

Regional Synthesis of Invasive Lionfish Citizen Science Programs in the Tropical Western Atlantic

Síntesis regional de programas de ciencia ciudadana sobre peces león invasores en el Atlántico occidental tropical

Synthèse régionale des programmes de science citoyenne du poisson-lion envahissant dans l'Atlantique Ouest tropical

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EXTENDED ABSTRACT

The geographic scale of marine ecosystems and the logistical and financial challenges related to surveying them limits our capacity to monitor the distributions of organisms in time and space. Consequently, research and monitoring of invasive species and their impacts is limited (Azzurro et al. 2013). Research in marine systems is often constrained by monetary, spatial and temporal aspects as well as the availability of human resources (Crall et al. 2010). As a result, there has been increased use of “citizen science” in which non-specialist volunteers are involved in data collection, management and scientific focused activities (Lopez-Gomez et al. 2014). The use of citizen scientists allows the potential to gather information at greater temporal and spatial scales (Tulloch et al. 2013) whilst aiding in the early detection and control of invasive species (Delaney et al. 2008). Citizen scientists can monitor invasive species’ distribution, behavior and other population dynamics whilst also contributing to their removal (Bodilis et al. 2014, Lopez-Gomez et al. 2014). Within the Western Atlantic Ocean, the Indo-Pacific lionfish (*Pterois volitans* and *P. miles*) has been deemed the most successful marine fish invader (Green and Côté 2014) due to their generalist diet and habitat preferences, feeding and growth rates, early maturation, high reproductive output, year-round reproduction, and lack of natural predators (Green and Côté 2014). Various management measures have been employed to manage their populations (Morris et al. 2010) and there is evidence that their negative impacts on native ecosystems can be mitigated through consistent, site-specific removals (Green and Côté 2014, Chagaris et al. 2017).

Because the extent of this invasion surpasses the resources and capacity of natural resource organizations alone, it requires innovative approaches as well as collaboration among a diverse set of stakeholders. Thus, organizations throughout the Western Atlantic region have engaged citizen scientists to physically remove lionfish, raise awareness and collect important data needed to manage the invasion. Using a structured survey provided in English and Spanish, we assessed 71 organizations’ lionfish management approaches, perceived impact, obstacles, public participation, engagement with citizen scientists, and the importance of citizen scientists to lionfish research and management. We examined five case studies that demonstrate organizations’ approaches to lionfish control and engagement of citizen scientists and other members of the public in multiple activities, including monitoring, removal, and knowledge-sharing efforts. Our findings demonstrate the importance of citizen science to organizations and their efforts to monitor and control the invasion (Clements et al. 2021). The majority of organizations engaging citizen scientists could not conduct their work without them. The data gathered by most of these organizations contribute to scientific publications, management, and government agency research and/or policy. For more details, this study has been published in *Diversity* and can be found at <https://doi.org/10.3390/d13120673>.

KEYWORDS: Lionfish, Citizen Science, Invasive Species, Public Engagement

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