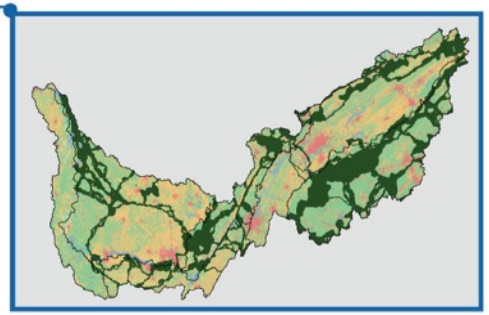
Six physiographic provinces in the Tennessee River Basin are based on physiographic characters of the landscape.

STRESSORS IN THE BASIN

Forest habitat fragmentation

An important strategy of landscape conservation is to protect a network of densely forested areas, each connected by forest corridors that permit the movement of plants and animals to new and better habitat. Outside of the region's state and national parks and forests, timber production companies have historically owned many of these important core and corridor forests. However, recent trends in land ownership have opened the potential for non-forest land uses. Thus, unprotected core and corridor forests have become a significant stress on the basin, potentially leading to lower quality, fragmented forests in the future.

The Tennessee River Basin forests (dark green) are most heavily fragmented in the Blue Ridge, North Appalachain Plateau, and Interior Plateau regions.



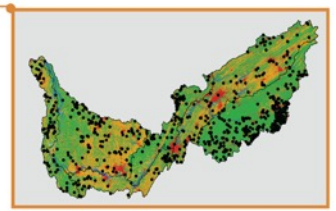
forests in the future.

The Tennessee River Basin forests (dark green) are most heavily fragmented in the Blue Ridge, North Appalachain Plateau, and Interior Plateau regions.

Dams, climate change, and aquatic habitat fragmentation

The Tennessee River Basin is one of the most impounded river networks in the world, which poses challenges to aquatic organisms attempting to disperse, find habitat, spawn, and thrive. As the climate warms and precipitation variability becomes more extreme, droughts are becoming more common. Drought, and the associated low stream flow, further reduce aquatic habitat area and connectivity. Drought has also contributed substantially to forest health and the risk of wild fire, notably contributing to the devastating 2017 wildfires in Gatlinburg, TN.

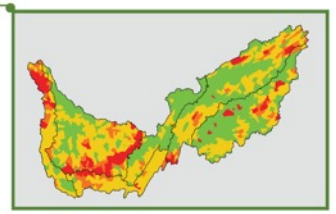
Dams (black) in the Tennessee River Basin are most heavily concentrated in the Blue Ridge region.



Land-based sources of pollution to streams and rivers

River and stream pollution can originate from urban land, but sedimentation and nutrients from agricultural lands is the dominant pathway in the basin. Highly erodible soils located in hilly terrain are the biggest source of sediment. While agricultural best management practices such as cover cropping and buffers can reduce runoff and leaching of polluted waters to streams and groundwater, these practices have not been implemented everywhere.

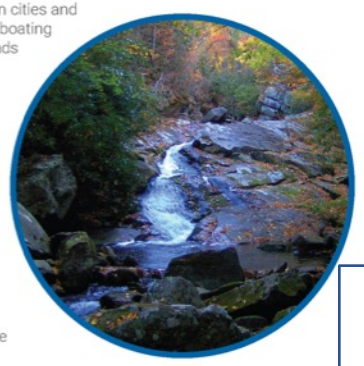
Highest levels of sedimentation (red) occur in the Interior Plateau and Coastal Plains regions of the Tennessee River Basin.



A UNIQUE AND VALUED BASIN

THE TENNESSEE RIVER BASIN IS WILD AND DIVERSE

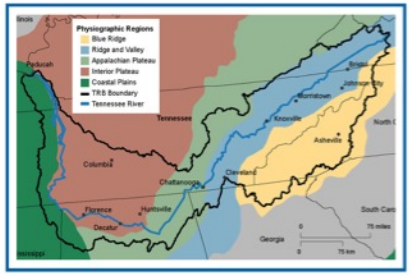
The Tennessee River Basin is home to over 5 million people in cities and small rural communities. Hunting, fishing, hiking, biking, and boating are popular outdoor activities in the amazing recreational lands of the Blue Ridge mountains. Flowing out of the Blue Ridge headwaters are thousands of streams that support some of the most diverse aquatic life in the world. However, the many dams here and throughout the basin restrict the movement of fish and other aquatic organisms, limiting dispersal and threatening population stability. The Tennessee River is one of the most impounded rivers in the world. Activities like boating and fishing on lakes created by dams are a way of life in the basin, garnering millions of dollars in economic activity through tourism. Through the ridge and valley and interior plateau, the river and its network of lakes is an important transportation corridor for shipping goods produced throughout the basin. Dams are also a source of carbon-neutral electricity, which attracts businesses dependent on clean electricity. The rich cultural heritage of Tennessee leads to the state being entirely designated as a National Heritage Area; Civil War sites throughout the state recall and remember the past.



Lynn Camp Prong Falls, Great Smoky Mountains, TN.
Brian Stansberry.

REPORT CARD REGIONS ARE BASED ON GEOLOGY AND BIOLOGY

Tennessee River Basin stakeholders divided the basin into six regions based on the geology and biology of the landscape. The headwaters of the Tennessee River are in the Blue Ridge mountains and Ridge and Valley regi While the Blue Ridge enjoys considerable land protection and a dense network of forests, the valleys of the Ridge and Valley region are more densely popula including the cities of Knoxville and Chattanooga and land is used extensively for grazing. Agricult activities intensify in the Appalachian and Interior Plateaus, where the topography is more conduci to agriculture. At the most western edge of the Tennessee River Basin is the Coastal Plain, which is a remarkably flat region dominated by cultivated agriculture. The reporting regions of this report card largely follow these physiographic boundaries, although the Appalachian Plateau is divided into a northern and southern region. Each region was evaluated independently, based on relevant data for indicators measuring important stressors, environmental condition, and management activities.



