INTRODUCED AQUATIC MOLLUSKS IN ARIZONA

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To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

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Key to common acronyms used in this report:

AGFD = Arizona Game and Fish Department
AIS = Aquatic Invasive Species
CAP = Central Arizona Project
NAS = Nonindigenous Aquatic Species
SRP = Salt River Project
USGS = U.S. Geological Survey

INTRODUCED AQUATIC MOLLUSKS IN ARIZONA

Jeff A. Sorensen

This brief identification guide highlights a few of the introduced aquatic mollusks that have become established in wild and captive sites in Arizona. This is by no means a complete inventory or account of introduced aquatic mollusks within the State. Many of our State's waterways, lakes, ponds, and wetlands have not been adequately surveyed for aquatic mollusks, native or introduced. Some of the mollusks in this identification guide are highly invasive, and have been formally recognized by the Arizona Game and Fish Department as Aquatic Invasive Species (AIS) in Director's Order 1 (A.R.S. §17-255). The U.S. Geological Service (USGS) website: http://nas.er.usgs.gov/queries/SpeciesList.aspx?Group=Mollusks provides detailed information and species occurrence records on Nonindigenous Aquatic Species (NAS). Another useful source of AIS distribution information in Arizona is the iMapInvasives database: http://imapinvasives.org/azimi/map/.

APPLESNAILS (*Pomacea*)

As of June 2011, island applesnails (*P. maculate [insularum]*) were documented as being well established in the Lower Salt River (Verde River confluence and downstream to Granite Reef), Lower Verde River (downstream of Bartlett Reservoir [2012]), Red Mountain Lake in Mesa (2014), and reported by Rick Amalfi of Aquatic Consulting and Testing Inc. in Eldorado North Lake of Scottsdale (2013) and Eldorado South Lake through the Indian Bend Wash (2014). Applesnails (*Pomacea* spp) also reported by Department Yuma Regional Fish Program in the Lower Colorado River and connected backwaters and lagoons around Yuma for the past decade. The entire genus of *Pomacea* was recognized as AIS under Director's Order 1. They were likely introduced by illegal stocking of aquarium pets into the wild. These are very large snails (i.e. golf ball-sized and slightly larger) compared to native aquatic snails. The following websites provide very useful background information on these snails: www.applesnail.net; http://snailbusters.wordpress.com/biology; and http://www.issg.org/database/species/ecology.

CHINESE MYSTERY SNAILS (*Cipangopaludina chinesis malleata*)

Chinese mystery snails are established in Bubbling Springs Pond and Bubbling Ponds Fish Hatchery in central Arizona; these were introduced by a former hatchery manager's wife decades ago. This snail is also reported by USGS-NAS, as established in the Salt River Project (SRP) Tempe Canal, downstream of the junction with South and Consolidated canals (2005) and in a pond on the University of Arizona campus (1965). These snails are not recognized as AIS in Director's Order 1. They were likely introduced by illegal stocking of aquarium pets into springs, canals and ponds. These are very large snails (i.e. golf ball-sized) compared to native aquatic snails.

BIG-EARED RADIX (*Lymnaea [Radix] auricularia*)

Big-eared radix is established in beaver ponds of West Fork Oak Creek (2009). Additional surveys of Oak Creek in central Arizona are needed to determine if the species is more widespread. These snails are not recognized as AIS in Director's Order 1. They may have been introduced incidentally with historic stocking of sport fish within the watershed or illegally stocked aquarium pets into the wild. These are large snails (i.e. acorn-sized) compared to native aquatic snails.

RED-RIM MELANIA (*Melanoides tuberculata*)

Red-rim melania are established in the SRP canals (1995 or prior), Lower Salt River (2014), Red Mountain Lake in Mesa (2014), and reported by USGS-NAS as established in Lake Mead and the Lower Colorado River near Yuma (data unknown). These snails are not recognized as AIS in Director's Order 1. They were likely introduced from illegal stocking of aquarium pets into canals, lakes and rivers. These are large snails (i.e. almond-sized) compared to native aquatic snails.

