

Review Article

Open Access

Health Management Techniques for Swimming Crab Under High-Temperature Conditions

Kaiwen Liang 

Agri-Products Application Center, Hainan Institute of Tropical Agricultural Resources, Sanya, 572025, Hainan, China

 Corresponding author: kaiwen.liang@hitar.org

International Journal of Marine Science, 2026, Vol.16, No.4 doi: [10.5376/ijms.2026.16.0016](https://doi.org/10.5376/ijms.2026.16.0016)

Received: 01 Jun., 2026

Accepted: 05 Jul., 2026

Published: 17 Jul., 2026

Copyright © 2026 Liang, This is an open access article published under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Preferred citation for this article:

Liang K.W., 2026, Health management techniques for swimming crab under high-temperature conditions, International Journal of Marine Science, 16(4): 204-216 (doi: [10.5376/ijms.2026.16.0016](https://doi.org/10.5376/ijms.2026.16.0016))

Abstract Against the backdrop of global climate change, the frequent occurrence of marine heatwaves significantly impacts the stability and health of swimming crab (*Portunus trituberculatus*) aquaculture systems; indeed, high-temperature stress has become a critical environmental factor constraining the industry's sustainable development. This paper systematically reviews the mechanisms by which high-temperature environments affect the physicochemical properties of culture water, production performance, and disease incidence, focusing on key physiological responses such as metabolic disorders, heightened oxidative stress, compromised immune function, and intestinal microbial imbalance. Based on this, and addressing the health management needs of swimming crabs under high-temperature conditions, the paper summarizes key technical systems, including water quality regulation and ecological optimization, nutritional and immunological enhancement, and intelligent monitoring with precision control. Furthermore, drawing on case studies from typical high-temperature culture seasons, the paper comprehensively evaluates the effectiveness of these health management measures in improving survival rates, mitigating disease risks, and stabilizing production performance. Research indicates that establishing an integrated health management system—grounded in environmental regulation, centered on nutritional and immunological modulation, and supported by digital monitoring—is an effective strategy for enhancing the heat tolerance and aquaculture resilience of swimming crabs. Future efforts should focus on further elucidating the mechanisms of high-temperature stress, developing precision health management technologies, and integrating intelligent aquaculture systems to drive high-quality, sustainable development of the swimming crab industry amidst climate change.

Keywords Swimming crab (*Portunus trituberculatus*); High-temperature stress; Health management; Climate change; Intelligent aquaculture

1 Introduction

Swimming crab aquaculture, particularly for *Portunus trituberculatus*, has become an important component of coastal aquaculture in East Asia and a high-value segment of the broader crab industry. Farming of *P. trituberculatus* expanded rapidly in east China over the past decade, demonstrating its strong production momentum and growing commercial relevance. At the same time, the global commercial exploitation of swimming crabs has increased markedly, and crab production from fisheries plus aquaculture reached nearly 1.3 million tons in 2015, indicating the substantial scale of the sector. The economic value of swimming crab is further enhanced by premium product forms such as soft-shell crab, which can command high unit prices in retail and restaurant markets, reflecting strong consumer demand and favorable market returns. However, the industrial chain still faces structural constraints, especially because commercial crab culture technology remains relatively incipient and is currently limited to a small number of species and production systems. For *P. trituberculatus* specifically, hatchery seed production still depends heavily on wild-caught broodstock, which creates a potential bottleneck for long-term industry sustainability and increases vulnerability in the supply chain.

High-temperature environments have become one of the most serious ecological and production challenges facing crustacean aquaculture under ongoing climate change. Rising water temperature directly affects the physiology, growth, and survival of aquatic animals, and crustaceans are especially vulnerable because their thermal tolerance is bounded by narrow physiological thresholds (Wang et al., 2025). Reviews of climate change effects on crustacean culture show that elevated temperature can disrupt food intake, moulting, immune response, survival, and broader