

## CONTENTS

### Volume 29 Number 1 2021

#### Reviews

- 1 Status, Potential, Prospects, and Issues of Floodplain Wetland Fisheries in India: Synthesis and Review for Sustainable Management  
*Uttam Kumar Sarkar, P. Mishal, Simanku Borah, Gunjan Karnatak, Ganesh Chandra, Suman Kumari, D. K. Meena, Dipesh Debnath, Sona Yengkokpam, Pronob Das, Piyashi DebRoy, Anil K. Yadav, Md. Aftabuddin, Pranab Gogoi, Arun Pandit, Biren K. Bhattacharjya, Tasso Tayung, L. Lianthuamluaia, and B. K. Das*
- 33 Herbal Immunomodulators in Aquaculture  
*Preetham Elumalai, Amitha Kurian, Sreeja Lakshmi, Caterina Faggio, Maria Angeles Esteban, and Einar Ringø*
- 58 Global Participation in and Public Attitudes Toward Recreational Fishing: International Perspectives and Developments  
*Robert Arlinghaus, Øystein Aas, Josep Alós, Ivan Arismendi, Shannon Bower, Steven Carle, Tomasz Czarkowski, Kátia M. F. Freire, John Hu, Len M. Hunt, Roman Lyach, Andrzej Kapusta, Pekka Salmi, Alexander Schwab, Jun-ichi Tsuboi, Marek Trella, Daryl McPhee, Warren Potts, Arkadiusz Wołos, and Zi-Jiang Yang*
- 96 A Synthesis of the Biology and Ecology of Sculpin Species in the Laurentian Great Lakes and Implications for the Adaptive Capacity of the Benthic Ecosystem  
*Kelly F. Robinson, Charles R. Bronte, David B. Bunnell, Peter T. Euclide, Darryl W. Hondorp, John A. Janssen, Matthew S. Kornis, Derek H. Ogle, Will Otte, Stephen C. Riley, Mark R. Vinson, Shea L. Volkel, and Brian C. Weidel*
- 122 Scenarios for Global Aquaculture and Its Role in Human Nutrition  
*Jessica A. Gephart, Christopher D. Golden, Frank Asche, Ben Belton, Cecile Brugere, Halley E. Froehlich, Jillian P. Fry, Benjamin S. Halpern, Christina C. Hicks, Robert C. Jones, Dane H. Klinger, David C. Little, Douglas J. McCauley, Shakuntala H. Thilsted, Max Troell, and Edward H. Allison*

### Volume 29 Number 2 2021

#### Invited Editorial

- 139 Importance of Seaweeds and Extractive Species in Global Aquaculture Production  
*Thierry Chopin and Albert G. J. Tacon*

#### Reviews

- 149 The Future of Legislation, Policy, Risk Analysis, and Management of Non-Native Freshwater Fishes in China  
*Shan Li, Hui Wei, Lorenzo Vilizzi, Aibin Zhan, Julian D. Olden, Daniel L. Preston, Stacey A. Clarke, Becky Cudmore, Gareth D. Davies, Xiaoming Wang, and Gordon H. Copp*
- 167 Aquaculture in Africa: A Comparative Review of Egypt, Nigeria, and Uganda Vis-À-Vis South Africa  
*Babatunde Adeleke, Deborah Robertson-Andersson, Gan Moodley, and Simon Taylor*
- 198 Oxidative Stress and Antioxidant Defense in Fish: The Implications of Probiotic, Prebiotic, and Synbiotics  
*Seyed Hossein Hoseinifar, Samira Yousefi, Hien Van Doan, Ghasem Ashouri, Giorgia Gioacchini, Francesca Maradonna, and Oliana Carnevali*
- 218 A Review of Freshwater Crayfish Introductions in Africa  
*Takudzwa C. Madzivanzira, Josie South, Louisa E. Wood, Ana L. Nunes, and Olaf L. F. Weyl*
- 242 Jellyfish Impacts on Marine Aquaculture and Fisheries  
*Mar Bosch-Belmar, Giacomo Milisenda, Lorená Basso, Thomas K. Doyle, Antonella Leone, and Stefano Piraino*
- 260 Pyridoxine and Its Biological Functions in Fish: Current Knowledge and Perspectives in Aquaculture  
*M. S. Akhtar and A. Ciji*

Review

- 279 World Octopus Fisheries  
*Warwick H. H. Sauer, Ian G. Gleadall, Nicola Downey-Breedt, Zöe Doubleday, Graham Gillespie, Manuel Haimovici, Christian M. Ibáñez, Oleg N. Katugin, Stephen Leporati, Marek R. Lipinski, Unai Markaida, Jorge E. Ramos, Rui Rosa, Roger Villanueva, Juan Arguelles, Felipe A. Briceño, Sergio A. Carrasco, Leo J. Che, Chih-Shin Chen, Rosario Cisneros, Elizabeth Conners, Augusto C. Crespi-Abril, Vladimir V. Kulik, Evgenyi N. Drobyazin, Timothy Emery, Fernando A. Fernández-Álvarez, Hidetaka Furuya, Leo W. González, Charlie Gough, P. Krishnan, Biju Kumara, Tatiana Leite, Chung-Cheng Lu, Kollyil S. Mohamed, Jaruwat Nabhitabhata, Kyosei Noro, Jinda Petchkamnerd, Delta Putra, Steve Rocliffe, K. K. Sajikumar, Hideo Sakaguchi, Deepak Samuel, Geetha Sasikumar, Toshifumi Wada, Xiaodong Zheng, Yongjun Tian, Yumeng Pang, Anyanee Yamrungrueng, and Gretta Pecl*

