

## 2012 - Arizona Risk Analysis

# Snakehead

**Wanted dead, not alive  
INVADING SPECIES**

Northern Snakehead, *Channa argus*



Aliases: Unknown



### Name

Snakehead (*Pisces, Channidae*); family *Channidae*, containing two genera: *Channa* with 26 species to Asia, Malaysia, and Indonesia; and *Parachanna* with 3 species native to tropical Africa.

### Description

Snakeheads are air breathing, freshwater fishes. Some species can tolerate extremely low salinities. A few snakeheads are small, reaching about 17 centimeters; most, however, are much larger, with the largest reported to be 1.8 meters in length. (Courtenay, W.R., Williams, J.D. 2004) The body of snakeheads is torpedo-shaped, which tapers towards the tail. Snakeheads have a scaled head that looks like a snake, hence the name, with a large mouth with sharp teeth, a truncated, not rounded tail. Another snake-like feature is the somewhat flattened head with eyes located in a dorsolateral position on the anterior part of the head. Anterior nostrils are present and tubular. Dorsal and anal fins are elongated, and all fins are supported only by rays. A few species lack pelvic fins. The caudal fin is rounded. The mouth is terminal and large with a protruding lower jaw, which is toothed, often containing canine-like teeth. (Courtenay, W.R., Williams, J.D. 2004) Snakeheads are easily identified by dark irregular blotches along their sides on a background of golden tan to pale brown. This species is capable of darkening its background colors to the point of almost obscuring the blotches. There is a dark stripe from just behind the eye to the upper edge of the operculum with another dark stripe below from behind the orbit extending to the lower quadrant of the operculum. (www.issg.org)

*Channa micropetites* (Cuvier, 1831)  
Giant Snakehead



### Life History

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Snakeheads are voracious feeders and predators. Post-larval fish feed on plankton and small insect larvae and their diets change to small crustaceans and fish when they reach the juvenile stage. As adults they feed primarily on fishes, but will also eat frogs, crustaceans and aquatic insects. On occasion, snakeheads will predate aquatic birds and small mammals. Some snakeheads are reported to school for feeding purposes and feeding in this species appears to peak at dusk and pre-dawn. (Courtenay, W.R., Williams, J.D. 2004)



### **Reproductive Strategy**

Spawning seasons vary by species. Spawning in several species occurs primarily in summer months (June through August) but, in at least two species complexes (*Channa striata* and *C. punctata*), breeding pairs can be found throughout the year. Some species spawn twice to three or more times each year. Northern snakeheads are capable of spawning five times per year. (ENSR International 2005) Several reports have noted that when snakeheads pair, they remain monogamous for a spawning season, perhaps longer, but this may not apply across the life history of any individual snakehead. Most snakeheads build nests by clearing generally circular areas in aquatic vegetation, often weaving the removed vegetation around the centrally cleared area. This results in a vertical column of water surrounded by vegetation. Sometimes the surface of this column contains pieces of removed vegetation. In general, the male entwines his body around that of the female, with some species appearing to “dance” in the water column as eggs are released and fertilized. Eggs are buoyant, due to a large oil droplet in the yolk mass, and rise to the surface where they are vigorously guarded by one or both parents. There is limited information on fecundity, except for snakeheads of commercial importance. Fecundity increases greatly in larger snakeheads and appears to be linear, increasing in volume with increasing body length. Development time to hatching varies with water temperature and, to a lesser extent, with the species involved. (Courtenay, W.R., Williams, J.D. 2004)

### **Environmental Tolerances and Restrictions**

The physiological and ecological characteristics of the snakehead allow for competitive advantages over native species. Snakeheads are highly evolved air breathing teleostean fishes, and several are capable of overland migration by wriggling motions. (Courtenay, W.R., Williams, J.D. 2004) Snakeheads, particularly Northern, lack the ability to migrate over dry land as an adult, but young can migrate over land in areas where some water is present. The advantage to being an air breather is obvious, and snakeheads can live in hypoxic conditions unlike most native species. The temperature tolerance of the snakehead gives it the ability to live under ice, ensuring the survival of this species between seasons. Snakeheads can remain out of water for considerable periods of time as long as they remain moist. Some snakeheads, especially *C. striata*, can bury themselves in mud during times of drought. (Courtenay, W.R., Williams, J.D. 2004) Temperature is the most important environmental factor that would determine potential range of snakeheads in the United States. Because there are few data providing thermal

tolerance ranges for snakeheads, potential range must be inferred from distribution within native ranges. The family *Channidae* contains 10 species that are strictly tropical and, if introduced, would survive in only the warmest waters, such as extreme southern Florida, perhaps parts of southern California and Hawaii, and certain thermal spring systems and their outflows in the American west. Another four species can be considered tropical to subtropical, indicating a similar potential range of distribution as for tropical species, but with a greater likelihood of survival during cold winters and more northward limits. One is subtropical. Another 11 snakeheads (3 that appear to be species complexes) can tolerate tropical or subtropical to warm temperate conditions, indicative of species that could survive in most southern states. One is warm temperate, and another is warm temperate to cold temperate (*Channa argus*) has a temperature range of 0-30 °C). In summary, there are no waters in the United States that, based on temperature, would preclude some member(s) of the family *Channidae* from becoming established. (Courtenay, W.R., Williams, J.D. 2004)

