Exploration of the Capabilities of a New Stereo Video Tool for the Monitoring of Hard-Bottom Fish Species

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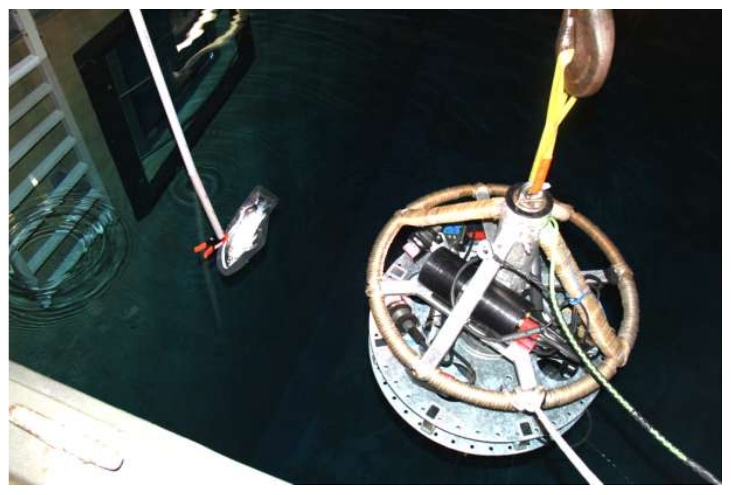
Introduction

- Rockfish Conservation Areas (RCAs) were created in 2002 by the Pacific Fisheries Management Council (PFMC) in response to drastic declines in several rockfish species
- Monitoring has primarily consisted of annual trawl surveys over soft bottom habitat
- Many species of rockfish occur primarily over hard bottom, high relief, complex habitats
- We developed a new stereo video lander to survey and monitor hard bottom, complex habitats with minimum disturbance
- This stereo video lander is a baited camera tool that drops directly to the bottom
- The lander is controlled from the surface
- Cameras rotate 360° and video is recorded on the lander as well as being piped up the umbilical
- Since this is a new tool, it needed to be calibrated to understand how distance, angle, size, and other factors influence measurements
- In order to determine time needed for data collection, we analyzed species accumulation curves

Methods: Calibration

- Camera optics were calibrated with a cube of known size
- We used model fish in the MBARI test pool to calibrate measurement accuracy and precision
- Calculated error as a percentage of body length
- Calculated the viewable space with our camera setup
- Calculated observed area and volume for every drop
- Calculated fish density (#/m^2 or m^3) allows comparisons to other visual surveys



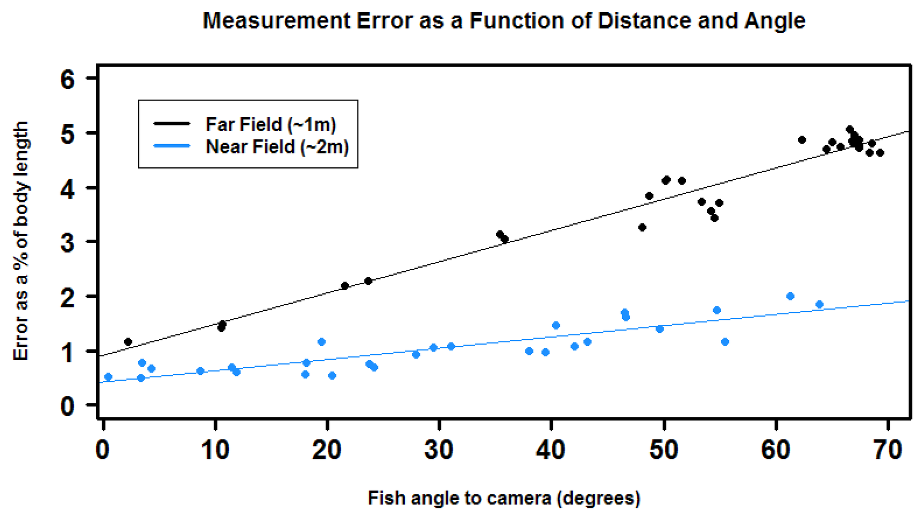


Figure 1: Error as a percentage of body length plotted against angle away from the camera, zero degrees being perpendicular to the camera. Error was always ≤5% of TL

