

Horizontal and vertical movements of dolphinfish, *Coryphaena hippurus*, in coastal waters of Taiwan and Kagoshima Bay, Japan

Shian-Jhong Lin¹, Wei-Chuan Chiang², Michael K. Musyl³, Sheng-Ping Wang¹, Nan-Jay Su¹, Ching-Ping Lu¹, Kazuki Tone⁴, Masanori Nishino⁵, Sasaki Akira⁵, Ryo Kawabe⁶ and Kazuyoshi Komeyama⁷

1. Department of Environmental Biology and Fishery Science, National Taiwan Ocean University, Taiwan
2. Eastern Marine Biology Research Center, Fisheries Research Institute, Taiwan
3. Pelagic Research Group LLC, USA
4. Graduate School of Fisheries and Environmental Science, Nagasaki University, Japan
5. Kagoshima City Aquarium, Japan
6. Institute for East China Sea Research, Organization for Marine Science and Technology, Nagasaki University, Japan
7. Division of Marine Bioresource and Environmental Science, Fisheries Engineering, Hokkaido University, Japan

Dolphinfish (*Coryphaena hippurus*) is an epi-pelagic, widely distributed species found in tropical, subtropical and temperate waters warmer than ~20°C. Though this species is primarily found near coastal areas, it is also widely distributed off-shore in the pelagic environment. Thus, their wide distribution patterns suggests dolphinfish may adapt to several different eco-regions with varying environmental conditions. To compare their movement patterns, habitat preferences and thermal niche between sub-tropical and temperate waters, we conducted a tagging study using pop-up satellite tags (PSATs) in the southeast coast of Taiwan (n=3) and Kagoshima Bay, Japan (n=3). Fish were tagged during different times of the years and tagged fish were tracked for periods of 7 to 40 days, reaching depths >100 m, and experiencing temperatures ranging from 15-29 °C in Taiwan, and 20-23 °C in Kagoshima Bay. Fish tagged in Taiwan made primarily northward movements during early summer but changed to a southward course in early winter. In Kagoshima Bay, tagged fish undertook southward excursions along the coast and all short-term movements were confined to the bay. Tagged fish exhibited pronounced diel oscillations in their vertical diving behavior. Dolphinfish spent >50% of their time near the surface and made more extensive vertical movements during nighttime than daytime, but vertical movements were largely confined to the mixed layer and did not cross the thermocline. Crepuscular diving periods and transitions were evident in the time series but dolphinfish dove deeper at nighttime than in the daytime. The depth distributions of the tagged fish appeared to be limited by a 6°C change relative to sea surface

temperature (i.e., 100% of movements were within 6°C of the warmest water). Overall, dolphinfish primarily inhabit near-surface habitat and vertical movements are limited to the depth of the mixed layer.