




# INVASION OF THE INVERTEBRATES

How invasive crayfish are destroying ecosystems in Southern California and endangering public health

Written and photographed by Rick Evans



A photograph of a stream flowing through a forest. A large, weathered tree trunk lies over the stream, creating a natural archway. The water is dark and murky, reflecting the surrounding trees and sky. The stream is surrounded by dense vegetation and fallen branches. The lighting is bright, suggesting a sunny day.

*Creeping beneath the murky bronze water of sluggish creeks and streams, alien creatures stalk along the muddy sediment searching for something to eat – anything to eat. People have even seen them eat each other.*



## INVASION OF THE INVERTEBRATES




No, this isn't the plot of a 1950s B-movie. This is the saga playing out right in the backyards of Southern California residents, specifically around the areas near the Santa Monica Mountains in neighborhoods like Calabasas, Malibu, Agoura Hills, and Oak Park. The creatures lurking below the water?

[Red-Swamp Crayfish.](#)

Native to the Southeastern United States, these crayfish are considered an invasive species in California. Outside of their native habitat they can be incredibly destructive to ecosystems. Their presence has been disastrous for many native species, and they can be hazardous for people as well.

# CRAYFISH INVASION





"...THEY KILL OR ELIMINATE THE PRESENCE OF ANY NATIVE SPECIES..."

Gary Bucciarelli, Assistant Adjunct Professor and Director of Research at the [UCLA Stunt Ranch Santa Monica Mountains Reserve](#), says crayfish are not a part of this local ecosystem and, "A lot of the species that are found in this native ecosystem don't have a way to defend themselves from these crayfish."

"Basically, what they are able to do is outcompete and prey upon all of the native amphibians that live in the streams and also insects, including potential predators of disease vectors like mosquitoes," he says.

A [statement](#) on the Stunt Ranch Reserve website indicates, "Current numbers estimate that the Santa Monica Mountains is home to more than 1,000 plant species that compose 26 natural communities, 400 species of birds, 50 species of reptiles and amphibians, and 46 species of mammals. Presently, more than 50 of these species are threatened or endangered. This is the highest concentration of such rare species in the United States." The crayfish are a major problem for this unique and critical habitat.

Erik Sode, Aquatic Supervisor for [Mountains Restoration Trust](#) (MRT), says the crayfish have pushed out a lot of native amphibians.

"What happens when [crayfish] get introduced into streams is they disrupt the ecosystem and they kill or eliminate the presence of any native species, which are important for the stream." He says when those native animals are absent, "the environment tends to suffer for it."





## JOINT EFFORT

**M**ountains Restoration Trust has worked closely with UCLA, Pepperdine University, the U.S. Geological Survey and the Las Virgenes Municipal Water District to study the crayfish and come up with a comprehensive solution to remove them from the places they have invaded.

One method MRT has used to mitigate the problem is to organize volunteer-based community [events](#) where local citizens meet up at chosen sites of concern to assist in removing the crayfish as well as participating in documentation of data for the pests they've caught.



# CATCHING THE CRUSTACEANS



**M**etal traps are placed along stretches of a creek in advance. Sode says he often baits these traps with enticements like dog food, bits of hot dog, or fish heads.

“They eat almost anything,” says Sode. Crayfish harm many aquatic species, “...by eating their food resources, taking up their habitat space, and then they also just eat the native species outright as well,” he adds.



**B**ucciarelli says amphibian species which rely on the streams for breeding like the [California Newt](#), [California Treefrog](#), and [Pacific Treefrog](#), are all directly affected. Crayfish are harmful to these species because they deter breeding activities, kill them, and destroy or eat all the eggs and tadpoles, he says.

The California Treefrog has an unfortunate defense mechanism where it will, “dive down deep into pools to hide when it's scared or feels like it needs to defend itself,” says Bucciarelli. “And it's like the worst response that it could possibly have because sitting at the bottom of the pool are the crayfish, and they just completely attack the treefrog.”



A close-up photograph of two crayfish on a dark, textured rock surface. One crayfish is in the foreground, facing left, and another is in the background, facing right. The text is overlaid in the center of the image.