Six physiographic provinces in the Tennessee River Basin are based on physiographic characters of the landscape.

STRESSORS IN THE BASIN

A BASIN UNDER THREAT

The Tennessee River Basin faces many stressors that threaten the basin's health. Main stressors to the basin include habitat fragmentation, climate change and its effects on aquatic habitats, pollution, and development in the basin. These major threats are outlined below. Indicators were chosen to reflect these stressors in the report card.

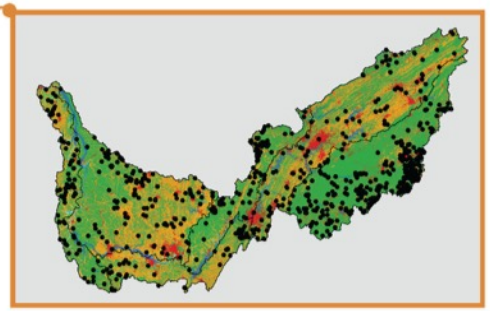
Forest habitat fragmentation

An important strategy of landscape conservation is to protect a network of densely forested areas, each connected by forest corridors that permit the movement of plants and animals to new and better habitat. Outside of the region's state and national parks and forests, timber production companies have historically owned many of these important core and corridor forests. However, recent trends in land ownership have opened the potential for non-forest land uses. Thus,

Dams, climate change, and aquatic habitat fragmentation

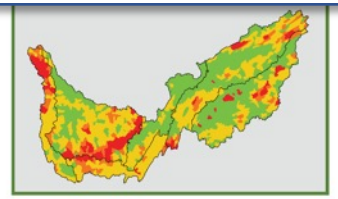
The Tennessee River Basin is one of the most impounded river networks in the world, which poses challenges to aquatic organisms attempting to disperse, find habitat, spawn, and thrive. As the climate warms and precipitation variability becomes more extreme, droughts are becoming more common. Drought, and the associated low stream flow, further reduce aquatic habitat area and connectivity. Drought has also contributed substantially to forest health and the risk of wild fire, notably contributing to the devastating 2017 wildfires in Gatlinburg, TN.

Dams (black) in the Tennessee River Basin are most heavily concentrated in the Blue Ridge region.



River and stream pollution can originate from urban land, but sedimentation and nutrients from agricultural lands is the dominant pathway in the basin. Highly erodible soils located in hilly terrain are the biggest source of sediment. While agricultural best management practices such as cover cropping and buffers can reduce runoff and leaching of polluted waters to streams and groundwater, these practices have not been implemented everywhere.

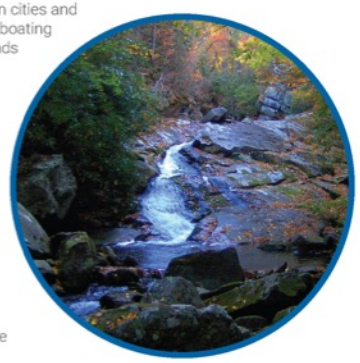
Highest levels of sedimentation (red) occur in the Interior Plateau and Coastal Plains regions of the Tennessee River Basin.



A UNIQUE AND VALUED BASIN

THE TENNESSEE RIVER BASIN IS WILD AND DIVERSE

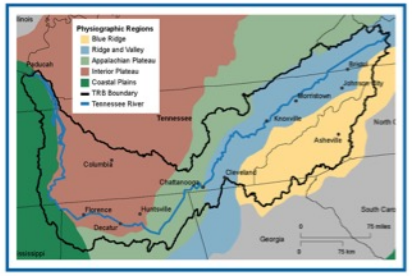
The Tennessee River Basin is home to over 5 million people in cities and small rural communities. Hunting, fishing, hiking, biking, and boating are popular outdoor activities in the amazing recreational lands of the Blue Ridge mountains. Flowing out of the Blue Ridge headwaters are thousands of streams that support some of the most diverse aquatic life in the world. However, the many dams here and throughout the basin restrict the movement of fish and other aquatic organisms, limiting dispersal and threatening population stability. The Tennessee River is one of the most impounded rivers in the world. Activities like boating and fishing on lakes created by dams are a way of life in the basin, garnering millions of dollars in economic activity through tourism. Through the ridge and valley and interior plateau, the river and its network of lakes is an important transportation corridor for shipping goods produced throughout the basin. Dams are also a source of carbon-neutral electricity, which attracts businesses dependent on clean electricity. The rich cultural heritage of Tennessee leads to the state being entirely designated as a National Heritage Area; Civil War sites throughout the state recall and remember the past.



Lynn Camp Prong Falls, Great Smoky Mountains, TN.
Brian Stansberry.

REPORT CARD REGIONS ARE BASED ON GEOLOGY AND BIOLOGY

Tennessee River Basin stakeholders divided the basin into six regions based on the geology and biology of th landscape. The headwaters of the Tennessee River are in the Blue Ridge mountains and Ridge and Valley reg While the Blue Ridge enjoys considerable land protection and a dense network of forests, the valleys of the Ridge and Valley region are more densely popula including the cities of Knoxville and Chattanooga and land is used extensively for grazing. Agricult activities intensify in the Appalachian and Interio Plateaus, where the topography is more conduci to agriculture. At the most western edge of the Tennessee River Basin is the Coastal Plain, whic is a remarkably flat region dominated by cultivat agriculture. The reporting regions of this report card largely follow these physiographic boundari although the Appalachian Plateau is divided into a northern and southern region. Each region was evaluated independently, based on relevant data for indicators measuring important stressors, environmental condition, and management activ



Six physiographic provinces in the Tennessee River Basin are based on physiographic characters of the landscape.

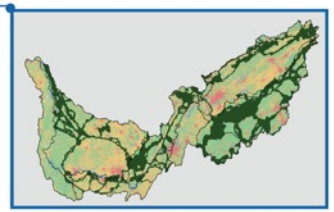
STRESSORS IN THE BASIN

A BASIN UNDER THREAT

The Tennessee River Basin faces many stressors that threaten the basin's health. Main stressors to the basin include habitat fragmentation, climate change and its effects on aquatic habitats, pollution, and development in the basin. These major threats are outlined below. Indicators were chosen to reflect these stressors in the report card.

