



## POPULATION ECOLOGY AND CURRENT DISTRIBUTION ASSESSMENT OF THE INTRODUCED INVASIVE CRAYFISH IN THE KAFUE FLOODPLAIN AND LAKE KARIBA, ZAMBIA

Since the 1990s, the exotic Australian red claw crayfish (*Cherax quadricarinatus*) has been spreading in the Zambezi River basin in Zambia. This Feed the Future Innovation Lab for Fish activity determined the population structure of crayfish in Lake Kariba and from the Kafue River Basin. The study was conducted to document the population dynamics, continued spread of redclaw crayfish in the Zambezi River basin of Zambia, and the socioeconomic impacts of crayfish on traditional fishing communities. The study consisted of crayfish sampling, an online poll, a fisher's survey, and focus group discussions in fisher communities.

### CRAYFISH SAMPLING AND ONLINE POLL

The team sampled crayfish and measured length monthly using fishers' catch at designated sites. They estimated crayfish population dynamics using standard fisheries methods. The data revealed that the crayfish populations in both areas were robust with multiple age classes present. Maximum size of crayfish was determined to be 215.25mm (total length) in both areas. The team determined presence or absence of crayfish at locations throughout Zambia by administering a poll to members of the staff of the Zambian Department of Fisheries assigned to various districts around the country and others. The crayfish have appeared in seven previously unreported locations in the Zambezi River basin, including the Kabompo River in the Northwestern Province, the Chingola Reservoir in the Copperbelt Provinces, and in the Kwando sub-watershed of the Zambezi Basin in the Western Province that borders with Angola, which has a seasonal aquatic connection to the critical Okavango Delta Wildlife Refuge in Botswana.



Throwing a trap in water. Photo by Eva Nambeye-Kaonga.

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### FISHER SURVEY

The team interviewed a total of 342 fishers to investigate their attitudes and perceptions toward the crayfish. One fisher reported seeing crayfish as early as 1990; however, most fishers reported seeing crayfish beginning around 2013. At first impression, most survey respondents reported perceiving crayfish as a threat or being useless. However, many fishers' perceptions later changed to perceive crayfish as useful for food or income, but a sizeable minority continue to view them as useless. In most locations, respondent attitudes toward crayfish either became more positive or stayed the same over time. Fishers reported that most of the crayfish were caught as bycatch, but there were a few fishers specifically targeting crayfish. Catches were highest at Siavonga on Lake Kariba. In terms of utilization, 59% of fishers reported throwing away crayfish, while 41% reported that they sold the crayfish, used them for home consumption, gave them to neighbors, or used them as animal feed. Kafue and Siavonga districts reported the highest levels of crayfish utilization. Negative impacts of crayfish included damage to fishing gear (about 50% of respondents) and damage to fish (over 90% of respondents). Fishers reported crayfish damaging fish by biting them, making the fish watery and tasteless and,



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therefore, inedible, requiring disposal. Fishers reported they had to fish longer to make up for the discarded fish. Some respondents reported seeing some predation of the crayfish by some fish (catfish and tigerfish) and birds (kingfishers), but predation rates remain low.

## FISHERY FOCUS GROUP INTERVIEWS

Focus group discussions with fishers yielded additional information about the fishery. They provided validation for many survey responses and made possible discussions with specific groups, including women, youth, crayfish trappers, river sardine (*kapenta*) fishers, and net fishers. The research team conducted focus group interviews from April 27–28 and June 5–9, 2023, in Itezhi tezhi, Sinazongwe, Siavonga, and Chanyanya area in Kafue. There were slightly different impressions at the sites, depending on crayfish abundance and proximity to markets, but key findings at the sites include negative impacts of crayfish on fishers such as destroying most of the fish

catch, crayfish reducing fish population in water, and fish losing taste after being bitten by crayfish destroying the value of the fish. Crayfish abundance in shallow waters may impact more women's fishing efforts (although minor in quantity but important for food security), and women, youth, and older fishers expressed interest in gaining skills to process crayfish into useful products.

## RECOMMENDATIONS

Based on the research findings, the team recommends the following:

- Continued collection of scientific data on fecundity, growth, natural and fishing mortality, age structure, and environmental and socioeconomic impacts.
- Engagement in extension education with relevant stakeholders to coordinate early detection and rapid response.
- Stock analysis to determine required fishing effort that would cause recruitment overfishing.
- Actions to protect indigenous species in critical habitat areas (e.g., Lake Tanganyika, Lake Malawi, Okavango Delta).
- Transnational cooperation in the management of capture fisheries. For example, the recently established Kavango–Zambezi Transfrontier Conservation Area (KAZA-TFCA) can serve as an excellent forum for coordination of proposed legislation within individual nations aimed at controlling invasive aquatic species.
- The online poll developed by the team should be kept for continued use and disseminated widely to include wildlife officials and the tourism industry. This can present a relatively easy way to continue tracking crayfish presence in Zambia and its neighboring countries.
- Trainings should be conducted to capacitate different groups (women, youth, and older individuals) with skills to process crayfish for consumption and for animal feed, especially in areas with well established populations. This may reduce crayfish populations and/or offset some of the negative socioeconomic impacts caused to fishers' livelihoods.

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## ABOUT THE FISH INNOVATION LAB

The Fish Innovation Lab supports the United States Agency for International Development's agricultural research and capacity building work under Feed the Future, the U.S. Government's global hunger and food security initiative. Mississippi State University is the program's management entity. The University of Rhode Island, Texas State University, Washington University in St. Louis, and RTI International serve as management partners.

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