**"HAVING CRAYFISH IN STREAMS DETERS THE DRAGONFLY NYMPHS FROM FEEDING ON THE MOSQUITO LARVAE, WHICH THEN LEADS TO MORE MOSQUITO LARVAE SURVIVING AND POTENTIALLY SPREADING DISEASES!"**

*GARY BUCCIARELLI*

*Director of Research, UCLA Stunt Ranch Santa Monica Mountains Reserve*



# DANGER FOR HUMANS

"...HIGHER INCIDENCES OF DISEASE..."

A [report](#) published last year by researchers leading crayfish studies has highlighted a major concern about the effects they have on mosquito populations and, ultimately, disease transmission.

Bucciarelli says dragonfly nymphs, which are the aquatic stage of dragonflies, are voracious predators in streams that eat mosquito larvae, and when found in areas where crayfish are present, "they actually don't feed on the mosquito larvae as they would if they were just alone without the crayfish."

"Having crayfish in streams deters the dragonfly nymphs from feeding on the mosquito larvae, which then leads to more mosquito larvae surviving and potentially spreading diseases," he says.

Sode says, "A huge misconception is that people believe that crayfish will eat the mosquito larvae on the surface of the water. This is not true." He says the only insects they eat are on the stream bed, which are a food source for amphibians.

"...they will eat the amphibians which would normally eat the larvae and or mosquitoes, and since [the amphibians] are not here anymore the mosquito population is basically unrestricted and they multiply rapidly," he says. "If there are no amphibians to control the mosquito population, any areas, housing or otherwise, that surround a stream full of crayfish will generally see higher incidences of disease because of it."





# THE EFFECTS OF A CHANGING CLIMATE

FEWER RAINSTORMS MEAN MORE DIFFICULTY IN ELIMINATION

**M**aking matters worse, environmental factors such as climate change may have a measurable effect on the crayfish proliferating. "One big [factor], especially in Southern California, is drought. We don't see as much rain anymore," says Sode. "One of the most beneficial ways to remove crayfish, in particular, is to have rainstorms," which flush crayfish out of the streams to the ocean. "Because of climate change, we aren't seeing as many rainstorms as California should naturally see. And because of that the crayfish are even harder to get rid of," he adds.



# MAIN PROBLEMS WITH CRAYFISH



## DESTRUCTIVE TO HABITAT

Reduce beneficial aquatic plants by eating them and digging them up. Negatively alter water quality.