Forest habitat fragmentation

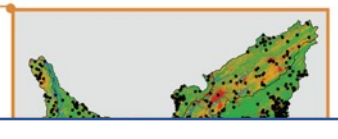
An important strategy of landscape conservation is to protect a network of densely forested areas, each connected by forest corridors that permit the movement of plants and animals to new and better habitat. Outside of the region's state and national parks and forests, timber production companies have historically owned many of these important core and corridor forests. However, recent trends in land ownership have opened the potential for non-forest land uses. Thus, unprotected core and corridor forests have become a significant stress on the basin, potentially leading to lower quality, fragmented forests in the future.



The Tennessee River Basin forests (dark green) are most heavily fragmented in the Blue Ridge, North Appalachain Plateau, and Interior Plateau regions.

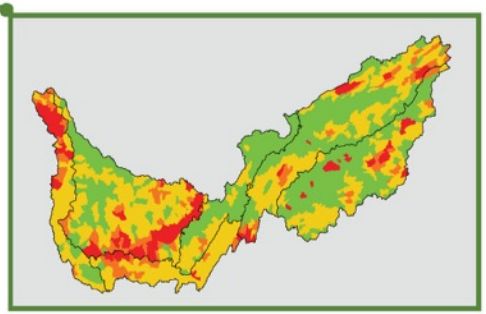
Dams, climate change, and aquatic habitat fragmentation

The Tennessee River Basin is one of the most impounded river networks in the world, which poses challenges to aquatic organisms attempting to disperse, find habitat, spawn, and thrive. As the climate warms and precipitation variability becomes more extreme, droughts are becoming more common. Drought, and the associated low stream flow, further reduce aquatic habitat area and connectivity.



Land-based sources of pollution to streams and rivers

River and stream pollution can originate from urban land, but sedimentation and nutrients from agricultural lands is the dominant pathway in the basin. Highly erodible soils located in hilly terrain are the biggest source of sediment. While agricultural best management practices such as cover cropping and buffers can reduce runoff and leaching of polluted waters to streams and groundwater, these practices have not been implemented everywhere.



Highest levels of sedimentation (red) occur in the Interior Plateau and Coastal Plains regions of the Tennessee River Basin.

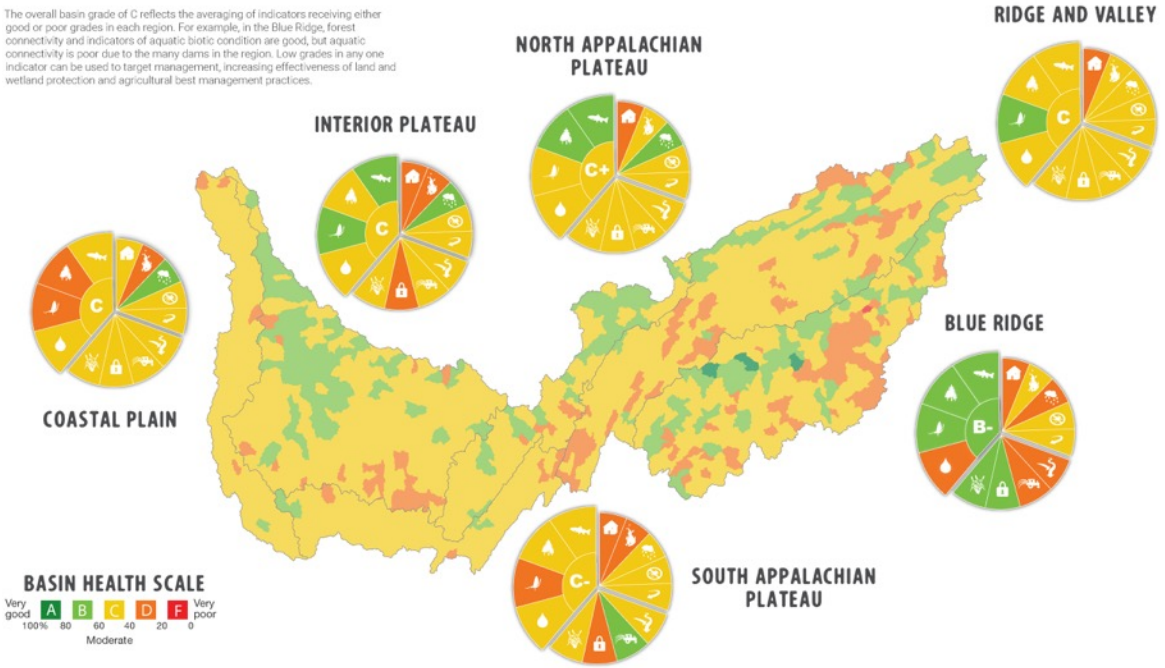
Middle four-page spread

TENNESSEE RIVER BASIN INDICATORS AND OVERALL HEALTH

Indicators for this report card were chosen to evaluate ecosystem stressors, condition, and management in the Tennessee River Basin. Stressors may have negative effects on ecosystem condition, but these effects can be adapted to or reduced through management actions. Each indicator is designed to evaluate one component of this pressure-state-response system. Detailed information for each indicator, including data sources used, analysis methods, and processes for these decisions are included in an accompanying methods report.

THE TENNESSEE RIVER BASIN HEALTH BY REGION

The overall basin grade of C reflects the averaging of indicators receiving either good or poor grades in each region. For example, in the Blue Ridge, forest connectivity and indicators of aquatic biotic condition are good, but aquatic connectivity is poor due to the many dams in the region. Low grades in any one indicator can be used to target management, increasing effectiveness of land and wetland protection and agricultural best management practices.



MANAGING THE BASIN

WETLAND PROTECTION

Wetlands are important for nutrient retention and therefore their presence on the landscape enhances water quality. Wetlands are best protected in the Blue Ridge region, where they received a grade of B-. Progress towards protecting wetlands, including small streams and riparian zones, from development and agriculture should be an ongoing priority for management.

