

# ***Impact of hydropattern disturbance on crayfish population dynamics in the seasonal wetlands of Everglades National Park, USA***

CHARLES A. ACOSTA\* and SUE A. PERRY

*South Florida Natural Resources Center, Everglades National Park, Homestead, Florida, USA*

## ABSTRACT

1. The natural hydropattern in the seasonally-flooded marl prairie wetlands of Everglades National Park has been severely disrupted by human water control activities, seriously impacting higher trophic organisms, e.g. wading birds, that depend on these wetlands. Less is known about the impacts on key aquatic fauna, such as crayfish *Procambarus alleni*, or how these populations might respond to proposed habitat restoration strategies.

2. Under severe environmental stress, populations of burrowing crayfish are predicted to have skewed size structure, low reproductive success, low survival, and widespread dispersal. As predicted for populations in stressed habitats, crayfish density was low, small dispersing adults were dominant, juvenile abundance was low, and survival was low in habitats where the hydroperiod (duration of flooding) was short and groundwater level was lowest.

3. Crayfish dispersed during flooding, but during the drydown, they burrowed rather than sought deeper water. This dispersal strategy may be adaptive for surviving in seasonal wetlands, but this had severe consequences on survival in disturbed habitats with shortened hydroperiods. Survival in burrows during the dry season was high in the longer-hydroperiod habitats but was zero in the short-hydroperiod habitat where the groundwater level fell more than 1 m.

4. Long-hydroperiod marl prairie may function as sources, whereas short-hydroperiod habitats act as population sinks. Our study suggests that the threshold conditions for preventing mass mortality of crayfish in these wetlands are hydroperiods > 7 months and groundwater levels < 0.5 m below the surface during the dry season.

5. Historical (pre-drainage) hydroperiods appear to be restricted to the longest hydroperiod areas of the marl prairie. This indicates that much of the marl prairie wetlands now function as population sinks for crayfish and other invertebrates. The historical hydropatterns need to be re-established throughout the marl prairie wetlands to achieve the restoration goal of increasing productivity in the aquatic faunal community.

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\* Correspondence to: Charles A. Acosta, South Florida Natural Resources Center, Everglades National Park, 40001 State Road 9336, Homestead, FL 33034, USA. E-mail: charles\_acosta@nps.gov