Increasing Monitoring and Understanding of Water Quality Parameters at Clam Leases

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Purpose: To better understand distribution and variation of water quality parameters on clam production farms in Cedar Key, monitoring efforts were increased. Water quality monitoring stations, measuring temperature, salinity and dissolved oxygen, have been operatable at the Dog Island and Gulf Jackson Aquaculture Use Zones (AUZs) for over twenty years. To increase insight on basic but key relationships between environmental factors and survival and health of cultured clams, monitoring of food availability was initiated using chlorophyll as a proxy. In addition, surveillance of water temperature and salinity at lease areas was expanded.

Results: Water quality parameters at the existing Cedar Key water quality monitoring stations are measured every 30 minutes using In-Situ AquaTroll 600 multi-parameter sondes for temperature, salinity, and dissolved oxygen. Regular maintenance is performed by UF staff. Real-time data at the Dog Island and Gulf Jackson AUZs are posted to a dashboard and made available for growers to access via the website, https://shellfish.ifas.ufl.edu/water-quality-monitoring/. Data downloaded from the In-Situ sondes are also archived as monthly graphs and posted to the website, providing a baseline for future references.

Chlorophyll a and phycoerythrin sensors were purchased and added to the existing monitoring equipment in June 2024 to assess phytoplankton concentrations. Phycoerythrin pigment is commonly found in saltwater blue-green algae, while chlorophyll a is relevant for all types of algae. These sensors measure in Relative Fluorescence Units (RFU). Calibrating relative fluorescence to chlorophyll involves establishing a relationship between the fluorescence signal and the actual concentration of chlorophyll present. This is typically done using a standard curve, where known chlorophyll concentrations are measured to determine the corresponding fluorescence readings. The sensor's response is then calibrated against these standards to enable accurate chlorophyll concentration measurements in unknown samples. Water samples were collected periodically at each station to create a calibration curve. Samples collected prior to Hurricane Helene, which made landfall in the Big Bend region on September 26, were lost due to power outages. Those samples collected after September were submitted to UF LakeWatch to be measured spectrophotometrically for chlorophyll a. Due to inherent variability, additional samples are being collected to ensure a reliable calibration curve.

In response to industry concerns of varying environmental conditions across lease areas, additional temperature and conductivity loggers (In-Situ AquaTroll 100) were deployed mid-June, expanding thermal and salinity surveillance to include North and South Gulf Jackson and Pelican Reef AUZs. During routine maintenance of the water quality equipment, the logger at the Pelican Reef AUZ, which was secured to a stilling well at the only corner lease marker intact after Hurricane Idalia in 2023, was found missing and not replaced. In anticipation of Hurricane Debby, which made landfall in the Big Bend on August 5, the In-Situ loggers and sondes were removed from the lease areas, redeployed 1-2 weeks later, and again removed on September 23 in anticipation of Hurricane Helene, which made landfall in the same location on September 26. Water temperatures did not differ significantly between the North (NGJ) and South Gulf Jackson

(SGJ) loggers, but salinity values did. In July, there was an average 2.8 psu difference between NGJ (23.1psu) and SGJ (25.9 psu). However, salinities fell below 15psu at NGJ for six days in that month. This is a threshold value at which clams begin to show added signs of stress at summer temperatures exceeding 90^{O}F. In September, salinities were influenced by rainfall associated with Hurricane Debby that made landfall the previous month with an average 5.9 psu difference between NGJ (20.6$\pm$3.0 psu) and SGJ (26.5$\pm$1.2 psu).

HOBO temperature loggers were also provided to growers to record bottom temperatures at the six farm sites where samples of sediment and clams were collected monthly from June through August and, again, in October for the other studies. Loggers measure every 30 minutes with data download via a bluetooth mobile app. These loggers were not recovered from growers' leases after Hurricane Helene.