NEW ZEALAND MUDSNAILS (*Potamopyrgus antipodarum*)

New Zealand mudsnails are established in the Colorado River, Lee's Ferry reach down through Grand Canyon, Lake Mead (2003) and Lake Mohave / Willow Beach National Fish Hatchery

(2010). This species is also documented by National Park Service biologists as occurring in Havasu Creek below Beaver Falls downstream to the confluence with the Colorado River (2013). Nevada Department of Wildlife reports that these snails occur in Beaver Dam Wash in the Lower Virgin River (2013). New Zealand mudsnails are recognized as AIS in Director's Order 1. Additional \surveys of the Lower Colorado River and its reservoirs below Lake Mead are needed to determine if the species is more widespread. They are known to "hitch hike" from infected areas via boats, trailers, and boat live-wells that had not been cleaned, drained or dried. These are very small snails (i.e. grass seed-sized) compared to native aquatic snails.

Photo by NPS

QUAGGA MUSSELS (*Dreissena rostriformis bugensis*)

Photos by George Andrejko, AZGFD

Quagga mussels are established in Lake Powell (2012) and in the Lower Colorado River (from Pearce Ferry Rapid downstream), Lake Mead (2007), Lake Mohave (2007), Lake Havasu (2007), Imperial Reservoir (2010), Mittry Lake (2010), Martinez Lake (2010), Topock Marsh (2010), the Central Arizona Project (CAP) canal from its intake at Lake Havasu down to Apache Junction (2007), Lake Pleasant (2007) and Red Mountain Lake in Mesa (2010?). Suspected waters include: Colorado River in the Lee's Ferry reach and Grand Canyon, the CAP canal from Apache Junction down to its terminus in Tucson, and the SRP canal system where it has a CAP interconnect below Granite Reef Dam. Quagga mussels and their conspecific, zebra mussels (*Dreissena polymorpha*; not yet found in Arizona) are recognized as AIS in Director's Order 1. Additional surveys of the Bill Williams drainage are needed to determine if the species is more widespread. They are known to "hitch hike" from infected areas via boats, trailers, and boat live-wells that had not been cleaned, drained or dried. These are small clams (i.e. finger nail-sized) compared to other freshwater clams found in Arizona.

ASIAN CLAMS (*Corbicula fluminea*)

Asian clams are widely established in the Lower Colorado River (throughout Arizona), Verde River, Salt River, Gila River, Aqua Fria River, most major lakes and reservoirs, canal-fed ponds, canal and irrigation systems in the State. It is unknown when they became

established in the State, but they are documented as early as 1958. These clams are not recognized as AIS in Director's Order 1. These are small to medium clams (i.e. penny to quarter-sized) compared to other freshwater clams found in Arizona.

GIANT FLOATERS (*Anodonta [Pyganodon] grandis grandis*)

Giant floaters are established in Lake Mary, Roosevelt Lake, and perhaps other impounded waters that were historically stocked with sport fish. It is unknown when they became established in the State, but they are documented as early as the late 1990s (?) from the sites above. These clams are not recognized as AIS in Director's Order 1. These are very large clams (i.e. palm-sized and larger) compared to other freshwater clams found in Arizona.

COMPARISON BETWEEN MUDSNAILS AND NATIVE SNAILS

NZ Mudsnails

- Exotic and highly invasive!
- Tend to be darker in color, and very small size
- Have an operculum cover over its shell opening
- Shell whorls to the right

Springsnails

- Native and typically found only near spring source
- Often light colored, green or dark brown with lighter tip of cone, and very small size
- Have an operculum cover over its shell opening
- Shell whorls to the right

Physids

- Most are natives and very common in most waters
- Tend to be darker in color and larger in size
- No operculum cover over its shell opening
- Shell whorls to the left

QUAGGA MUSSEL OUTREACH MESSAGE