A typical TRB wetland. Flickr user Courtney Celley.

FOREST PROTECTION

The Appalachian LCC has mapped forest lands important for regional biodiversity conservation and the connectivity of forest cores across the basin. Progress towards biodiversity management is reflected in the fraction of these areas that are forested and/or protected from further development. Forests are least protected in the South Appalachian Plateau and the Interior Plateau Regions, receiving grades of D.

Appalachian forest at sunset. Flickr user Thomas.

AGRICULTURAL BEST MANAGEMENT PRACTICES

RUNOFF

Agricultural best management practices such as no-till management and riparian buffers help reduce the effects of nutrient runoff from fields throughout the basin. These management activities could be concentrated in the Interior Plateau, where highly vulnerable soils are cultivated and receive a grade of C. However, runoff best management practices could be improved throughout the basin, including pasture management (e.g., fencing cattle out of streams) in the Blue Ridge and Ridge and Valley regions.

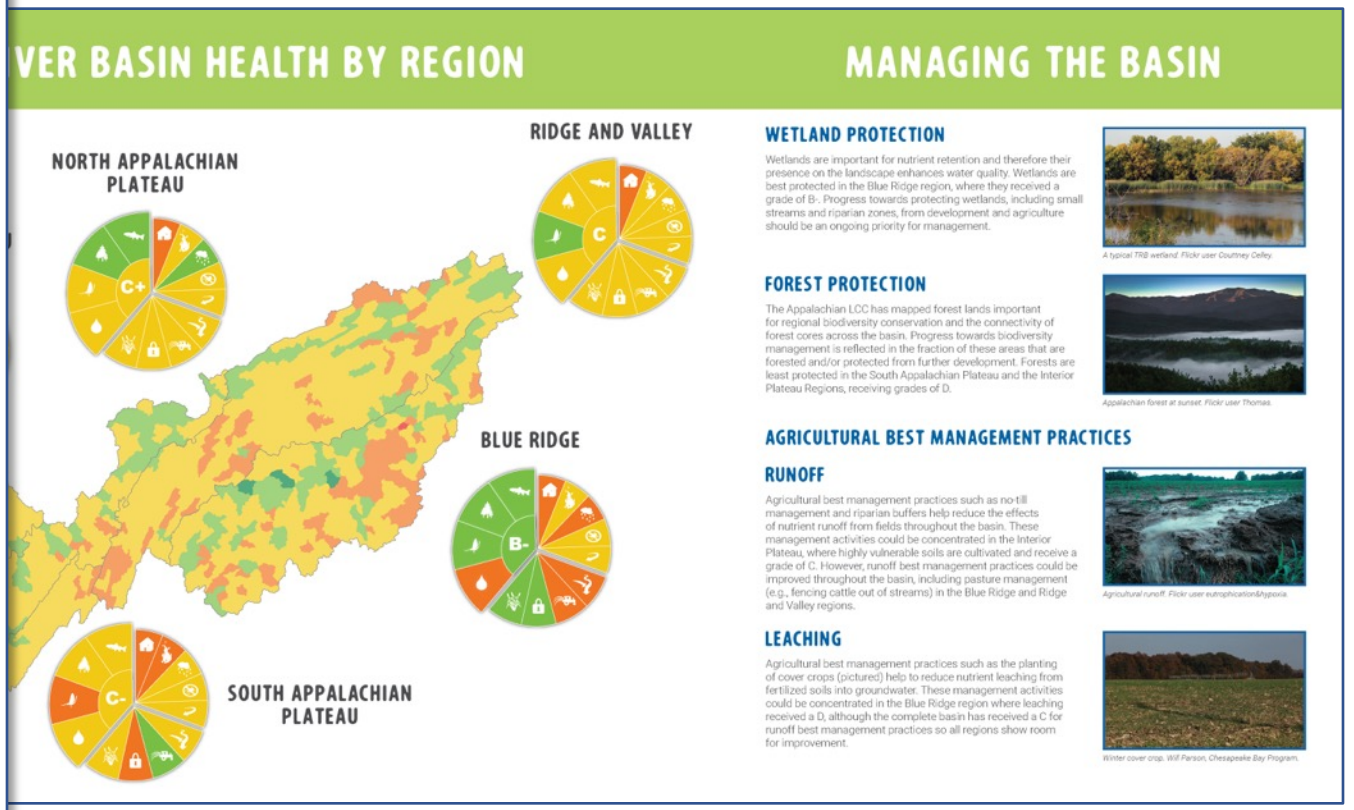
Agricultural runoff. Flickr user eutrophication&hypoxia.