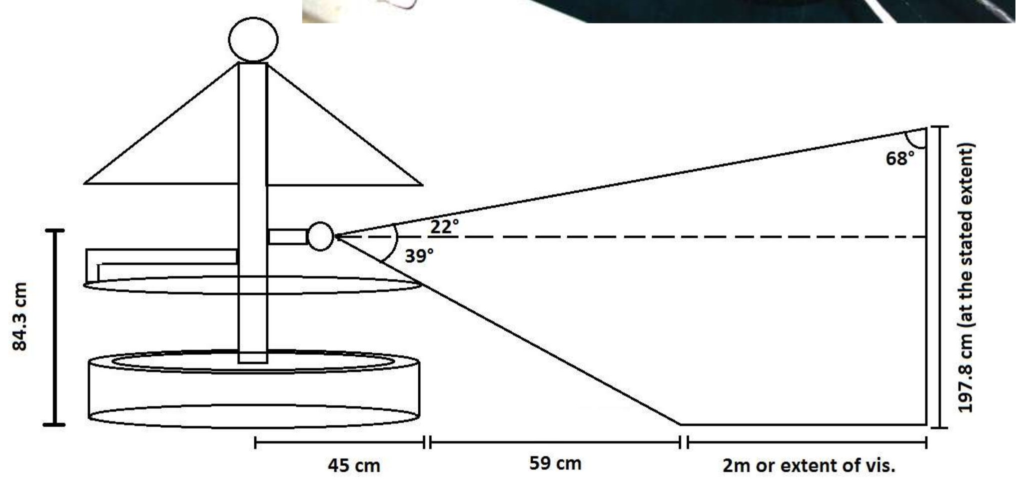


Figure 2: Diagram of the theoretical observable space. Measurements of all the relevant angles and distances were made in the MBARI test pool to allow for quantification of this space.

Methods: Accumulation Curves

- Compared baited vs. un-baited drops
- Performed 30 minute soaks
- Found time at which 80% of species had been observed

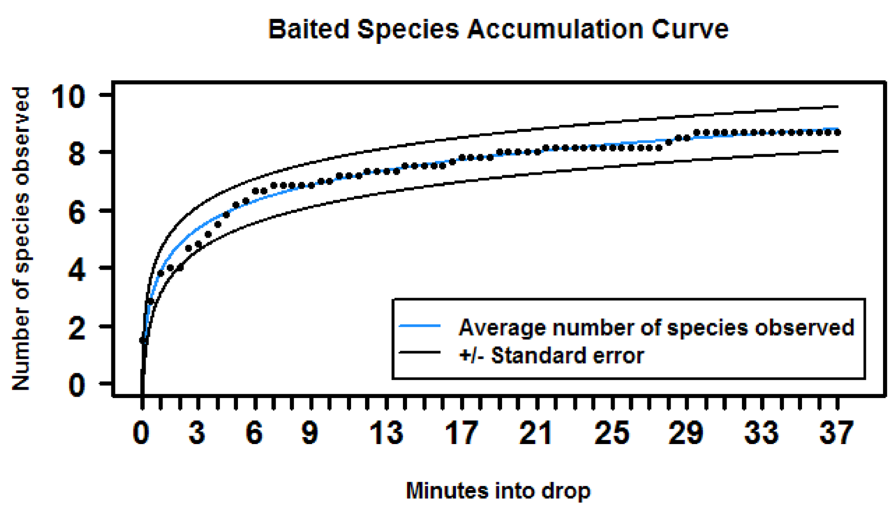


Figure 3:Average number of species seen over time for baited drops fit with a log curve Black curves represent the best fit lines for the SE values.

