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Harris mud crab, *Rhithropanopeus harrisi*
 photo by Arthur Anker
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Invasive crabs have settled in the Pacific side Third Cut

by Eric Jackson

We don't yet know how serious it is or what might be done about it, but Panama, The Crossroads of the World, is faced with yet another invasion by an exotic species. This past February an Smithsonian Tropical Research Institute biologist Mark Torchin and McGill University graduate student Dominique Roche discovered the Harris mud crab (*Rhithropanopeus harrisi*), including males, females with eggs and juveniles, living in a brackish Pacific side lake left over from abandoned late 1930s US attempt to build a third set of Panama Canal locks.

This species of crab is native to estuaries on the Atlantic seaboard of the United States, but it hitching rides on the sides of or in the ballast water of ships, or as the result of careless intentional transplantations of other species it spread to the West Coast of the USA and at least 21 other countries.

The earliest Harris mud crab invasion was in California in the 1880s, when somebody created oyster beds by bringing in East Coast shellfish, among which the crabs mingled. There is anecdotal evidence that the crabs have fouled pipes, invaded fresh water bodies, feasted on things caught in gill nets and affected other species in ecosystems that they have invaded. The problem Torchin pointed out, is that the effects of these invasions have not been systematically studied and quantified.

Torchin and Roche reported their findings in the September edition of *Aquatic Invasions*, a scholarly journal. Their research is in conjunction with the The Smithsonian Institution Marine Science Network, an array of marine labs extending from the eastern United States down the Meso-American isthmus and crossing over to the Pacific here in Panama, which was organized to increase scientific knowledge about the marine species invasions that have become increasingly common with the expansion of global commerce and shipping.

Because these crabs have spread to so many other places in the world, it may not be possible to determine how and from whence they got here. The possibilities of figuring out that puzzle lay mainly in DNA studies, in which one crab population might be compared with another. What is known about this from the DNA evidence now is characterized by Torchin as "not definitive."



Dominique Roche sets up a crab trap under the Miraflores Spillway
photo by Beth King, STRI

This is not the first time that the Harris mud crab has been found in Panamanian waters. In 1969 the species was discovered in canal waters, but was not thought to have established a breeding population here. How did it get into the Third Cut? The lakes left over from that discontinued project were once connected to the canal's south entrance by a culvert, but it is believed that the duct has been blocked for many years. Torchin and Roche suspect that a flooding event may have brought the crabs into the Third Cut lake, but that question is intricately linked with a much more general and important one: how widespread has this invasion of Panama become?

The Third Cut lakes on both sides of the isthmus will become part of the channels for the Panama Canal expansion, and if these invaders are confined to the ones near Miraflores, then it may be worthwhile to eradicate the crabs before they spread. But that issue raises a number of other questions:

- How does one eradicate Harris mud crabs?
- Could these crabs be eliminated without massive destruction of other species?
- Are there predators or other factors present in Panama from which the crabs have found refuge in protected waters of the Third Cut?
- If these brackish water crabs are confined to the Miraflores Third Cut waters and those lakes are connected to Panama Canal, can they survive the fresh water of Culebra Cut and Gatun Lake to make it to the Caribbean Sea via the canal?

According to Torchin, inquiries into such questions would depend on what is found by ongoing studies of the crabs distribution in the canal. "Potential for eradication only becomes worth talki about if they are restricted to a particular area," he pointed out. Further studies are being conducted to answer that threshold question, with funding from the Panama Canal Authority. In addition t current canal waters, Torchin said that a fauna survey in the Third Cut lake on the Atlantic si between the former Fort Davis and Gatun, is "on our list."

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