LEACHING

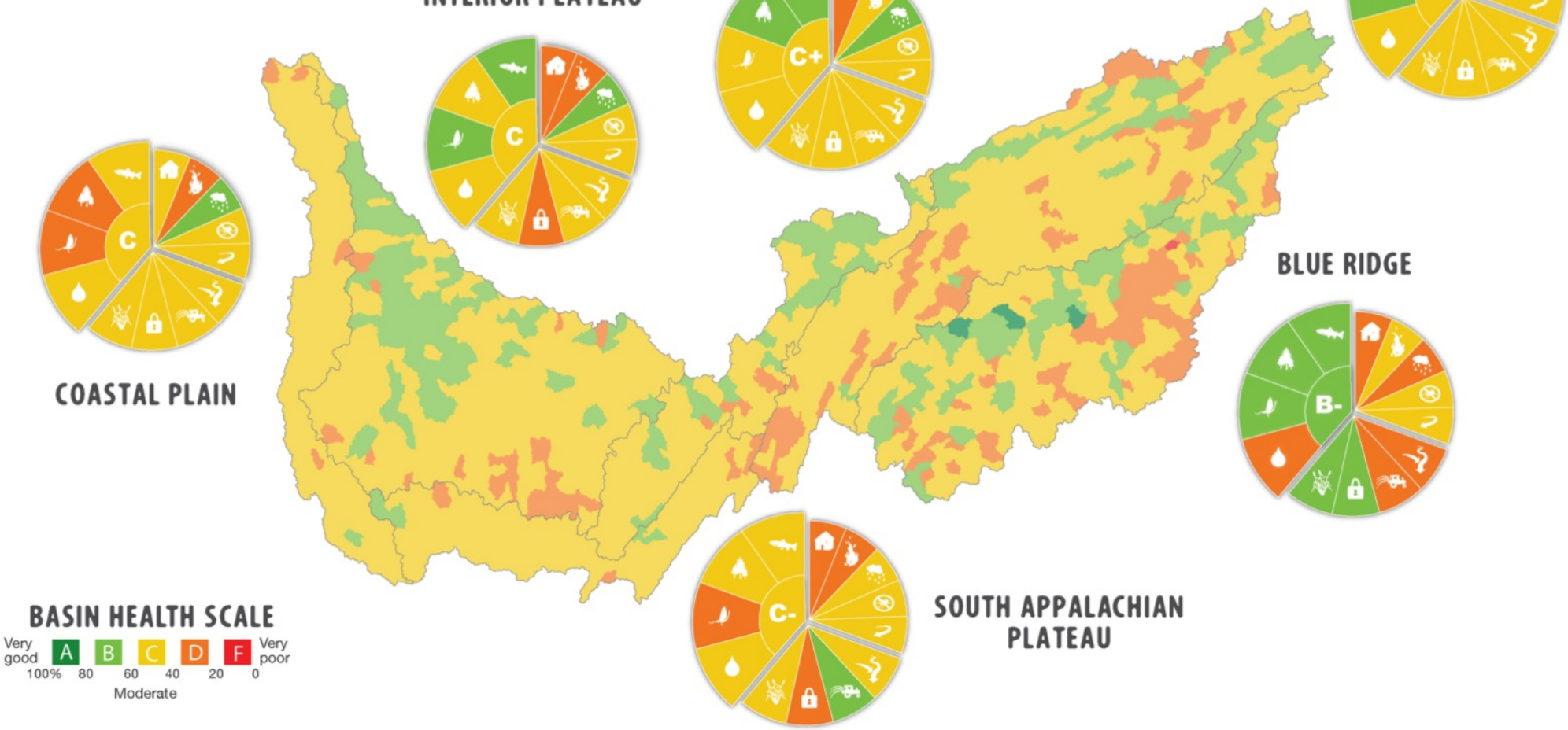
Agricultural best management practices such as the planting of cover crops (pictured) help to reduce nutrient leaching from fertilized soils into groundwater. These management activities could be concentrated in the Blue Ridge region where leaching received a D, although the complete basin has received a C for runoff best management practices so all regions show room for improvement.

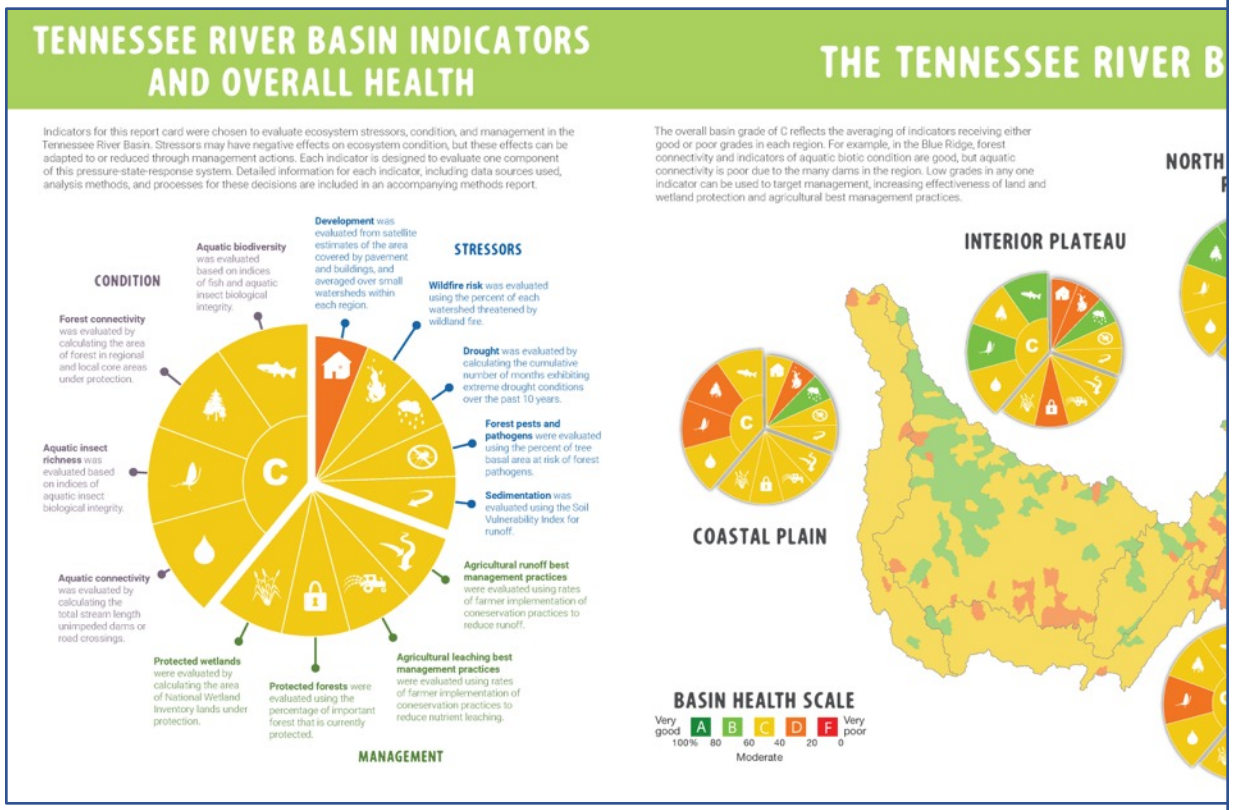
Winter cover crop. Will Parson, Chesapeake Bay Program.


