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TRYING TO WIN THE BATTLE

story and photos
by Brian T. Watson

In 1938, Orson Wells caused a panic across the country with his radio broadcast of "War of the Worlds." For those not familiar with this event, a fictional news report about aliens invading Earth was broadcast in the Northeast and had thousands fearing the end was near. Eventually, everyone came to understand that this was a fictional story and aliens were not wreaking havoc and causing death throughout cities across the United States and they never have. However, as a Wildlife Diversity Biologist with the Department of Game and Inland Fisheries, I happen to know this is not the case—aliens have been and are running amuck, even causing deaths, in cities across the U.S., and in other countries for that matter. "How can this be?" you say, with no television or radio reports of alien sightings or evidence of destruction. Well, the aliens to which I'm referring are not the typical large-headed, bug-eyed creatures depicted in books or the laser-shooting, hulking beasts often portrayed in movies from far-away planets. Rather, I'm talking about alien species that live right here on planet Earth, but which may be better known as nonnative, nonindigenous, or exotic species.

You may wonder, if a species naturally inhabits our planet, how can it be considered an alien? Nonnative, nonindigenous, or exotic species are

animals or plants that are not native to a locality or did not evolve in that area but have since become established. These species typically arrive in their new surroundings through no actions of their own but accidentally or intentionally through human actions. Such avenues include bait bucket introductions, release of pets, transport on watercraft, scuba and fishing gear, ballast water discharge, interstate and intercontinental shipments, and intentional releases for the purpose of establishing the species in a new area. It is estimated that 50,000 alien species inhabit the U.S., with some of the better publi-



The third in a series of articles that look at the introduction of exotic species and the threat they pose to Virginia's wildlife and natural resources.

cized examples being kudzu, zebra mussels, snakehead fish, killer bees and West Nile virus. While numerous alien species introductions cause no problems, many nonnative species do cause significant biological, ecological and economic harm. These species are referred to as invasive species. The main reason for the tremendous problems caused by these invasive species is that there are no natural checks and balances in their new environment. In its native range, a species may be kept in check by a predator or some environmental condition. However, in a new environment, a species can thrive unchecked and often outcompete native plants and animals to their detriment. In fact, invasive species pose one of the main threats to our natural heritage. They directly threaten native species and can alter landscapes and ecosystems. Nearly 50% of the 1,180 imperiled or federally listed species are directly threatened by

Brian Watson, a wildlife diversity biologist with VDGIF, searches for invasive crayfish in a Virginia stream.

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E AGAINST INVASIVE SPECIES

competition with or predation by invasive species. In fact, invasive species are considered the top threat to native plants and animals after habitat loss. Killing or eradicating invasive species is typically a futile effort and controlling them is extremely costly. Nationally, invasive species result in an estimated annual cost of \$120 billion. These monetary losses range from the loss of crops and wildlife viewing opportunities to control of these alien species. Virginia is not immune to invasive species and is experiencing the same problems we see at the national level. Hundreds of invasive species have invaded



Red swamp crawfish

ed the state, resulting in annual costs of as much as \$1 billion. While you may have heard of the recent discovery of snakehead fish in the Potomac watershed or are familiar with kudzu, there are numerous other invasive species that mostly go unnoticed and either have already invaded the Commonwealth or may arrive in the near future. I will present just a fraction of these alien invaders, with a focus on aquatic species.

Didymo (*Didymosphenia geminata*) is a microscopic, single-celled alga, within the group of algae called diatoms. These single-celled organisms grow on stalks and form large colonies in freshwater systems. Once a beautiful and rare diatom restricted to pristine lakes and streams of northern latitudes, this species is no longer rare. It seems this alga has unknowingly been transported on anglers' gear and is now causing problems. Referred to as rock snot, *Didymo* colonies are visible as white to light brown tufts attached to rocks and often appear as strands of toilet paper or fiberglass. While the only



Didymo, or rock snot, engulfs a rock after invading a stream. The spread of this diatom could have negative consequences on Virginia's fisheries and other aquatic wildlife.

YOU CAN HELP

Hitchhiking isn't as popular as it used to be, except if you're an aquatic hitchhiker. Over the past few decades, thousands of aquatic species have moved into and across the U.S. by "hitching" rides on watercraft and associated equipment and in ballast water, resulting in tremendous biologic and economic impacts. In an effort to combat these hitchhikers, the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries have partnered to post "Stop Aquatic Hitchhikers!" signs at boat ramps across the Commonwealth. So please be on the lookout for these signs and follow their instructions to help us stop these invaders! If you operate a boat ramp and are interested in posting a sign, or would like to display one in a related business, please contact Brian Watson at (434) 525-7522.

After a long day of fishing, the last thing likely on your mind is properly disposing of any remaining bait. Unfortunately, too many times this bait is dumped into a local lake or stream rather than in the trash, resulting in unforeseen impacts to native fisheries and other aquatic organisms. The Virginia Department of Game and Inland Fisheries is trying to make the angling community and general public more aware of this problem through the distribution of "Don't Dump Bait!" stickers at locations like bait shops, tackle shops and sporting goods stores, through angling guides and groups, and at events like fishing clinics. Signs are also being posted at boat ramps and some of the aforementioned locations. If you are interested in obtaining stickers for distribution at your business or through your organization, or a sign for posting, please contact Brian Watson at (434) 525-7522.

direct human impact appears to be eye irritation in swimmers, as the colonies develop, they smother rocks and benthic organisms, like aquatic insects and fish eggs, and can impact adult fish species. Excessive colonies can stretch for tens of miles and persist for weeks to year round. Didymo has been discovered in Virginia in the tailraces of the Smith and Jackson rivers, both of which are high quality trout fisheries. While the impacts in Virginia are yet unknown, it is believed fisheries may be negatively affected in these areas, as well as other freshwater systems in which Didymo is introduced. New Zealand is currently battling this tiny organism and experiencing significant declines in trout fisheries. At the least, aesthetics will decline as the growths will snag fishing gear, making these areas unappealing.

