

Kentucky Aquatic Nuisance Species Management Plan

Commonwealth of Kentucky
Steve Beshear, Governor

Kentucky Department of Fish and Wildlife Resources
Jon Gassett, Commissioner

Kentucky Department of Fish and Wildlife Resources
Benjy Kinman, Fisheries Division Director

Drafted by:
Michael Mahala
Aquatic Nuisance Species Specialist
University of Kentucky




Approved by Steve Beshear, Governor

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Date

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The Kentucky ANS Task Force

Governor's Office: Andy Hightower, Libby Milligan

Kentucky Department of Fish and Wildlife Resources-Division of Fisheries: Benjy Kinman, Gerry Buynak, Ryan Oster, Neal Jackson, Matthew Thomas

Kentucky Department of Fish and Wildlife Resources-Division of Wildlife: Monte McGregor

Kentucky Division of Water: John Brumley, Dave Harmon

Kentucky State Nature Preserves Commission: Joyce Bender, Ryan Evans

Kentucky Department of Agriculture: Ernest Collins-Pesticides, Angela Caporelli-Aquaculture Marketing

Kentucky Division of Forestry: Tim McClure

Kentucky Transportation Cabinet-Division of Environmental Analysis: Dale Noe

Kentucky State University: Bob Durborow

Eastern Kentucky University: Guenter Schuster, Ron Jones

University of Kentucky: Dave Maehr, Tom Barnes, Michael Mahala

Commercial Fisherman: Brian Maness

Bait Supplier: Rob Jones

Fish Processor: Tom French

Third Rock Consultants: Ed Hartowicz

Kentucky Nursery and Landscape Association: Debbie Barnes

Southeast Aquatic Resource Partnership: Marilyn Barrett-O'Leary

The Nature Conservancy: Richie Kessler

United States Fish and Wildlife Service: Lee Andrews, Leroy Koch, Mike Floyd

United States Department of Agriculture Wildlife Services: Keith Stucker

United States Department of Agriculture Forest Service: Dick Braun, David Taylor, Pam Martin

United States Army Corps of Engineers: Danny Barrett-Retired

National Park Service: Tom Blount-Big South Fork, Mark Depoy-Mammoth Cave

United States Department of Agriculture National Resources Conservation Service: Mason Howell

Executive Summary

This management plan has been created to help Kentucky deal with the myriad of problems associated with aquatic nuisance species (ANS). The aim of the plan is to describe ANS problems within Kentucky and to provide specific management actions that can mitigate current situations and prevent future problems. Mandated by federal legislation and developed by the Kentucky ANS Task Force (KYANSTF), this document will guide our efforts to address ANS problems on a state, regional, and national level over the next 2-3 years.

Aquatic nuisance species are non-native, aquatic species that threaten the diversity or abundance of native species, the ecological stability of waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters. Unfortunately, human activities can contribute to the adverse impacts of ANS by facilitating introductions and expediting their spread. In Kentucky, some of the major pathways by which humans contribute to ANS spread include:

- Physical transport between water bodies.
- Fragmentation and spread of existing populations within a habitat.
- Release (unintentional and intentional) into the wild.

Kentucky's abundant freshwater resources make it highly vulnerable to invasions of ANS. The Commonwealth shares a common border with seven other states (Missouri, Illinois, Indiana, Ohio, West Virginia, Virginia, and Tennessee), making their ANS problems our problems (and vice-versa). Some of Kentucky's state borders are defined by aquatic systems (the Mississippi and Ohio Rivers in the west, the Ohio River in the north, and the Big Sandy River to the east). The state's temperate climate and variety of ecosystems provide many opportunities for adaptable and tolerant ANS to thrive. Many ecosystems are fragile and include imperiled species (plants, fish, and mussels). Fragile ecosystems are more prone to disturbance, and an ANS introduction could threaten entire biotic communities. Furthermore, the costs of managing ANS once introduced can be staggering. These factors compel Kentucky to prevent and/or mitigate the negative impacts of ANS.