CONDITION
Aquatic biodiversity was evaluated based on indices of fish and aquatic insect biological integrity.
Forest connectivity was evaluated by calculating the area of forest in regional and local core areas under protection.
Aquatic insect richness was evaluated based on indices of aquatic insect biological integrity.
Aquatic connectivity was evaluated by calculating the total stream length unimpeded dams or road crossings.
C
STRESSORS
Development was evaluated from satellite estimates of the area covered by pavement and buildings, and averaged over small watersheds within each region.
Wildfire risk was evaluated using the percent of each watershed threatened by wildland fire.
Drought was evaluated by calculating the cumulative number of months exhibiting extreme drought conditions over the past 10 years.
Forest pests and pathogens were evaluated using the percent of tree basal area at risk of forest pathogens.
Sedimentation was evaluated using the Soil Vulnerability Index for runoff.
Agricultural runoff best management practices were evaluated using rates of farmer implementation of conservation practices to reduce runoff.
Agricultural leaching best management practices were evaluated using rates of farmer implementation of conservation practices to reduce nutrient leaching.
Protected forests were evaluated using the percentage of important forest that is currently protected.
Protected wetlands were evaluated by calculating the area of National Wetland Inventory lands under protection.
MANAGEMENT


VER BASIN HEALTH BY REGION
NORTH APPALACHIAN PLATEAU
C+
RIDGE AND VALLEY
C
BLUE RIDGE
B-
SOUTH APPALACHIAN PLATEAU
C-
MANAGING THE BASIN
WETLAND PROTECTION
Wetlands are important for nutrient retention and therefore their presence on the landscape enhances water quality. Wetlands are best protected in the Blue Ridge region, where they received a grade of B-. Progress towards protecting wetlands, including small streams and riparian zones, from development and agriculture should be an ongoing priority for management.
A typical TRB wetland. Flickr user Courtney Celley.
FOREST PROTECTION
The Appalachian LCC has mapped forest lands important for regional biodiversity conservation and the connectivity of forest cores across the basin. Progress towards biodiversity management is reflected in the fraction of these areas that are forested and/or protected from further development. Forests are least protected in the South Appalachian Plateau and the Interior Plateau Regions, receiving grades of D.
Appalachian forest at sunset. Flickr user Thomas.
AGRICULTURAL BEST MANAGEMENT PRACTICES
RUNOFF
Agricultural best management practices such as no-till management and riparian buffers help reduce the effects of nutrient runoff from fields throughout the basin. These management activities could be concentrated in the Interior Plateau, where highly vulnerable soils are cultivated and receive a grade of C. However, runoff best management practices could be improved throughout the basin, including pasture management (e.g., fencing cattle out of streams) in the Blue Ridge and Ridge and Valley regions.
Agricultural runoff. Flickr user eutrophication&hypoxia.
LEACHING
Agricultural best management practices such as the planting of cover crops (pictured) help to reduce nutrient leaching from fertilized soils into groundwater. These management activities could be concentrated in the Blue Ridge region where leaching received a D, although the complete basin has received a C for runoff best management practices so all regions show room for improvement.
Winter cover crop. Will Parson, Chesapeake Bay Program.

The overall basin grade of C reflects the averaging of indicators receiving either good or poor grades in each region. For example, in the Blue Ridge, forest connectivity and indicators of aquatic biotic condition are good, but aquatic connectivity is poor due to the many dams in the region. Low grades in any one indicator can be used to target management, increasing effectiveness of land and wetland protection and agricultural best management practices.





WETLAND PROTECTION

Wetlands are important for nutrient retention and therefore their presence on the landscape enhances water quality. Wetlands are best protected in the Blue Ridge region, where they received a grade of B-. Progress towards protecting wetlands, including small streams and riparian zones, from development and agriculture should be an ongoing priority for management.

A typical TRB wetland. Flickr user Couttney Celley.

FOREST PROTECTION

The Appalachian LCC has mapped forest lands important for regional biodiversity conservation and the connectivity of forest cores across the basin. Progress towards biodiversity management is reflected in the fraction of these areas that are forested and/or protected from further development. Forests are least protected in the South Appalachian Plateau and the Interior Plateau Regions, receiving grades of D.

Appalachian forest at sunset. Flickr user Thomas.

AGRICULTURAL BEST MANAGEMENT PRACTICES

RUNOFF

Agricultural best management practices such as no-till management and riparian buffers help reduce the effects of nutrient runoff from fields throughout the basin. These management activities could be concentrated in the Interior Plateau, where highly vulnerable soils are cultivated and receive a grade of C. However, runoff best management practices could be improved throughout the basin, including pasture management (e.g., fencing cattle out of streams) in the Blue Ridge and Ridge and Valley regions.

Agricultural runoff. Flickr user eutrophication&hypoxia.

LEACHING

Agricultural best management practices such as the planting of cover crops (pictured) help to reduce nutrient leaching from fertilized soils into groundwater. These management activities could be concentrated in the Blue Ridge region where leaching received a D, although the complete basin has received a C for runoff best management practices so all regions show room for improvement.

Winter cover crop. Will Parson, Chesapeake Bay Program.

REPORT CARDS FOR YOUR FUTURE

HOW YOU CAN USE THIS REPORT CARD TO INFLUENCE FUTURE IMPROVEMENTS IN TENNESSEE RIVER BASIN HEALTH

This report card provides a snapshot assessment of ecosystem stressors, condition, and protection in the Tennessee River Basin. Depending on your profession, you might use this report card to help improve the basin in a variety of ways.

Resource manager: The report card communicates the current condition of the system, and can be used to direct future funding to particular locations and resources that received low grades. Future updates to the report card can be used to assess progress toward goals.

Scientists: Continued scientific investment is needed in the development of new indicators that can be inexpensively measured and monitored over time. Resources that are valued by the community but are absent from the report card provide direction to future monitoring and data synthesis activities.