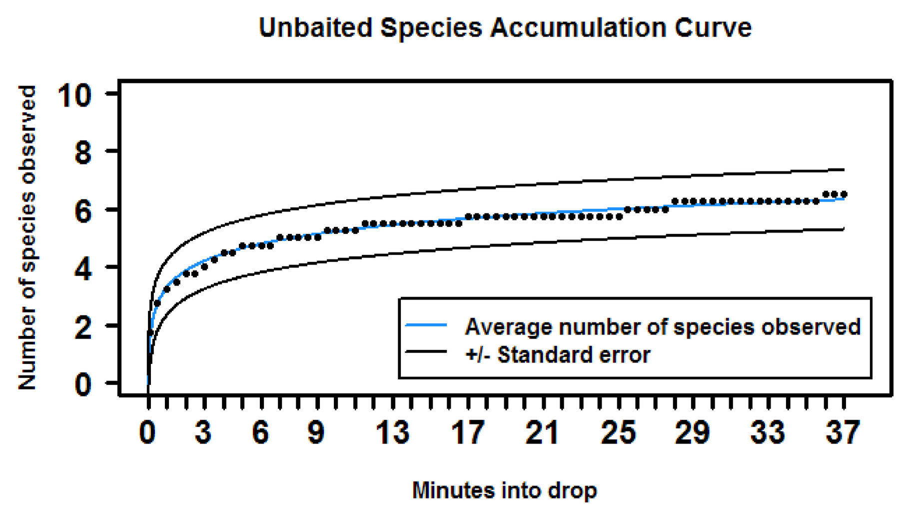
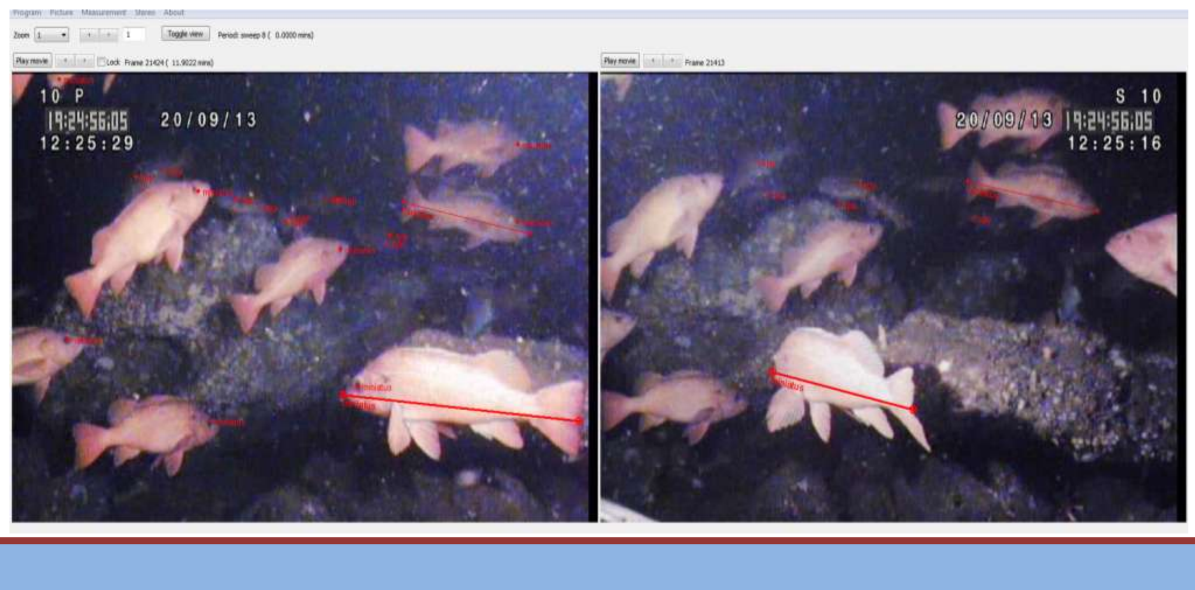