Once established, ANS have adverse biological, socio-economic, and aesthetic impacts. They can:

- Disrupt the balance of food webs.
- Degrade previously undisturbed habitats.
- Reduce abundance of native organisms by increasing competition (i.e., food resources, nesting areas).
- Decrease biodiversity.
- Deplete limited management (agencies, non-governmental organizations, etc.) funds and other resources.
- Disrupt industrial operations (i.e. hydroelectric plants) and damage drainage ditches.

- Spoil or diminish recreational experiences (swimming, boating, sportfishing, etc.).
- Reduce property values.
- Interfere with commercial fishing and aquaculture operations.
- Endanger public health.

Efforts to prevent and control ANS in Kentucky have been limited, and we are indebted to other states that have led the way in developing management plans. This plan aims to narrow that gap and allow Kentucky to become an important contributor at the state, regional, and national level in the fight against ANS. Specifically, this plan describes ANS problems in Kentucky and proposes management actions that can help mitigate and prevent current and future ANS problems.

This plan aims to identify and prioritize current and potential ANS within Kentucky. Unfortunately, due to global commerce, global mobility, and pathway utilization, new ANS can arrive at any time. To illustrate this sense of urgency, a new ANS *Didymo*, also known as rock snot, was discovered in Kentucky while this plan was being drafted. The following established and potential new ANS arrivals to Kentucky, are described herein:

Plants:

- Eurasian watermilfoil (*Myriophyllum spicatum*)
- Purple loosestrife (*Lythrum salicaria*)
- Brazilian watermilfoil (*Myriophyllum aquaticum*)
- Common reed (*Phragmites australis*)
- Curly pondweed (*Potamogeton crispus*)
- Japanese stiltgrass (*Microstegium vimineum*)
- Reed canarygrass (*Phalaris arundinacea*)
- Japanese knotweed (*Polygonum cuspidatum*)
- Alligator weed (*Alternanthera philoxeroides*)
- Water hyacinth (*Eichhornia crassipes*)

Fish:

- Silver carp (*Hypophthalmichthys molitrix*)
- Bighead carp (*Hypophthalmichthys nobilis*)
- Black carp (*Mylopharyngodon piceus*)
- Snakehead (*Channa* sp. or *Parachanna* sp.)
- Round goby (*Neogobius melanostomus*)

Mollusks:

- Zebra mussel (*Dreissena polymorpha*)
- Asian clam (*Corbicula fluminea*)

Algae:

- Rock snot (*Didymosphenia geminata*)

Mammals:

- Nutria (*Myocastor coypus*)

To successfully implement Kentucky's ANS management plan, local, state, and federal officials hope to achieve the following **4 main goals**:

1. Stop new introductions of ANS to Kentucky.
2. Prevent the spread of ANS currently in Kentucky and neighboring states.
3. Limit damages from ANS that cannot be eradicated.
4. Educate the public and stakeholders so they do not facilitate introductions and/or dispersal of new or existing ANS.

The **4 objectives** necessary to meet these goals include:

1. Raise public and stakeholder awareness of ANS issues.
2. Provide programs to prevent introductions and transport of ANS.
3. Develop and utilize an ANS early detection and rapid response (EDRR) system.
4. Offer effective communication and coordination of ANS management activities.

The purpose of this plan is to outline an initial and cohesive approach to ANS management in Kentucky until a time when additional resources and knowledge (e.g., assimilation of baseline data) allow us to develop specific strategies for individual ANS. This plan will provide effective communication, coordination, leadership, and support for ANS control efforts through the creation of an ANS coordinator position. ANS management efforts are located under a central umbrella (the KYANSTF) in the hopes of increasing implementation efficiency and avoiding unnecessary duplication or gaps in efforts. Cooperation among all interested parties are key to developing this plan and even more so in the plan's execution.