Crayfish, or crawdads, are best known for two things—fish bait and food. However, crayfish also are critical components of aquatic environments. Crayfish feed on algae, leaves, plants and smaller invertebrates such as aquatic insects, while serving as a critical food source for game fish like smallmouth and largemouth bass and helping to sustain economically beneficial fisheries resources. However, crayfish have caused tremendous unintended consequences when introduced outside their native range. The problems vary from habitat destruction to the elimination of



Virile crayfish

native crayfish species. Invasive crayfish species are typically much more aggressive than their native counterparts, will attack game fish, and often reach larger sizes making them much more difficult for game fish to consume. Likewise, habitat destruction usually occurs to aquatic vegetation, which is a critical habitat resource for many other aquatic species including larval fish. Reduced aquatic vegetation results in reduced young fish and, naturally, less adult fish. In Virginia, at least two invasive species are established, the red swamp crawfish (*Procambarus clarkii*) and the virile crayfish (*Orconectes virilis*). The red swamp crawfish is native to the gulf-coast region and is the typical crayfish used in aquaculture. In Virginia, the species is established mainly in Coastal Plain areas but is often found at fish hatcheries across the state. The virile crayfish, native to parts of the Midwest, is a common crayfish sold as bait. In



Above: Rusty crayfish
Crayfish are often used for bait to catch other game fish. They are also prized as a delectable culinary delight in many areas of the country. In recent years numerous invasive crayfish species have found their way into Virginia's waterways causing habitat destruction, which in turn threatens other native aquatic species.



Courtesy of US Fish and Wildlife Services



Virginia, the species is established in portions of the New, James and Potomac river watersheds and was noted by the author in Smith Mountain Lake last summer. Both crayfish reach larger sizes compared to native crayfishes and are much more aggressive than their native counterparts. In streams where the virile crayfish have taken up residence, they are typically the only species you now find, so impacts to native crayfish species are obvious. Impacts to the Commonwealth's fisheries resource have yet to be determined. One species where the impacts are clear is the rusty crayfish (*Orconectes rusticus*). Native to parts of the Midwest, this species has yet to be documented in Virginia but has been found just across the border in the Clinch and Holston rivers in Tennessee. This species has been called the "clear-cutter" of aquatic systems for its ability to shred aquatic vegetation. Likewise, it reaches a fairly large size and is extremely aggressive, even attacking humans if approached! Unlike other invasive crayfish species, the rusty crayfish has been observed raiding fish nests and eating the developing eggs. In hopes of preventing the introduction and spread of invasive crayfish species throughout the Commonwealth, the sale of live crayfish as bait or in the aquarium trade was banned in July 2006. However, with the virile crayfish already established and the

Although minute in size, the New Zealand mudsnail can cause large problems in aquatic systems. They have rapidly infested water and river systems in parts of the western United States clogging intakes and harming native fisheries. Even though they are not found in Virginia, biologists are concerned that it may be just a matter of time before they show up.

rusty crayfish standing at our doorstep, is it too little, too late?

As its name indicates, the New Zealand mudsnail (*Potamopyrgus antipodarum*) is native to streams and lakes in New Zealand. This tiny snail, reaching a maximum size of less than a half inch, can reach densities in the 100,000s per square yard, blanketing stream bottoms. Impacts include bio-

fouling of intakes, elimination of native benthic species, and impacts to native fisheries. First found in the U.S. in the Snake River in Idaho, in 1987, it is believed the snail arrived either in ballast water discharged into the Great Lakes or in the water of live gamefish shipped from infested waters to western rivers. Now documented throughout parts of the western states east to Colorado, the snails' spread has been facilitated through attachment to fishing and sporting equipment. Yet to be found in Virginia, it may only be a matter of time.

What can be done to stop the introduction of alien species, particularly invasives? While Virginia has regulations prohibiting the release of wildlife and the sale and possession of certain species, these regulations are only as strong as the citizens who carry them out. Additionally, these regulations will not reduce or prevent the unintentional introduction and spread of invasive species. Therefore, it is clear that if we are to win the battle against these alien creatures, it is our own behaviors and attitudes that must change. While tackling issues such as ballast water discharge and interstate and intercontinental shipments may be beyond our capacity, we can and must be more diligent in preventing alien species from spreading through our own actions. The first, and most important, step in this endeavor is educating yourself and friends. Many Web sites such as the U.S. Department of Agriculture's National Invasive Species Information Center (www.invasivespeciesinfo.gov) or the Virginia Invasive Species Council (<http://www.dcr.virginia.gov/dnh/vaisc/index.htm>) are good places to start, or you can contact your local Department of Game and Inland Fisheries office. In an effort to help in this capacity, the Department has recently publicly targeted two pathways—bait bucket introductions and aquatic hitchhikers (see sidebars). With your help, hopefully we can slow and even prevent some of these modern-day "War of the Worlds." □

Brian Watson is a Wildlife Diversity Biologist with the Virginia Department of Game and Inland Fisheries.