Figure 4: Average number of species seen over time on unbaited drops. Black curves represent fit lines for the best fit line for the SE values

Methods: Video analysis

- Video was collected in 2013 for 12 minutes. These 12 minute collection periods are called “drops”. There are multiple drops on a single deployment, which is the period between when the lander is put in the water and recovered
- During a drop, each full rotation of the cameras, which takes approximately a minute, is referred to as a sweep.
- In order to analyze these data, the video files are loaded into SeaGIS analysis software, EventMeasure along with calibration files created in SeaGIS CAL software (http://www.seagis.com.au/)
- Each individual fish is identified to lowest taxonomic level
- We measure fish in the sweep with the highest number of individuals of a particular species which provides a conservative estimate and prevents double counting
- Habitat metrics such as depth, relief, and rugosity were recorded



Number of fish seen per sweep

- From the fall 2013 cruise, all fishes observed from each drop were tallied
- Average number of fish in each sweep for several species was calculated, one sweep is approximately one minute
- Additionally, the average number of species observed per sweep was recorded
- These data suggest that there is likely no large attractive or repulsive effects of the lander

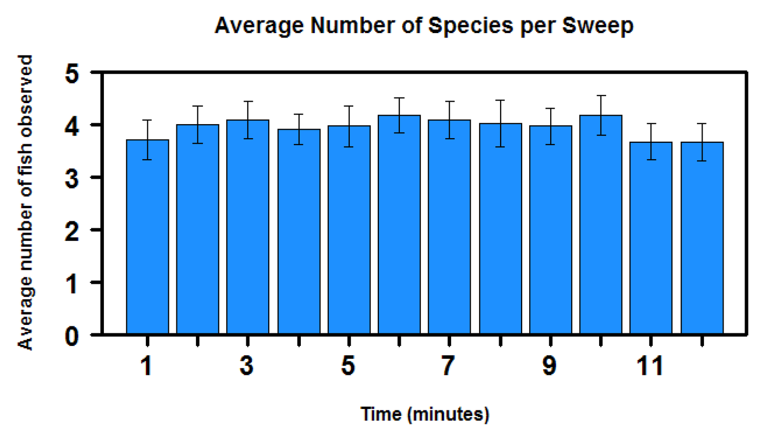


Figure 5: The average number of species observed on each sweep with SE bars shown.

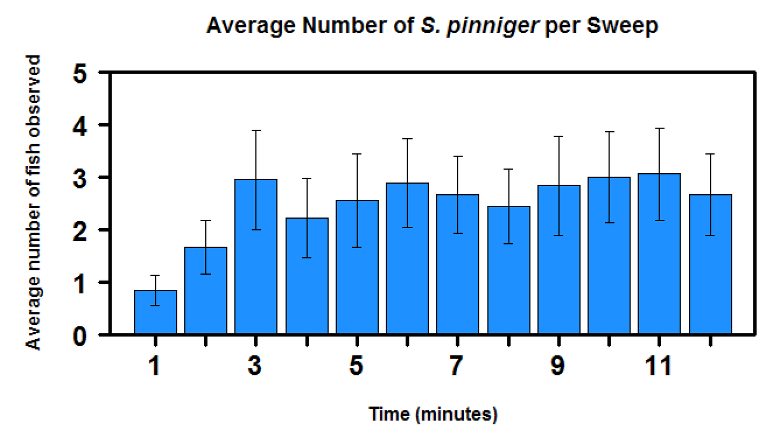


Figure 6: Average number of *S. pinniger* individuals seen per sweep with SE bars shown