Introduction

The state of Kentucky is located in the east-central United States and contains numerous aquatic habitats, including lakes, rivers, streams, cave streams, springs, and wetlands. Residing in these habitats are diverse native flora and fauna, many of which are identified by federal agencies as threatened or endangered (U.S. Fish and Wildlife Service, 2007). Like many states, Kentucky is experiencing adverse biological, socio-economic, and aesthetic impacts from ANS that threaten freshwater ecosystems statewide.

Federal legislation introduced in 1990, and amended in 1996, deals specifically with problems associated with ANS. The Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) calls on states to develop ANS plans and provides federal funds to help states enact, maintain, and achieve the goals of their plans.

The legislation calls on coordinating local, state, and federal interests to ensure efficient implementation of the ANS management plan. The Federal ANS Task Force has provided state plan guidelines that have helped Kentucky develop our plan. Many organizations, agencies, and authorities have been involved in the process to help achieve the objectives and goals of the plan.

At the federal and national level, the KYANSTF has sought guidance and/or input from:

- **United States Fish and Wildlife Service**
- **United States Department of Agriculture Wildlife Services**
- **United States Army Corps of Engineers**
- **National Park Service**
- **United States Department of Agriculture Forest Service**
- **United States Department of Agriculture National Resources Conservation Service**

Involvement at the state and regional level has included:

- **The Governor's Office**
- **Kentucky Department of Fish and Wildlife Resources-Division of Fisheries**
- **Kentucky Department of Fish and Wildlife Resources-Division of Wildlife**
- **Kentucky Division of Water**
- **Kentucky State Nature Preserves Commission**
- **Kentucky Department of Agriculture**
- **Kentucky Division of Forestry**
- **Kentucky Transportation Cabinet-Division of Environmental Analysis**
- **Kentucky State University**
- **Eastern Kentucky University**
- **University of Kentucky**
- **University of Kentucky Extension Service**
- **Commercial Fishermen**

- **Bait Suppliers**
- **Fish Processors**
- **An Environmental Consulting Firm**
- **Kentucky Nursery and Landscape Association**
- **Southeast Aquatic Resources Partnership**
- **The Nature Conservancy**

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This plan will attempt to incorporate realistic and efficient objectives to achieve the desired goal of minimizing the adverse effects of ANS by using the most environmentally sound and effective methods available. The plan will be submitted to the Federal ANS Task Force and, when approved, provide 75:25 matching funds (as provided in NANPCA) to help implement the program.

An implementation table (page 41) is included detailing existing funds appropriated to ANS programs. As of 1/17/08, \$0 and 0 full time equivalencies (FTE) are dedicated to current ANS programs, of which \$0 will be carried forward and 1 FTE will be created over the next 2-3 years. The plan requests \$121,750 to help the Kentucky Department of Fish and Wildlife Resources to effectively implement the plan.

What are ANS?

Aquatic nuisance species are non-native, aquatic species that threaten the diversity or abundance of native species, the ecological stability of waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters.

Of course, these species did not migrate here naturally. Since the arrival of the earliest European settlers, native ecosystems have accommodated non-native introductions. Settlers brought many agricultural (cows, pigs, etc.) and horticultural (wheat) species to

North America in an effort to ease hardship and reap benefits provided by these species. Many of these species continued to benefit human populations and never caused significant harm to native species, ecosystems, and human utilization of these natural resources. However, once introduced (intentionally or accidentally), a relatively small percentage (~15%) of these introduced organisms can cause a great deal of harm to the nation's native flora and fauna and the human use of them. These species are termed "nuisance species," and if not managed effectively can cause great biological, socio-economic, and aesthetic harm. This plan does not try to manage all nuisance species within Kentucky, only those species primarily inhabiting aquatic environments, hence the term "aquatic nuisance species."

Why are ANS so successful?

Unfortunately, once introduced, most ANS are equipped for a speedy and successful takeover of native ecosystems. They have numerous adaptations and advantages that allow them to quickly colonize and spread.

Some of these adaptations include:

- Reproductive characteristics that facilitate rapid dispersal and colonization and self-sustaining populations. Many of these organisms have high seed/egg counts, high survival, and rapid maturation.
- Wide tolerance of diverse and fluctuating environmental conditions. Kentucky has a temperate climate and variety of ecosystems that allow many opportunities for ANS to thrive. Some of these ecosystems, such as Mammoth Cave National Park, are extremely fragile, increasing the need for preventing ANS introductions.

