

Telemetry Techniques: A User Guide for Fisheries Research

Edited by Noah S. Adams, John W. Beeman, and John H. Eiler. 2012. American Fisheries Society, Bethesda, Maryland. 543 pages.

I would have greatly benefited from reading this book at the start of my Ph.D. It is a thorough and well-organized “Telemetry 101” for students and senior researchers alike. Covering the extensive theory and application of radio and acoustic telemetry, this volume is a must-read for anyone interested in following fish. The lessons learned within could be applied to other aquatic or terrestrial species as well. It is unique in its depth; it begins with the very basics, providing a complete background on the physics and engineering involved in the methods. Study design, attachment techniques and data analysis are described in equal detail. Readers will gain greater theoretical understanding, which will likely yield more effective research.

There is an incredible range of skills required in fish telemetry work. From construction to surgery, boat mechanics to human psychology, it is a life-long learning process with frequent technological advancements. Previously, textbook resources on fish-telemetry methods included the decades-old *Fish-Marking Techniques: Proceedings from the International Symposium and Educational Workshop on Fish-Marking Techniques* (Parker et al. 1990) and two chapters in *Fisheries Techniques* (Murphy et al. 1996). The proceedings of other conferences, such as the *International Fish Telemetry Conference* (previously the *Fish Telemetry Conference Held in Europe*) and the *International Symposium on Tagging and Tracking Marine Fish with Electronic Devices*, provide more recent examples of telemetry use, but lack the thorough methodological and theoretical background found in *Telemetry Techniques*. Journal articles may offer sufficient detail, but tend to have a narrow focus—e.g., fish surgery techniques (Jepsen et al. 2002, Mulcahy 2003). The field has been waiting for an up-to-date, comprehensive handbook outlining the basics, and as such, *Telemetry Techniques* is a celebrated publication.

With its logical layout and coherent chapters, this book is engaging and easy to navigate. It begins with an in-depth history of fish telemetry, from the first electronic transmitters of the 1950s to the vast arrays of the present. Study design considerations and tag attachment techniques follow in the next two chapters, providing an impressive wealth of information applicable to all telemetry endeavours and exceeding the scope of anything already published.

The next four sections of the book cover radio telemetry basics and case studies, and acoustic telemetry basics and case studies. The theoretical chapters describe how radio and acoustic signals are generated by the transmitters, how antennas and hydrophones detect the signals, and everything that may play a role in-between. They include instructions on designing arrays, estimating detection efficiencies, and maximizing the effectiveness of telemetry equipment. The broad variety of case

studies from around the world illustrate telemetry methods specific to rivers, lakes, coastlines, and open-ocean areas. Stationary and mobile receiver methods are discussed. The book gives particular emphasis to research involving hydroelectric dams, offering expert advice on how to overcome the challenges unique to these study sites.

A section tackling data management and analysis wraps up the volume. Mark-recapture models for estimating survival are outlined, as are real-time data systems and fish passage evaluations. The quality assurance plan proposed by Hardiman et al. is a great system that involves, among other things, determining all data requirements and analyses prior to collecting data. The potential for great losses in efficiency (i.e., time, money) and data quality are very real in telemetry work; this plan would benefit all studies by minimizing such losses.

Telemetry Techniques is a complete guide to radio and acoustic telemetry methods. My only criticism is their omission of the rest of the telemetry spectrum (e.g., conventional, satellite, archival tags). I would be very interested in reading a sequel that describes these other methods with the level of detail contained in *Telemetry Techniques*. For brief descriptions of the other methods, see the recently published proceedings *Advances in Fish Tagging and Marking Technology* (McKenzie et al. 2012). *Telemetry Techniques* is bound to be a resident of the fish researcher’s office shelf for years to come. This manual offers extensive advice on how to plan and execute a telemetry project from start to finish, facilitating quality science for fish researchers.

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