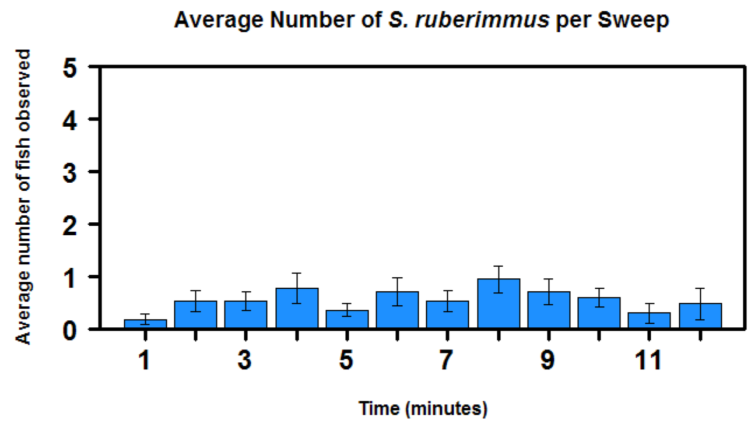


Figure 7: Average number of *S. rubberimus* observed on each sweep with SE bars shown

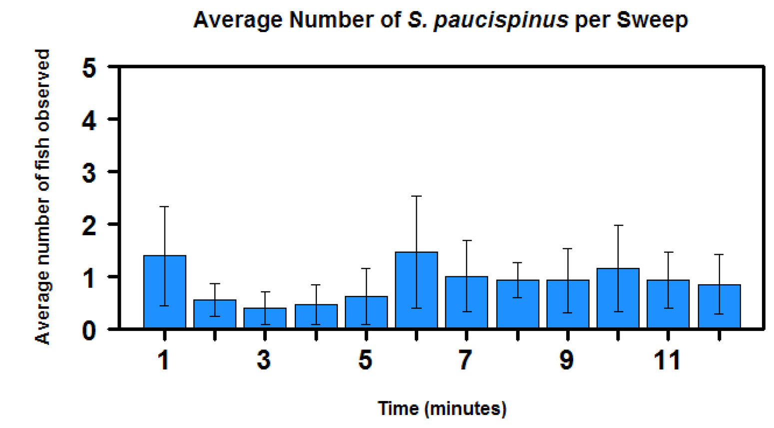


Figure 8: Average number of *S. paucispinus* observed on each sweep with SE bars shown

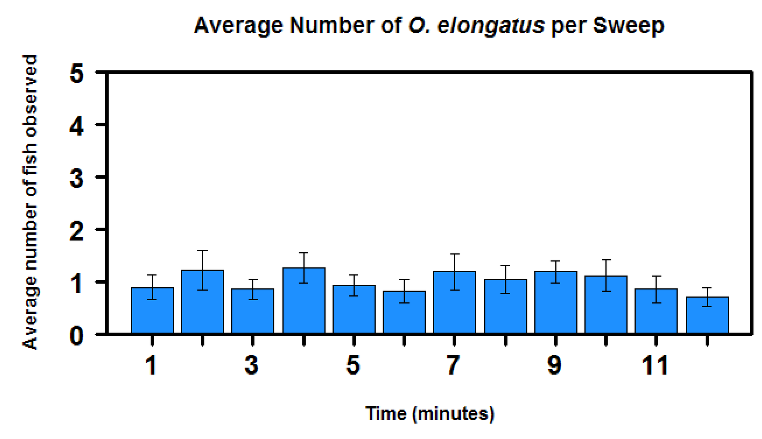


Figure 9: Average number of *O. elongatus* observed on each sweep with SE bars shown

