**Quantifying Seagrass Light Requirements Using an Algorithm to Spatially Resolve Depth of Colonization**

Marcus W. Beck – *ORISE Research Participation Program, USEPA National Health and Environmental Effects Research Laboratory*

Gulf Ecology Division, 1 Sabine Island Drive, Gulf Breeze, FL 32561

850-934-2480, [beck.marcus@epa.gov](mailto:beck.marcus@epa.gov)

James D. Hagy III – *USEPA National Health and Environmental Effects Research Laboratory*

Gulf Ecology Division, 1 Sabine Island Drive, Gulf Breeze, FL 32561

850-934-2455, [hagy.jim@epa.gov](mailto:hagy.jim@epa.gov)

Chengfeng Le – *ORISE Research Participation Program, USEPA National Health and Environmental Effects Research Laboratory*

Gulf Ecology Division, 1 Sabine Island Drive, Gulf Breeze, FL 32561

850-934-9308, [le.chengfeng@epa.gov](mailto:le.chengfeng@epa.gov)

The maximum depth of colonization (Zc) is a useful measure of seagrass growth that describes response to light attenuation. However, lack of standardization among methods for estimating Zc has limited the description of habitat requirements at spatial scales most relevant for environmental management. An algorithm is presented for estimating seagrass Zc using geospatial datasets that are commonly available for coastal regions. A defining characteristic of the algorithm is its ability to estimate Zc using an adjustable spatial region such that the estimated values can be interpreted for specific areas of interest. These spatially-resolved estimates of Zc can then be related to light attenuation to evaluate factors that affect seagrass growth, such as light requirements. Four distinct coastal regions of Florida were evaluated, describing seagrass growth patterns on relatively small spatial scales in each region. The analysis was extended to entire bay systems using Zc and estimates of light attenuation (Kd) to quantify minimum light requirements derived from satellite remote sensing. Sensitivity analyses indicated that estimates of Zc were generally robust for each case study, although confidence intervals varied with sample size and number of points containing seagrass. Zc estimates also varied along water quality gradients such that seagrass growth was more limited near locations with reduced water clarity. Site-specific characteristics that contributed to variation in growth patterns were easily distinguished using the algorithm as compared to less spatially-resolved estimates of Zc. Light requirements for the Indian River Lagoon (13.4%) on the Atlantic Coast were substantially lower than those for Tampa Bay (30.4%) and Choctawhatchee Bay (47.1%) on the Gulf Coast. More importantly, the algorithm characterized spatial variation in light requirements within bays, with values ranging from 4.2 – 26.4% in the Indian River Lagoon, 15.6 – 78.3% in the Choctawhatchee Bay, and 4.8 – 50% in Tampa Bay. Higher light requirements in Gulf Coast estuaries may indicate regional differences in species composition or additional factors, such as epiphyte growth, that further reduce light availability at the leaf surface. A spatially-resolved characterization of seagrass Zc is possible for other regions because the algorithm is transferable with minimal effort to novel datasets.