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# 11th Indo-Pacific Fish Conference (IPFC) and Annual Conference of the Australian Society for Fish Biology

# Conference Handbook

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5.2A Special Session 1 Moving beyond home-ranges: how can we harness fish movement ecology to study, understand and manage ecosystem functioning?, 260-073, November 24, 2023, 10:30 AM - 12:30 PM

# Assessing ecosystem functioning through 3D AI-enhanced fish tracking: A Red Sea Case Study

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Anthropogenic pressures are placing coral reefs, crucial pillars of marine biodiversity, under increasing threat. A key challenge in managing these sensitive ecosystems lies in understanding the fine-scale movement ecology of herbivorous fish. Their grazing behaviour has a significant impact on the health and function of coral reefs.

In this study, we harness the power of AI-driven 3D tracking technologies and stereo-video measurements. We aim to explore the foraging behaviour of two dominant grazers, Brown surgeonfish *Acanthurus nigrofuscus* and Yellowtail tang *Zebrasoma xanthurum*, in a severely degraded coral reef system in Eilat, Israel, Gulf of Aqaba, Red Sea. We reveal complex energy-distance trade-offs between bite distance and feeding intensity. The species optimise their foraging strategies and energy expenditure in accordance with the distribution of grazable substrate patches. Remarkably, despite different foraging strategies, both species maintain similar energy expenditure levels, demonstrating a sophisticated adaptation to spatial resource heterogeneity.

By showcasing the potential of AI and 3D tracking technologies to provide detailed insights into species-specific foraging behaviour, this study enhances our understanding of fine-scale fish movement and ecosystem functioning. Our results underscore the importance of leveraging advanced technologies and interdisciplinary approaches for ecosystem management, highlighting the potential of integrating these tools and knowledge into effective conservation strategies for these at-risk ecosystems.