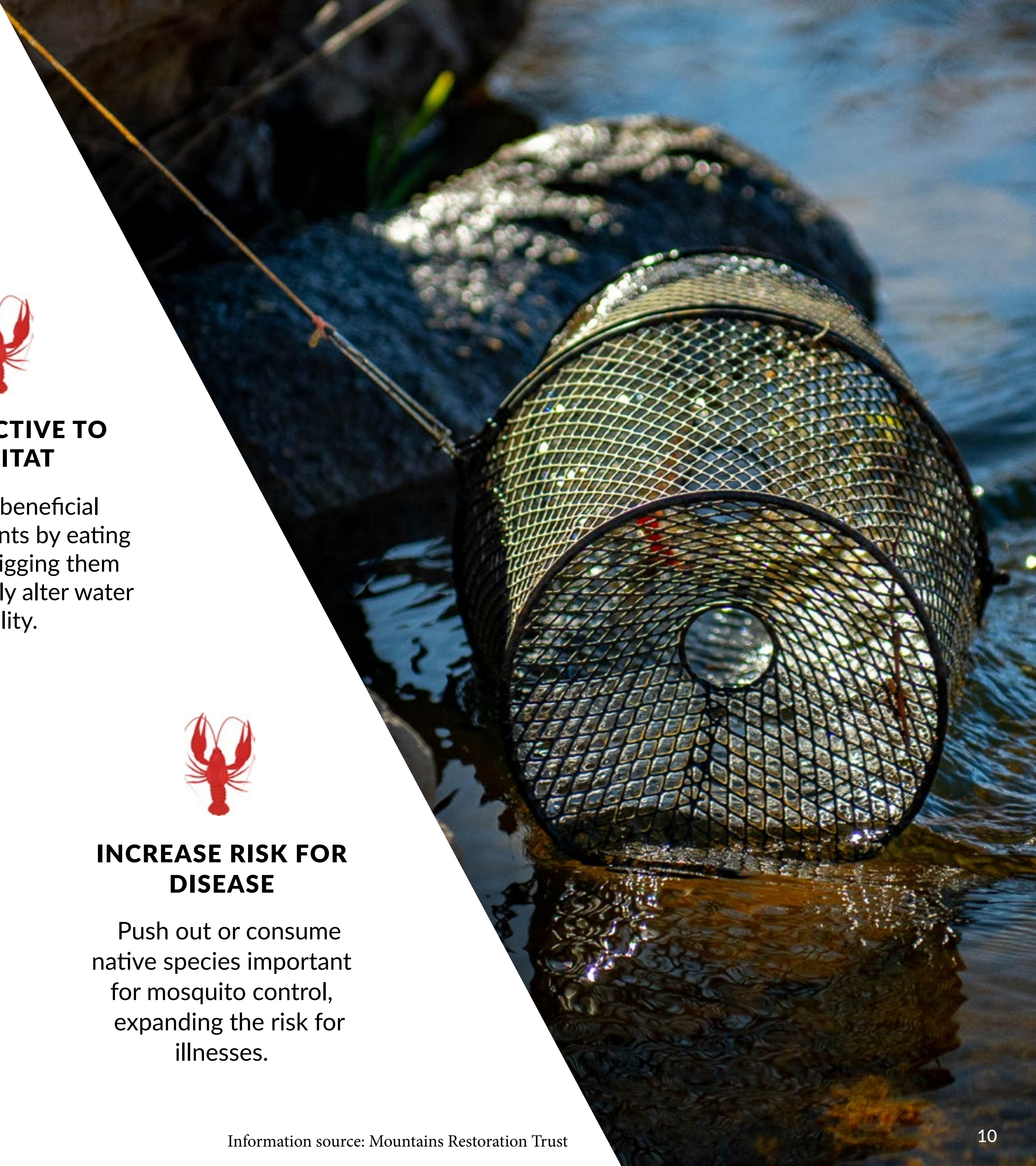
## DETRIMENTAL TO NATIVE ANIMALS

Consume juvenile fish, amphibians and their eggs. Make the water less inhabitable by native species.



## INCREASE RISK FOR DISEASE

Push out or consume native species important for mosquito control, expanding the risk for illnesses.





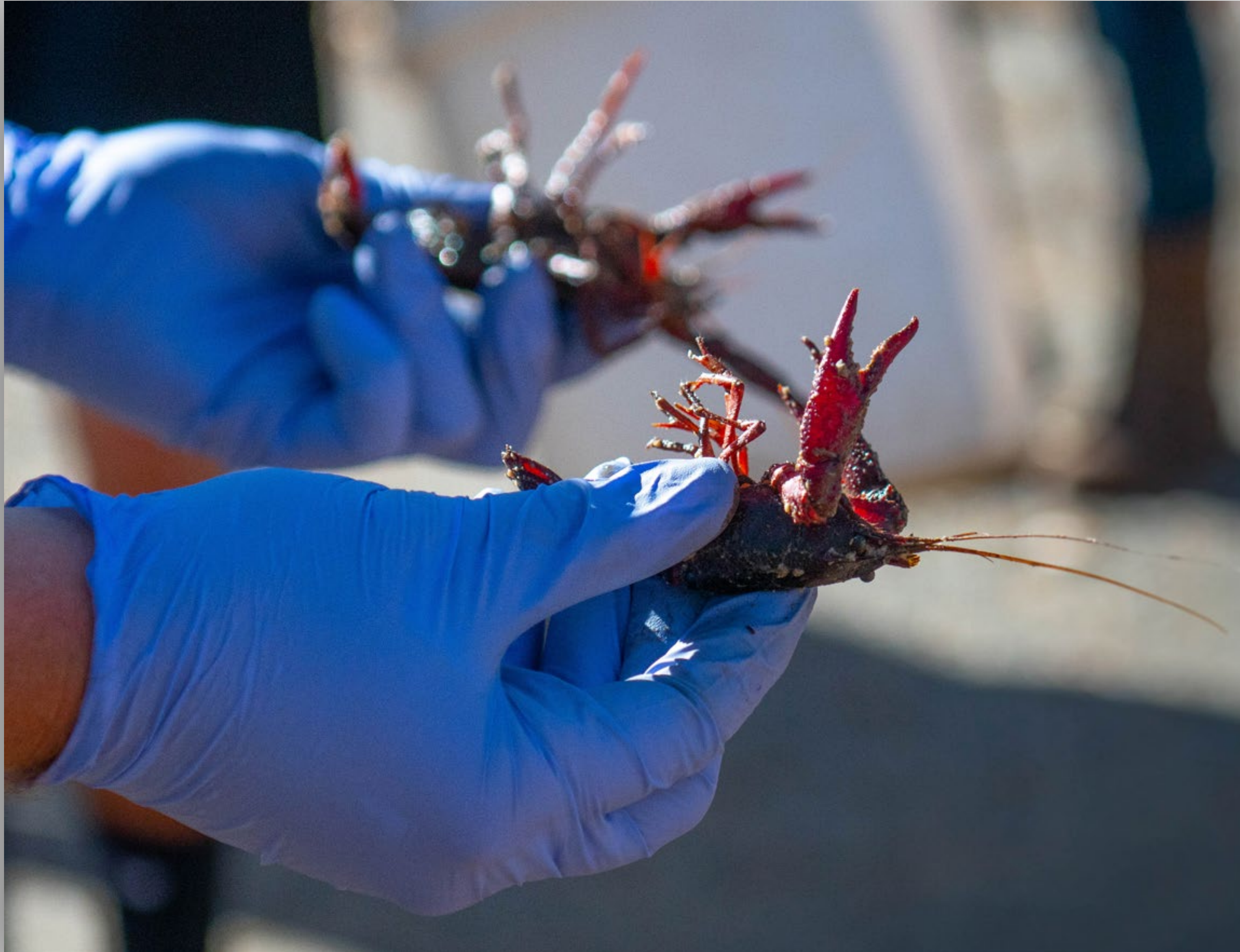
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## "FASCINATING BUT SCARY."