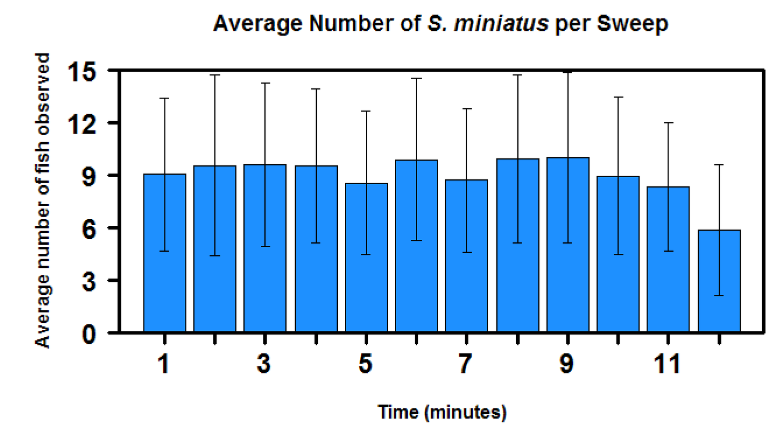


Figure 10: Average number of *S. miniatus* observed on each sweep with SE bars shown. *S. miniatus* was one of most abundant species observed.

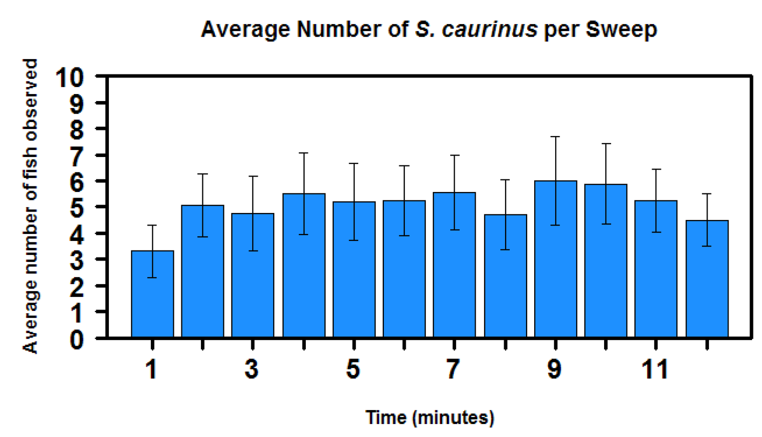


Figure 11: Average number of *S. chlorostictus* observed on each sweep with SE bars shown