Residents: How did your watershed grade? For example, were you surprised to find ecosystem condition in your area received a poor grade? Residents can use the report card to highlight threats to their environmental values and urge their communities to take action towards reversing negative trends.

Citizen scientists: Many volunteer citizens help promote scientific advances and leverage environmental monitoring measurements and observations. Web resources and watershed organizations can help volunteers (young and old) to make measurements of air and water quality, biological diversity, and changes over time.

Dave Herasimtschuk, Freshwaters Illustrated.

ACKNOWLEDGMENTS

This preliminary report card was produced and released in November 2017 by the Appalachian Landscape Cooperative and the University of Maryland Center for Environmental Science Integration & Application Network to provide an initial assessment of the conditions in the Tennessee River Basin. Subsequent report cards will build on this to refine the indicators and assessments prepared in this initial effort.

This report card is accompanied by a detailed methods document and report that describes the data sources, analysis methods and process for developing this report card. It also outlines the process required to complete the final report card. Special thanks to the Tennessee River Basin Network for their contributions to the Report Card.

Front cover photo: Debord Falls, Wartburg, TN. Frank Kehren.

Tennessee River Basin Network

Appalachian Landscape Conservation Cooperative

University of Maryland Center for Environmental Science

Back page

REPORT CARDS

HOW YOU CAN USE THIS REPORT IMPROVEMENTS IN TENNESSEE R

This report card provides a snapshot assessment of e
Tennessee River Basin. Depending on your professio
a variety of ways.

Resource manager: The report card communicates t
direct future funding to particular locations and resou
card can be used to assess progress toward goals.

Scientists: Continued scientific investment is needed
inexpensively measured and monitored over time. Re
from the report card provide direction to future monit

Residents: How did your watershed grade? For example, were you surprised to find ecosystem condition in your area received a poor grade? Residents can use the report card to highlight threats to their environmental values and urge their communities to take action towards reversing negative trends.

Citizen scientists: Many volunteer citizens help promote scientific advances and leverage environmental monitoring measurements and observations. Web resources and watershed organizations can help volunteers (young and old) to make measurements of air and water quality, biological diversity, and changes over time.

ACKNOWLEDGMENTS

This preliminary report card was produced and releas
Cooperative and the University of Maryland Center fo
to provide an initial assessment of the conditions in t
build on this to refine the indicators and assessments

This report card is accompanied by a detailed metho
and report that describes the data sources, analysis
and process for developing this report card. It also ou
process required to complete the final report card. Sp
to the Tennessee River Basin Network for their contri
Report Card.

Front cover photo: Debord Falls, Wartburg, TN. Frank Kehren.

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

HOW YOU CAN USE THIS REPORT CARD TO INFLUENCE FUTURE IMPROVEMENTS IN TENNESSEE RIVER BASIN HEALTH

This report card provides a snapshot assessment of ecosystem stressors, condition, and protection in the Tennessee River Basin. Depending on your profession, you might use this report card to help improve the basin in a variety of ways.

Resource manager: The report card communicates the current condition of the system, and can be used to direct future funding to particular locations and resources that received low grades. Future updates to the report card can be used to assess progress toward goals.

Scientists: Continued scientific investment is needed in the development of new indicators that can be inexpensively measured and monitored over time. Resources that are valued by the community but are absent from the report card provide direction to future monitoring and data synthesis activities.

Residents: How did your watershed grade? For example, were you surprised to find ecosystem condition in your area received a poor grade? Residents can use the report card to highlight threats to their environmental values and urge their communities to take action towards reversing negative trends.

Citizen scientists: Many volunteer citizens help promote scientific advances and leverage environmental monitoring measurements and observations. Web resources and watershed organizations can help volunteers (young and old) to make measurements of air and water quality, biological diversity, and changes over time.

Dave Herasimtschuk, Freshwaters Illustrated.

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

REPORT CARDS FOR YOUR FUTURE

HOW YOU CAN USE THIS REPORT CARD TO INFLUENCE FUTURE IMPROVEMENTS IN TENNESSEE RIVER BASIN HEALTH

This report card provides a snapshot assessment of ecosystem stressors, condition, and protection in the Tennessee River Basin. Depending on your profession, you might use this report card to help improve the basin in a variety of ways.

Resource manager: The report card communicates the current condition of the system, and can be used to direct future funding to particular locations and resources that received low grades. Future updates to the report card can be used to assess progress toward goals.

Scientists: Continued scientific investment is needed in the development of new indicators that can be inexpensively measured and monitored over time. Resources that are valued by the community but are absent from the report card provide direction to future monitoring and data synthesis activities.

Residents: How did your watershed grade? For example, were you surprised to find ecosystem condition in your area received a poor grade? Residents can use the report card to highlight threats to their environmental values and urge their communities to take action towards reversing negative trends.

Citizen scientists: Many volunteer citizens help promote scientific advances and leverage environmental monitoring measurements and observations. Web resources and watershed organizations can help volunteers (young and old) to make measurements of air and water quality, biological diversity, and changes over time.

ACKNOWLEDGMENTS

This preliminary report card was produced and released
Cooperative and the University of Maryland Center for E
to provide an initial assessment of the conditions in the
build on this to refine the indicators and assessments p

This report card is accompanied by a detailed methods
and report that describes the data sources, analysis me
and process for developing this report card. It also outli
process required to complete the final report card. Spec
to the Tennessee River Basin Network for their contribut
Report Card.

Front cover photo: Debord Falls, Wartburg, TN. Frank Kehren.