## **Distribution**

### **Native Range:**

Species and species complexes of the genus *Channa* are native from southeastern Iran and eastern Afghanistan eastward through Pakistan, India, southern Nepal, Bangladesh, Myanmar, Thailand, Laos, Malaysia, Sumatra, Indonesia, Vietnam, Korea, and China northward into Siberia. See map below.

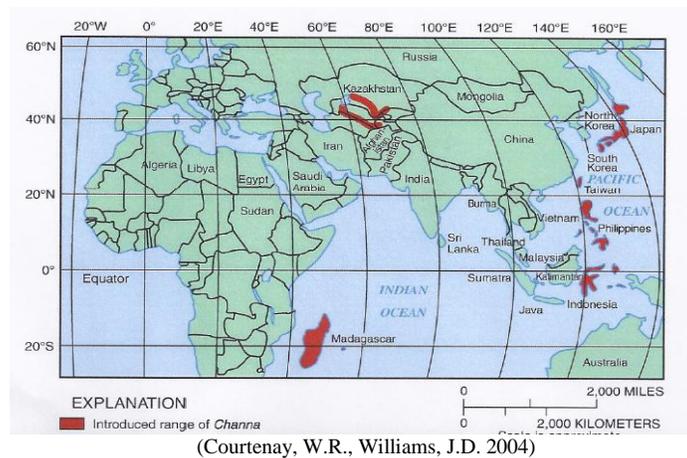


(Courtenay, W.R., Williams, J.D. 2004)

### **Introduced Range:**

Locations where snakeheads have been introduced beyond their native ranges in the Eastern Hemisphere are shown on map below.

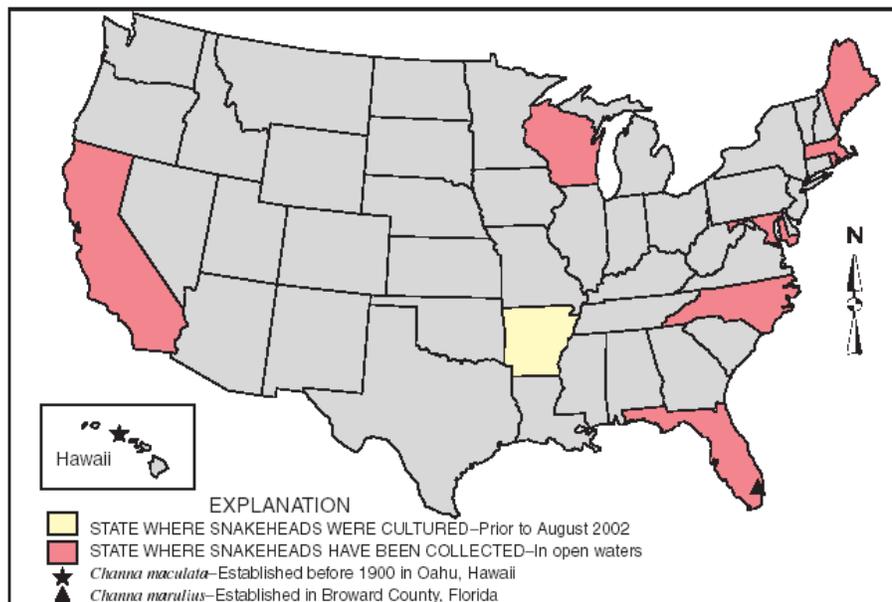
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### Established Range in United States:

Five species of snakeheads have been reported from open waters of the United States (California, Florida, Maine, Maryland, Massachusetts, North Carolina, Rhode Island, and Wisconsin), and three became established as reproducing populations. One species was being cultured in Arkansas until possession of live snakeheads was prohibited in August 2002 and a fifth species is under culture in Hawaii.

See map below.



**Figure 4**—States where snakeheads have been collected from open waters, were cultured prior to August 2002, or are established.

(Courtenay, W.R., Williams, J.D. 2004)

### Current Status in Arizona

No current occurrences of Snakeheads exist in Arizona. Snakeheads, all species of the family *Channidae*, are listed as Restricted Live Wildlife per, (R 12-4-401) and the northern snakehead (*Channa argus*) is an Arizona listed aquatic invasive species (per A.R.S § 17-255).

## **Pathways**

Aquacultures, hunting/fishing, live food trade, pet/aquarium trade. ([www.issg.org](http://www.issg.org)).  
Table below shows known cultured for food and/or aquarium fish trade.

