



TÍTULO DO TRABALHO

TEMPORAL INVASION REGIMES MODULATE STABILITY IN NATIVE RIVERINE FISH COMMUNITIES

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Temporal stability is a fundamental property of ecological communities because it reflects their capacity to maintain structure and functioning under environmental change. A key mechanism expected to support this stability is interspecific asynchrony, in which declines in some populations are compensated by increases in others, buffering fluctuations at the community level. In freshwater fish assemblages, stability may also be reflected in the temporal consistency of community size structure, an important dimension of community organization. Understanding how these processes respond to biological invasions is essential for identifying mechanisms that sustain native communities in impacted ecosystems. Here, we evaluated the effects of invasion pressure and its temporal variability on stability in native fish communities and tested how asynchrony contributes to stability under invasion. We hypothesized that: (1) communities exposed to higher invasion pressure would exhibit lower stability, particularly when invasion regimes were more pulsed than chronic; and (2) asynchronous population dynamics would enhance native community stability under invaded conditions. To test these hypotheses, we analyzed 270 freshwater fish community time series from French rivers, each monitored for 10 years. We used linear models to assess relationships between invasion metrics and two response variables: community stability and the coefficient of variation of size-spectrum slopes over time. Our results showed that sites with higher mean relative abundance of non-native fishes had lower stability and greater variability in community size structure. Moreover, the negative effects of invasion pressure were stronger under more variable invasion regimes, indicating that fluctuations in non-native abundance can amplify the destabilizing effects of sustained invasion pressure. In contrast, asynchrony was positively associated with community stability, indicating that compensatory



dynamics among native populations can buffer invasion effects. Together, these findings suggest that non-native fishes erode the temporal stability of native assemblages, while asynchronous dynamics help buffer community fluctuations in impacted freshwater ecosystems.

Palavras-chave: *Non-native species; stability; population dynamics; size spectra; synchrony*