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

ACKNOWLEDGMENTS

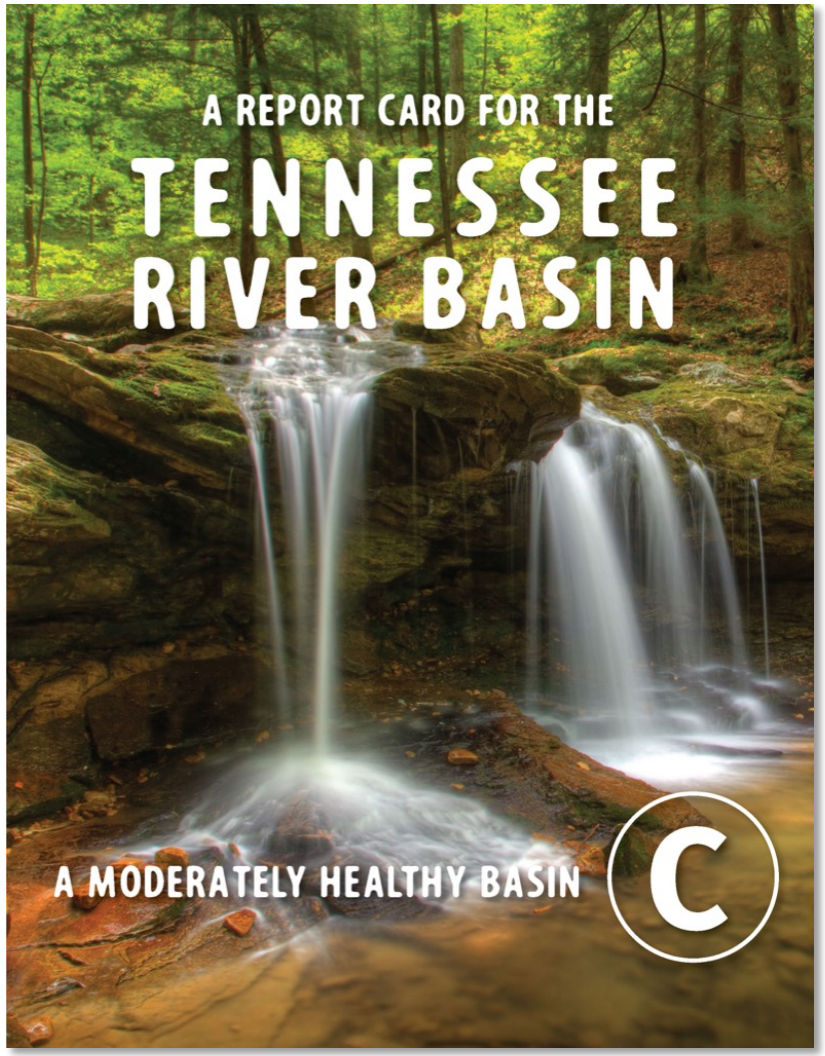
This preliminary report card was produced and released in November 2017 by the Appalachian Landscape Cooperative and the University of Maryland Center for Environmental Science Integration & Application Network to provide an initial assessment of the conditions in the Tennessee River Basin. Subsequent report cards will build on this to refine the indicators and assessments prepared in this initial effort.

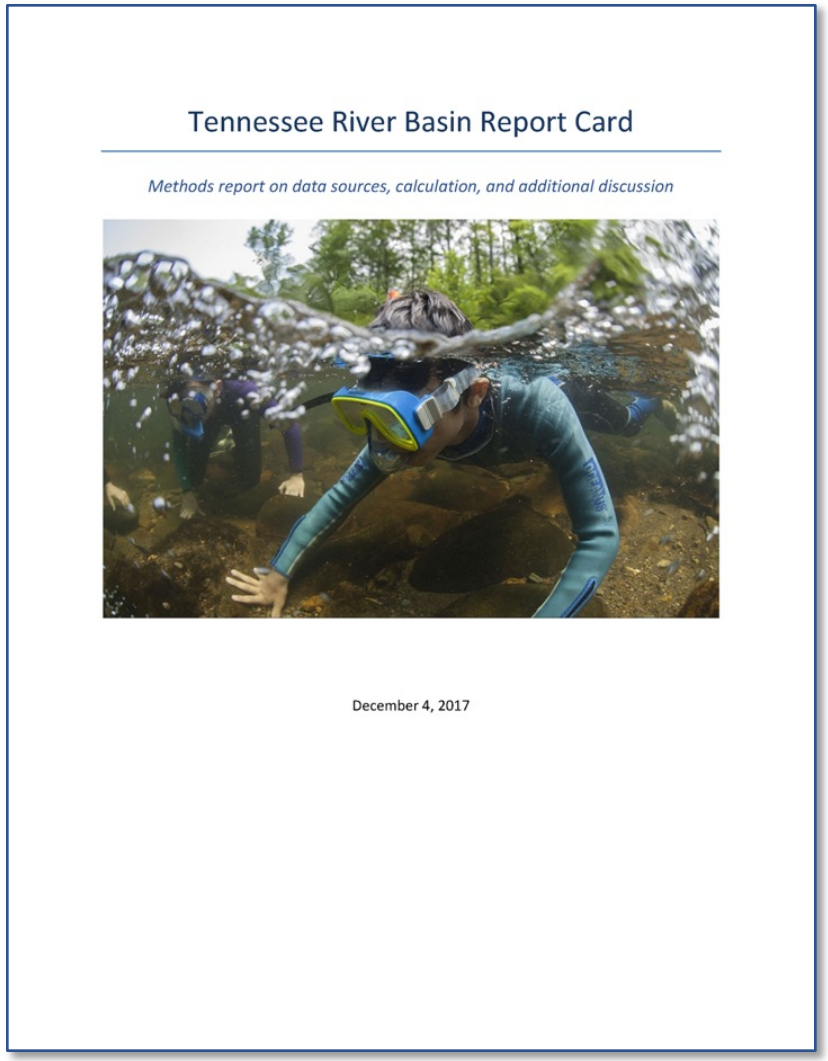
This report card is accompanied by a detailed methods document and report that describes the data sources, analysis methods and process for developing this report card. It also outlines the process required to complete the final report card. Special thanks to the Tennessee River Basin Network for their contributions to the Report Card.

Front cover photo: Debord Falls, Wartburg, TN. Frank Kehren.

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE





The report card and the methods report are both available on-line, at IAN Press: http://ian.umces.edu/press/

Thank you!

Questions?

hkelsey@umces.edu
aelmore@umces.edu
dtaillie@umces.edu