Cost-effective data gathering is a crucial step in the process of developing monitoring for the health of the Puget sound and the abundance of the crab. Monitoring Dungeness crab megalope – a stage in larval development – provides an opportunity to gather raw data on crab population as well as providing specimens for lab work. Current megalope monitoring efforts are conducted using a series of buoys. Dungeness crab is a vital economic resource and a critical part of the Pacific economy.

This iteration of the Smart Crab Trap (SCT) can deploy for approximately 26 hours before the batteries of the system are depleted. This system fits easily into a waterproof case that is attached to a buoy, providing specimens for lab work.

Previous capstone cohorts have designed an Arduino-based system capable of monitoring the temperature and wave action. The footprint of the SCT should fit easily within the buoys used by the other crab monitoring buoys, augmenting the array already in place. The prototype should be easy to handle and should be able to be set up, deployed, collected, and broken down by a single individual working on the deck of a small boat. The footprint of the SCT should fit easily within the buoys used by the other crab traps in the network.

The system must be robust, capable of extended deployment, and be cost-effective if it is to be adopted for use by the various municipal and tribal governments that are affected by the abundance and health of the Dungeness crab population. The SCT design should be able to be easily integrated into the existing system of crab monitoring buoys, augmenting the array already in place.

Smart Crab Trap Requirements

- Developing a Smart Crab Trap (SCT) provides an instrument that can not only help monitor the health and abundance of the local crab population but can also monitor the local water column in which the trap is deployed.

- The system must be robust, capable of extended deployment, and be cost-effective if it is to be adopted for use by the various municipal and tribal governments that are affected by the abundance and health of the Dungeness crab population.

- The SCT design should be able to be easily integrated into the existing system of crab monitoring buoys, augmenting the array already in place.

- The SCT should fulfill the functions of a crab buoy already integrated into the system – that is, it should be a light-driven crab trap as well as an environmental monitoring system.

Goals for this Cohort

- Upgrade the power system to provide enough power for a minimum of three days' deployment without human intervention.

- Ensure the SCT is tamper-proof and protected from the environment, including inclement weather and rough seas.

- The prototype should be easy to handle and should be able to be set up, deployed, collected, and broken down by a single individual working on the deck of a small boat.

- The footprint of the SCT should fit easily within the buoys used by the other crab traps in the network.

Power for Long-Term Deployment

- Installing a larger battery increased projected deployment time to 46 hours.

- The larger battery was connected to a solar panel and a charge controller to allow trickle charging of the battery.

- Using the average of the past ten years' irradiance for the first and last months of crabbing season, the output power, additional instrumentation, and efficiency of the solar panel, a model was constructed to estimate the minimum power generated by the panel. Installing a larger battery increased projected deployment time to 46 hours. The larger battery was connected to a solar panel and a charge controller to allow trickle charging of the battery.

- The average of the past ten years' irradiance for the first and last months of crabbing season, the output power, additional instrumentation, and efficiency of the solar panel, a model was constructed to estimate the minimum power generated by the panel. Installing a larger battery increased projected deployment time to 46 hours. The larger battery was connected to a solar panel and a charge controller to allow trickle charging of the battery.

- Based on this model, the minimum deployment time before the batteries of the SCT die is 74 hours.

- The upgraded power system fits within a slightly larger case than the previous prototype and is still easily handled by a single person.

Future Work, References, and Acknowledgments

- Implement cellular tower connection for hands-free data gathering.

- Combine with ML camera system to perform counting of megalope entering trap.

- Implement release system to periodically flush the trap out, preserving the megalope population.

- Further improvements to the power system for fully autonomous, season-long deployment.

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