Because native populations evolved in balanced systems, there are checks and balances that prevent a single organism from dominating a system. Aquatic nuisance species did not coevolve with the native organisms in their new environment and therefore lack natural controls resulting in competitive advantages.

Some of these advantages are:

- Lack of predators that limit a species in its native range.
- Ability to utilize and compete for limited food supplies.
- Tolerance of a wide range of environmental conditions.

These adaptations and advantages help ANS populations explode because they can quickly outcompete and overrun existing native species.

Is Kentucky vulnerable?

Make no mistake, Kentucky, with its abundance of freshwater resources, is vulnerable. Aquatic habitat within the state includes 89,431 miles of streams, 637,000 acres of wetlands, and 228,385 acres of publicly-owned lakes and reservoirs of which 18

reservoirs are 1000+ acres in size (Kentucky Division of Water, 2006). We share a common border with seven other states (Missouri, Illinois, Indiana, Ohio, West Virginia, Virginia, and Tennessee) making their problems our problems and vice-versa. The state's temperate climate and variety of aquatic ecosystems provide many opportunities for adaptable and tolerant ANS to thrive. Many ecosystems are fragile with numerous imperiled flora and fauna. Furthermore, the popularity of boating and fishing in the state assures the spread of ANS unless effective action is taken as soon as possible.

What does Kentucky have to lose?

Although all the impacts of existing ANS on Kentucky's aquatic habitats are currently unclear, our experiences, and the experiences of other states, warrant immediate action. Kentucky has one of the most diverse freshwater fish assemblages (242 native species) in North America (Kentucky Department of Fish & Wildlife Resources, 1993). There are 103 species of freshwater mussels within the state's waters, making it one of the most diverse mussel habitats in North America (Kentucky Department of Fish & Wildlife Resources, 2007). Twenty-three of these species are listed as endangered. There are also four fish and one shrimp species listed as endangered, and one fish is listed as threatened (U.S. Fish and Wildlife Service, 2007). Although there are other threatened or endangered species that spend part of their life cycle in aquatic habitat or depend on aquatic habitat, this plan will include only those species that spend the majority of their life cycle in aquatic habitat, with the exception of nutria due to their devastating negative impacts.

The Cumberland and Green River systems are two of the highest quality river systems in the U.S. With 151 species of freshwater fishes and 71 species of freshwater mussels, the Green River system is the fourth most important system in the country in terms of fish and mussel biodiversity (Nature Conservancy, 2007). These valuable and fragile ecosystems are more prone to disturbance, and an ANS introduction could threaten entire communities. Kentucky cannot afford to take chances and must resolve to be as proactive as possible. The single most important way to prevent biological, socio-economic, and aesthetic loss in this state is to prevent new introductions of ANS. Letting the "genie out of the bottle" is easy; coaxing the genie back in is not.

What are the negative impacts associated with ANS?

Once established, ANS have serious biological, socio-economic, and aesthetic impacts.

Biological impacts include:

- Disruption of balanced food webs.
- Degradation of previously undisturbed habitats.
- Reduced abundance of native organisms due to increased competition (i.e., food resources, nesting areas).
- Decreased biodiversity.

Approximately 42% of the 958 aquatic and terrestrial species listed as federally threatened or endangered are at risk primarily due to non-indigenous species (Wilcove *et. al.*, 1998).

Beyond the aquatic systems where ANS reside, their impacts are felt by local, state, and federal entities that must provide resources to prevent, contain, and limit the socio-economic impacts of ANS.

Socio-economic impacts include:

- Depletion of limited management resources.
- Disruption of industrial operations.
- Damage of drainage ditches resulting in increased risk of flooding.
- Lost tourism dollars when recreational experiences such as sportfishing, swimming, and boating are no longer possible or pleasant.
- Fouled rivers and lakes resulting in reduced property values of nearby homes.
- Hurt business groups when ANS interfere with commercial fishing and aquaculture operations.
- Compromised public health. For example, nutria, an ANS from South America, harbors a parasite that results in a severe and painful rash on its human host.