Article

- 431 Metagenomic Analyses of Biofilms on Whiteleg Shrimp (*Litopenaeus vannamei*) Effluents: Implications for Worldwide Aquaculture Bioremediation and Environmental Sustainability in the Current Trend of Climate Change and Global Warming – State of the Art and Experimental Proof of Concept  
*Oscar Mendoza, Krizia Pretell, Beder Ramírez, John Sandoval, José Luis Caballero, and Gabriel Dorado*

Reviews

- 445 Trace Element Patterns in Otoliths: The Role of Biomineralization  
*Karin Hüsey, Karin E. Limburg, Hélène de Pontual, Oliver R. B. Thomas, Philip K. Cook, Yvette Heimbrand, Martina Blass, and Anna M. Sturrock*
- 478 Benefits of Dietary Polyphenols and Polyphenol-Rich Additives to Aquatic Animal Health: An Overview  
*Ehsan Ahmadifar, Morteza Yousefi, Msoumeh Karimi, Raha Fadaei Raieni, Maryam Dadar, Sevdan Yilmaz, Mahmoud A. O. Dawood, and Hany M. R. Abdel-Latif*
- 512 Review and Meta-Analysis of the Environmental Biology and Potential Invasiveness of a Poorly-Studied Cyprinid, the Ide *Leuciscus idus*  
*Mehis Rohtla, Lorenzo Vilizzi, Vladimír Kováč, David Almeida, Bernice Brewster, J. Robert Britton, Łukasz Głowacki, Michael J. Godard, Ruth Kirk, Sarah Nienhuis, Karin H. Olsson, Jan Simonsen, Michał E. Skóra, Saulius Stakėnas, Ali Serhan Tarkan, Nildeniz Top, Hugo Verreycken, Grzegorz Zięba, and Gordon H. Copp*
- 549 An Ecosystem Approach to Wild Rice-Fish Cultivation  
*Nesar Ahmed, Shirley Thompson, Bruce Hardy, and Giovanni M. Turchini*
- 566 Evolution of Mariculture Insurance Policies in China: Review, Challenges, and Recommendations  
*Jinkai Yu and Jing Yu*
- 582 Current Knowledge on the Biology, Ecology, and Commercial Exploitation of the Sea Cucumber *Cucumaria frondosa*  
*Bruno L. Gianasi, Jean-François Hamel, Emaline M. Montgomery, Jiamin Sun, and Annie Mercier*
- 654 The Genomics of the Farmed Shrimp: Current Status and Application  
*Mudagandur Shashi Shekhar, Vinaya Kumar Katneni, Ashok Kumar Jangam, Karthic Krishnan, Nimisha Kaikkolante, and Koyadan Kizhakedath Vijayan*
- 666 A New Approach to Evaluate Reproductive Traits in Batch-Spawning Fishes of Indeterminate Fecundity and Asynchronous Oocyte Maturation  
*Kristína Hôrková-Žitňanová, Kristína Švolíková, Danka Haruštiaková, and Vladimír Kováč*
- 682 Ecological-Fishery Forecasting of Squid Stock Dynamics under Climate Variability and Change: Review, Challenges, and Recommendations  
*Hassan Moustahfid, Lisa C. Hendrickson, Alexander Arkhipkin, Graham J. Pierce, Avijit Gangopadhyay, Hideaki Kidokoro, Unai Markaida, Chingiz Nigmatullin, Warwick H. Sauer, Patrizia Jereb, Gretta Pecl, Thibaut de la Chesnais, Luca Ceriola, Najih Lazar, Christopher J. Firmin, and Vladimir Laptikhovskiy*
- 706 Climate Change and Variability Impacts on Sub-Saharan African Fisheries: A Review  
*Rodney. T. Muringai, Paramu. L. Mafongoya, and Romano Lottering*

- 721 Innovation, Practice, and Adaptation to Climate in the Aquaculture Sector  
*Louis Lebel, Hap Navy, Tuantong Jutagate, Michael Joseph Akester, Lenore Sturm, Phimpakan Lebel, and Boripat Lebel*
- 739 Creel Surveys for Social-Ecological-Systems Focused Fisheries Management  
*Chelsey L. Nieman, Carolyn Iwicki, Abigail J. Lynch, Greg G. Sass, Christopher T. Solomon, Ashley Trudeau, and Brett van Poorten*
- 753 Sturgeon, Caviar, and Caviar Substitutes: From Production, Gastronomy, Nutrition, and Quality Change to Trade and Commercial Mimicry  
*Samad Tavakoli, Yongkang Luo, Joe M. Regenstein, Ehsan Daneshvar, Amit Bhatnagar, Yuqing Tan, and Hui Hong*
- 769 Challenges in the Identification and Interpretation of Phenological Shifts: Anthropogenic Influences on Adult Migration Timing in Salmonids  
*M. D. Tillotson, M. C. Arostegui, C. S. Austin, A. E. Lincoln, W. Matsubu, K. N. McElroy, and T. P. Quinn*
- 791 The Utility of Discriminant Analysis to Determine the Geographic Origin of Commercially Important Seafood and Aquaculture Species: A Meta-Analysis  
*Robert P. Davis, Claude E. Boyd, and Donald Allen Davis*
- 800 A Review of Applications Evaluating Fisheries Management Scenarios through Marine Ecosystem Models  
*H. A. Perryman, C. Hansen, D. Howell, and E. Olsen*