# Prey Behaviour and Morphology Predict Vulnerability to Predation by Invasive Lionfish on Reef Fishes

# Comportamiento Presa y Morfología Predecir la Vulnerabilidad a la Depredación por pez León Invasor en Peces de Arrecifes

# Comportement Prédateur et de la Morphologie de Prédire la Vulnérabilité à la Prédation par les Poissons-Papillons Invasive sur les Poissons de Récif

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## EXTENDED ABSTRACT

Predation by invasive lionfish has been implicated in the significant decline of reef fish biomass in the northern Caribbean (Green et al. 2012, Côté et al. 2013, Green et al. 2014). Given that reef fish assemblages differ across this large region, elucidating prey trait variants that are most susceptible to predation will aid in forecasting prey declines as the invasion spreads to areas with novel fish assemblages. To do this, we generated hypotheses about prey traits that could facilitate or deter predation by lionfish, and assessed whether selective predation on specific trait variants occurs from data collected at two spatial scales (Green and Côté 2014).

Accounting for relatedness among taxa, we test whether morphological and behavioural traits of reef fishes predict patterns of predation by lionfish determined from:

i) *In situ* visual observations of predation, and
ii) Comparisons of prey consumption to availability on invaded reefs.

Both analyses reveal that prey size, body shape, position in the water column, and cleaning behaviour are important determinants of prey selection, with small, fusiform fishes that are found just above reefs and exhibit facultative cleaning behaviour most vulnerable. Together, these traits heighten the risk of predation by a factor of nearly 200.

We show that mortality from lionfish predation will be greatest for prey possessing a specific suite of behavioural and morphological characteristics on invaded Atlantic coral reefs. As lionfish can reach densities that allow the rapid depletion of prey biomass (Green et al. 2012), prey types that are selectively consumed may post more rapid and substantial declines over time, with potentially serious implications for local population persistence. Time-series data documenting the relative change in biomass of prey types over time, in relation to lionfish predation pressure, are needed to test this prediction. Moreover, selective predation by lionfish may have repercussions on invaded marine food webs if vulnerability to lionfish predation correlates with functional role of prey. As the invasion progresses, native species that exhibit traits vulnerable to predation are likely to post more rapid and substantial population changes.

Because our analyses focus on prey characteristics and not species identity, our findings may provide useful insight into the potential effects of lionfish predation on fish communities elsewhere in the invaded region; data on fish assemblages from before and early in the invasion of a region may be used to establish spatial priorities for management action. For example, locations where native fish communities are composed of a high proportion of vulnerable individuals (i.e. small-bodied, shallow-bodied, benthic or demersal, and nocturnal species) could be targeted for lionfish culling.

## LITERATURE CITED

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