All of these problems must be mitigated, and the costs associated with managing ANS can soar. For example, damages associated with ANS and the control of ANS cost \$9 billion annually in the United States (Pimentel *et. al.*, 2000). Kentucky simply cannot afford to act indecisively.

Finally, the loss of aesthetic value that is felt by every citizen and/or visitor to Kentucky due to ANS must be considered. For example, what dollar amount equals not being able to share a favorite childhood fishing spot with a child or grandchild? How many future memories will be lost because recreational swimming and boating activities have been degraded? Although biological and socio-economic loss can be quantified through losses of biodiversity and dollar amounts, aesthetic loss to current and future generations cannot.

Problem Definition and Ranking

Kentucky is relatively fortunate. To date, the ecological and economic impacts of ANS on the state's wildlife and water resources have been limited to specific areas or types of ecological systems without inflicting severe damage on the entire state. Most ANS identified in this section have spread to Kentucky through a combination of natural and human forces. Recognition of those forces is the first step in limiting future impacts.

By developing this plan, agencies and citizens throughout Kentucky can work to prevent invasions that could inflict more severe impacts while limiting the spread of those ANS already in the state. Implementation depends upon federal agencies, state agencies and citizens recognizing the importance of the state's watersheds in relation to economic, social, and biological activities. All must have knowledge of the invaders, agree to contain them, and cooperate to prevent introductions of new ANS.

Watershed and County Maps of Kentucky

To prevent and manage ANS in Kentucky, an understanding of the state's watersheds and their management is necessary. Kentucky watersheds are managed by the Kentucky Division of Water through the Watershed Management Initiative (WMI). The WMI focuses attention on selected watershed problems and priorities by providing a coordinated framework for public and private efforts. There are 12 drainage basins in Kentucky, which the WMI groups into 7 management units, primarily for administrative purposes. Each management unit is provided with a dedicated basin coordinator and staff. Because watersheds are naturally occurring, they are not limited by state or county boundary lines. Thus, regional and statewide coordination of ANS management efforts are essential because Kentucky shares river borders, lakes, and streams with neighboring states.

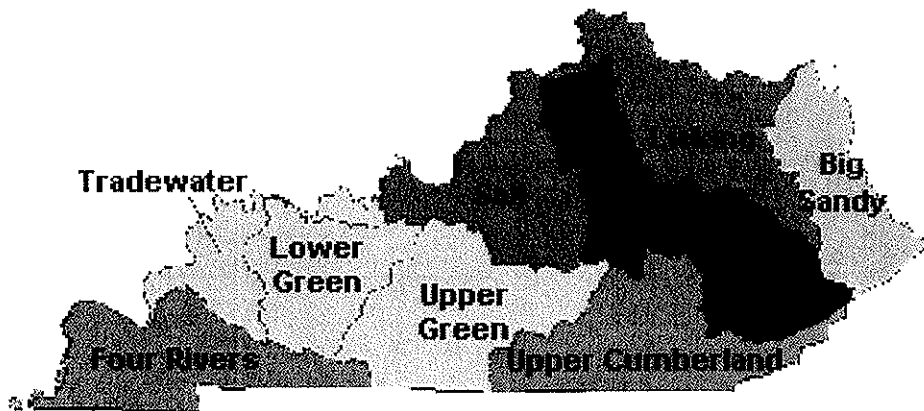


Figure 1. Map of the 7 watershed management units within Kentucky (<http://www.water.ky.gov/watersheds/>). The color scheme for each unit is as follows: Kentucky River Basin (Red), Licking River Basin and minor Ohio River tributaries (Green), Salt River Basin and minor Ohio River tributaries (Green), Green/Tradewater and Ohio River tributaries (Grey), Upper Cumberland River Basin (Blue), Four Rivers