**Table 3**—Species of the family Channidae currently known to be cultured for food and/or aquarium fish trade

<i>Channa argus</i> <sup>1</sup>	<i>Channa maculata</i>
<i>Channa asiatica</i>	<i>Channa micropeltes</i> <sup>2</sup>
<i>Channa marulius</i>	<i>Channa striata</i> <sup>3</sup>
<i>Channa punctata</i>	<i>Parachanna obscura</i>

<sup>1</sup>Second most important species cultured for food. Also, the only species that has been in culture in the contiguous United States (Arkansas).  
<sup>2</sup>Appears to be the most important species cultured for the aquarium fish trade.  
<sup>3</sup>Species most widely cultured for food. Being cultured in Hawaii.

(Courtenay, W.R., Williams, J.D. 2004)

## **Potential Impacts**

### **Wildlife/Habitat**

Snakeheads are voracious predators and compete with native aquatic species. They can eat prey up to 33% of their own body length with larger prey. Snakeheads are capable of surviving in water with very low oxygen content, giving them a competitive advantage over species such as pike and bass that require more oxygen. ([www.issg.org](http://www.issg.org))

The predatory nature of Snakeheads indicates that their introduction would likely affect other populations of fish, amphibians, and invertebrates through direct predation, competition for food resources, and alteration of food webs. Larger snakehead species are known to feed on birds (particularly young waterfowl), amphibians, small reptiles (snakes and lizards), and small mammals. Through predation, ecosystem balance could be modified drastically if snakeheads became established in waters with low diversity of native fishes and low abundance or absence of native predatory species. ([www.fws.gov](http://www.fws.gov)).

The northern snakehead is affected by parasites which are also known to affect native species. ([www.issg.org](http://www.issg.org))



### **Infrastructure**

None known.

### **Economic**

The snakehead could potentially compete with commercially and recreationally important fish species through predation and competition for food and habitat in ponds, streams, canals, reservoirs, lakes, and rivers.

### **Human Health**

A parasitic disease that can affect humans in gnathostomiasis, caused by a helminth parasite, *Gnathostoma spinigerum*. It has been recognized as a highly important disease with about 800 suspected cases per year in two hospitals in Bangkok, Thailand, between 1985 and 1988. *Channa striata* has been identified as an intermediate host for this parasite, found mostly in muscle tissue and occurring in 100 percent of fish examined over 41 cm in length. It is unknown if additional species of snakeheads in Thailand and other countries of southeastern Asia may serve as an intermediate host for larvae of this parasite. (Courtenay, W.R., Williams, J.D. 2004)

### **Benefits**

None.

### **Threats to Arizona**

Due to the diet mostly consisting of fish, negative impacts to native and sport fish populations could be high. Impacts to rare, threatened and endangered aquatic species could be very high if snakeheads are introduced into a water body with listed species. Snakeheads may introduce parasites and disease to native fish populations. Ecosystem balance could be modified due to establishment of snakeheads. Over time, an introduction could be detrimental to the sport fishing industry due to predation on sport fish. (ENSR International 2005)

### **Recommendation**

**Through Directors Order, list all Snakehead (family *Channidae*, containing two genera: *Channa* and *Parachanna*) as an aquatic invasive species in Arizona per ARS 17 – 255.01 B1.**

Preventing and detecting the invasion of snakeheads starts with outreach and education of the public, especially since people may move and/or transport these highly invasive fish (ENSR International 2005) or use these fish as a food source. Eradication would be nearly impossible and control efforts challenging in large lakes or riverine systems. Control in smaller systems depends on the amount of vegetation, access to the water body, and effectiveness of available control methods. When a population is discovered, it is typically too late for eradication unless the population is isolated. (www.fws.gov)

### **References**

Ecology of *Channa argus*

[www.issg.org/database/species/ecology.asp](http://www.issg.org/database/species/ecology.asp)

Courtenay, Walter R., Williams, James D. 2004 Snakeheads (*Pisces*, *Channidae*)-A Biological Synopsis and Risk Assessment. U.S. Geological Survey Circular 1251. Pp. 45-52.

ENSR International 2005. Rapid response plan for the Northern Snakehead (*Channa argus*) in Massachusetts. Massachusetts Department of Conservation and Recreation.

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U.S. Fish and Wildlife Service. July 2002. Invasive Species Program Snakeheads-The Newest Aquatic Invader. [www.fws.gov/snakeheadfstotal.pdf](http://www.fws.gov/snakeheadfstotal.pdf)

Northern Snakehead Working Group. Department of Interior. National Control and Management Plan for the Northern Snakehead (*Channa argus*).

<http://www.fws.gov/northeast/marylandfisheries/reports/National%20Management%20Plan%20for%20the%20Northern%20Snakehead.pdf>