**T**he crayfish are incredibly resilient and stubborn, making them very difficult to eradicate. As Sode is teaching volunteers at one of MRT's crayfish removal events, he tells them the crayfish have been found in small stagnant pools of water with little to no measurable oxygen content and somehow manage to survive. An observation he calls, "fascinating but scary."







# PROGRESS

THE AMBITIOUS REMOVAL PROJECTS APPEAR TO BE WORKING.

**P**rogress has been made despite the tenacity of the crustaceans. “In general, when we look at our data we can graph out if we see more native species and less crayfish, and that's usually a pretty positive sign,” Sode says.

Bucciarelli says when removal projects are able to eliminate crayfish to almost undetectable levels, “native [species] will come back and colonize those sites, and the ecosystem will start to look a little more like uninvaded sites without crayfish.”

He says a major project success was when [Red Legged Frogs](#), a federally endangered species, recolonized a site on their own after removal of crayfish, “allowed the frog species to actually move downstream and kind of capitalize on that cleared environment.”



An aerial photograph of a stream with dark, rippling water. The water is a deep, dark blue-black color, and the surface is covered in intricate, swirling patterns of light brown and tan, which are reflections of the surrounding environment and possibly submerged tree roots. The overall scene is somewhat somber and textured.

**"IT'S ALWAYS GOOD TO MAKE SURE THAT  
PEOPLE IN THE AREA KNOW THAT [CRAYFISH]  
DON'T BELONG IN THE STREAM AND THAT  
THEY NEED TO BE REMOVED."**

*ERIK SODE*

*Aquatic Supervisor, Mountains Restoration Trust*



# COMMUNITY INVOLVEMENT

Sode says community involvement is important at MRT. “Volunteer events...are super important for awareness, especially for crayfish because they are such a very stubborn problem. It’s always good to make sure that people in the area know that [crayfish] don't belong in the stream and that they need to be removed.”

Bucciarelli says, “There are lots of opportunities for people to get involved and help with this effort.” First, he says, avoid releasing unwanted pets and other animals like crayfish into the wild. The second is look into organizations working hard to restore habitat. “If [anyone] is interested, find those entities that are working on this and please volunteer.”









## TAKE ACTION

Visit the Mountains Restoration Trust and UCLA Stunt Ranch Reserve websites to learn about important projects going on and how you can help get involved in restoring essential habitat.

[Mountains Restoration Trust](#)

[UCLA Stunt Ranch Reserve](#)

