

Research Insight

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Health Management Strategies for Large Yellow Croaker During High-Temperature Seasons

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International Journal of Marine Science, 2026, Vol.16, No.1 doi: [10.5376/ijms.2026.16.0003](https://doi.org/10.5376/ijms.2026.16.0003)

Received: 16 Dec., 2025

Accepted: 29 Jan., 2026

Published: 13 Feb., 2026

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Preferred citation for this article:

Li M.M., 2026, Health management strategies for large yellow croaker during high-temperature seasons, International Journal of Marine Science, 16(1): 30-44 (doi: [10.5376/ijms.2026.16.0003](https://doi.org/10.5376/ijms.2026.16.0003))

Abstract High-temperature stress has become one of the most critical environmental constraints affecting marine aquaculture under ongoing climate warming, particularly for economically important species such as large yellow croaker (*Larimichthys crocea*). This review synthesizes current knowledge on the impacts of elevated temperature on physiological functions, disease susceptibility, and overall health performance of large yellow croaker, and evaluates integrated management strategies for mitigating thermal stress in aquaculture systems. High temperatures disrupt metabolic homeostasis, leading to increased energy expenditure, impaired respiratory and osmoregulatory functions, and reduced growth efficiency and feed utilization. At the immune level, thermal stress weakens host defense mechanisms, alters inflammatory responses, and promotes gut microbiota dysbiosis, thereby increasing the risk of bacterial and viral disease outbreaks. In response, environmental regulation strategies such as water temperature control, dissolved oxygen optimization, and water quality management are essential for maintaining system stability. Nutritional interventions, including optimized protein-energy balance and functional feed additives such as probiotics and immunostimulants, further enhance stress resilience. In addition, advances in health monitoring and early warning technologies, including physiological indicators and molecular diagnostics, provide new opportunities for precision aquaculture management. This review highlights the importance of integrated “environment-nutrition-management” frameworks and proposes future directions for intelligent and climate-resilient aquaculture systems for large yellow croaker.

Keywords High-temperature stress; Large yellow croaker; Marine aquaculture; Health management; Climate change

1 Introduction

Large yellow croaker (*Larimichthys crocea*) is one of China's most important marine aquaculture species, highly valued for its taste, nutritional quality, and strong market demand, and its cage-culture production has led the national marine fish sector for many years. However, rapid expansion of its farming has been accompanied by germplasm degradation, reduced disease resistance, and inconsistent product quality, threatening sustainable development of the industry (Han et al., 2025). As a warm-water coastal species with an optimal temperature of about 18 °C-25 °C and relatively high water-quality requirements, large yellow croaker is particularly sensitive to environmental fluctuations common in intensive mariculture. At the same time, intensive stocking and environmental change have driven frequent outbreaks of parasitic and bacterial diseases, making health constraints a central bottleneck for this species (Yao et al., 2024).

Rising water temperature linked to climate variability adds a further layer of risk to marine aquaculture systems. Comprehensive thermal biology assessment of cultured large yellow croaker shows that, although this species has relatively wide thermal limits and apparent plasticity, long-term exposure to 30 °C triggers energy redistribution, oxidative stress responses, and significant reductions in body weight, indicating trade-offs between growth, health, and heat tolerance under chronic heat stress (Wu et al., 2022). In floating sea-cage systems, shallow culture depth, high densities and limited space constrain behavioral thermoregulation and increase risks of hypoxia and disease infection during warm periods, leaving farms in main producing areas already at risk from summer heatwaves with in situ sea surface temperatures surpassing 30 °C. Case studies from other marine fish demonstrate that prolonged high temperatures (e.g., 35 °C in spotted seabass or extreme summer conditions in carp) precipitate oxidative damage, inflammation, and elevated mortality, highlighting generic mechanisms by which heat stress undermines