

Title: The College of the Florida Keys (CFK) FY 2024-25 Budget Request for continued Water Quality Monitoring Around Key West

Budget and Justification:

Table 1. below provides an itemized list of the most important needs for the continued water quality monitoring of areas of concern (AOC) around Key West, FL. Below Table 1. is a justification for each specific budget item.

Table 1. Itemized budget request for 2024-25

Item #	Item	Unit Cost	Qty	Total
1	50 hp electric motors	\$ 9,950	4	\$ 39,800
2	LiFePO ₄ Batteries	\$ 11,800	2	\$ 23,600
3	Wireless Solar Powered IP camera system	\$ 350	1	\$ 350
4	Mobile Service (Monthly)	\$ 100	12	\$ 1,200
5	Water Quality Monitoring Equipment (solar buoy)	\$ 40,000	1	\$ 40,000
6	50% Research Assitant	\$ 9,600	1	\$ 9,600
7	RA Fringe (6.25%)	\$ 600	1	\$ 600
8	Internships	\$ 3,325	3	\$ 9,975
9	Shipping	\$ 2,000	1	\$ 2,000
			Total	\$ 127,125

Justification:

Item 1 – the vessel most frequently used for water quality monitoring is the College designated Research Vessel (RV) Renewable Energy Test Vessel (RETV). With it’s central 10 ft. x 10 ft. opening, the RETV is designed specifically for research and an ideal platform from which to collect water samples, deploy/retrieve water quality monitoring equipment and launch the newly acquired EcoMapper Autonomous Under Water Vehicle (AUV) (Figure 1)

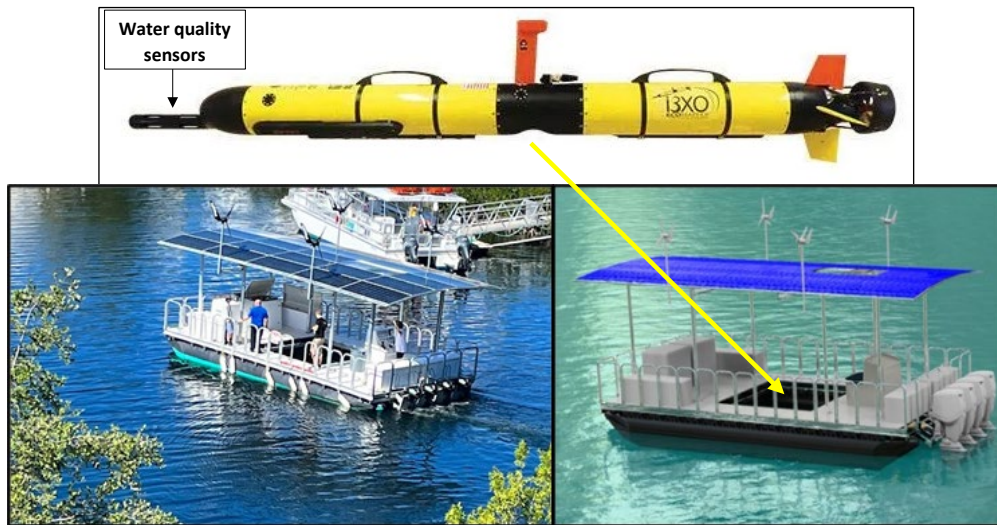
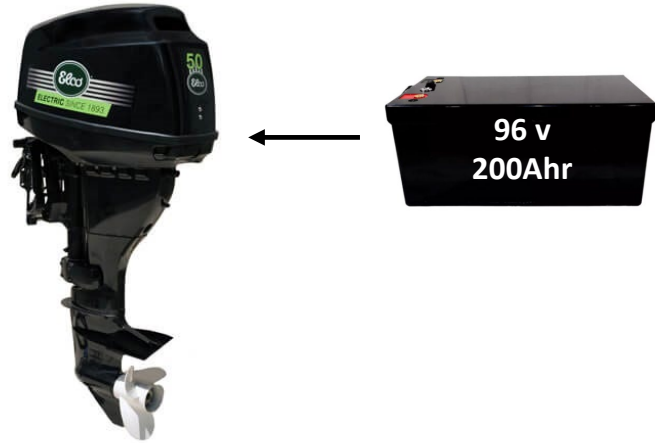


Figure 1. (Top) YSI EcoMapper Autonomous Under Water Vehicle (AUV) with water quality sensors in the nosecone of the AUV. (Bottom) The CFK RETV research vessel with a schematic rendering showing the 10 ft. x 10 ft. opening for deploying research equipment.

However, the RETV is currently underpowered (i.e. 4 x 20 hp outboard electric motors; 80 hp total) and relatively slow (about 5 mph), so the current water quality research missions are not able to be completed in a single day. The issue has been exacerbated by an extremely windy winter that creates navigational challenges for the RETV and has forced cancellation of many water quality research trips.

Therefore, the College is working to upgrade and repower the RETV with four 50 hp electric motors (total = 200 hp) (Figure 2).

Figure 2. An image of the Elco 50 hp electric outboard motor (left) with the required 96-volt, 200 amp hour Lithium Iron Phosphate (LiFePO₄) battery (right) that powers the Elco 50 hp electric outboard motor.



The College is currently working with Eleco Motor Yachts, LLC., which has indicated that they may be able to match funding dollar-for-dollar on the RETV repower project. Moreover, the College currently has a \$27,000 battery credit with Elco that can also be applied to the RETV repower project, so only two additional LiFePO₄ batteries will be needed and requested.

Item 2 – The Lithium Iron Phosphate batteries (LiFePO₄ Batteries) (Figure 2) are needed to power the 50 hp electric outboard motors. Each LiFePO₄ battery is 96 volts and 200-amp hours and will power one 50 hp electric motor. As mentioned in the previous section, CFK has a \$27,000 credit with Elco motors that will be used to purchase two of these batteries. Therefore, the current budget request only requires two additional batteries.

Item 3 – This wireless IP camera will be used to monitor arrival and departure times of vessels in Key West Harbor. This camera will be installed on the “Yellowman” mooring pole (where the current water quality monitoring equipment is installed) and will provide important information on exact arrive and depart times from the dock (Figure 3).

Figure 3. Images of the proposed 4G wireless solar powered outdoor camera.



Item 4 – This is the estimated annual cost for the mobile wireless service for the 4G wireless solar powered camera.

Item 5 – This is the cost associated with a YSI DB-600 water quality monitoring buoy with a similar sensor package to the equipment at Mallory Square (i.e. sensors for dissolved oxygen, turbidity, total algae, salinity, and temperature). This buoy system can be placed into any area of concern (AOC) and will transmit real-time data to a secure, cloud-based software application that can be viewed by authorized users on any computer, tablet, or cell phone (Figure 4).



Figure 4. The DB-600 water quality monitoring buoy system with a current meter and YSI Exo data sonde with up to six water quality monitoring sensors.

Item 6 – This is the annual shared cost (50%) for a Part-Time Research Assistant (RA) to help with the Key West water quality monitoring project. The position pays \$20/hr plus fringe (i.e. FICA and Medicare).

Item 7 – This is the calculated cost of the fringe (i.e. FICA and Medicare) associated with the Part-time RA position (6.25%)

Item 8 – This is the annual cost associated with three marine science internships (fall, spring, and summer semesters) to help with the Key West water quality monitoring project. Interns are required to provide 225 hrs/internship.

Item 9 – This is the estimated shipping costs associated with delivery of equipment and supplies.