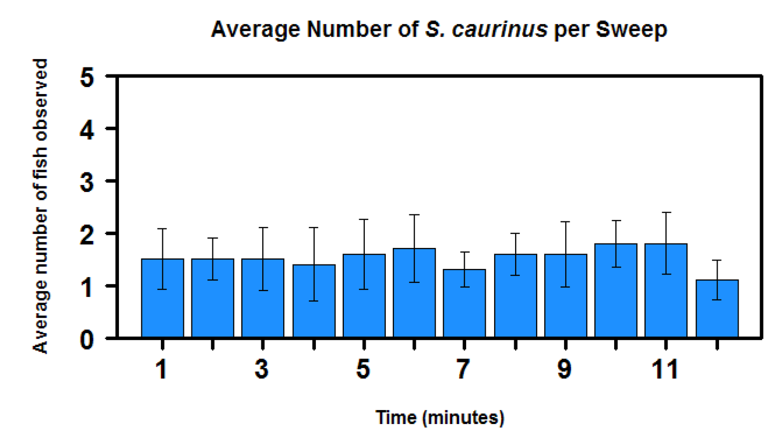
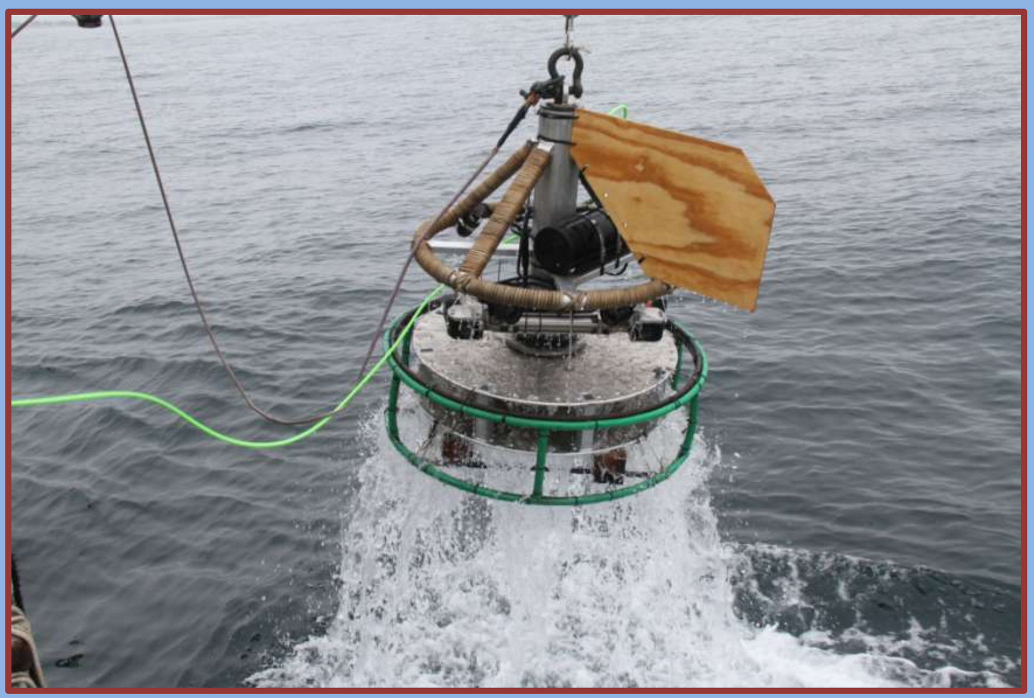
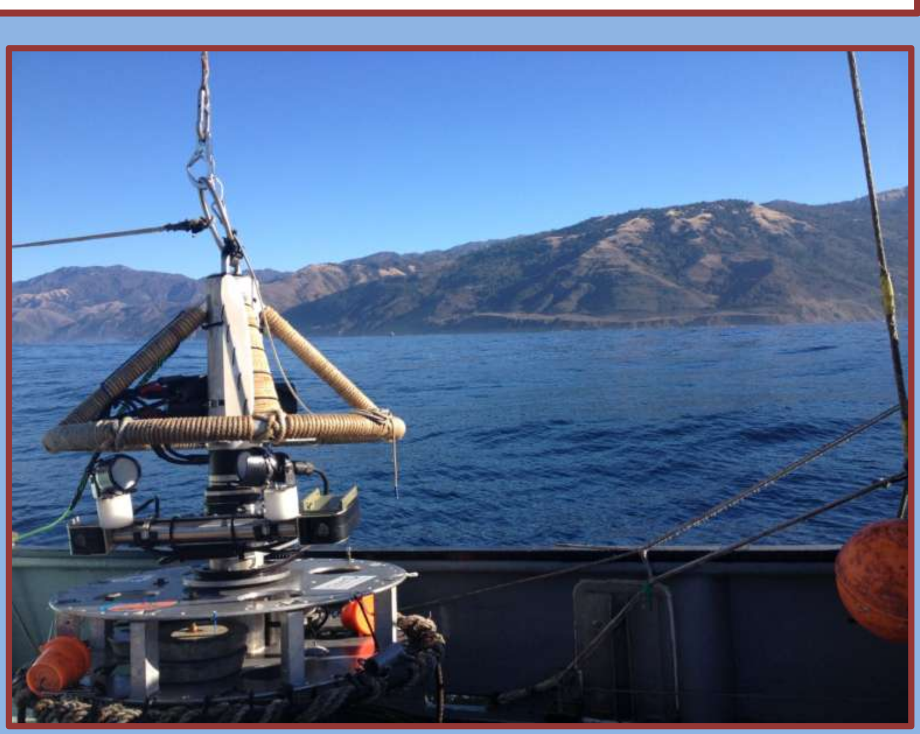


Figure 12: Average number of *S. caurinus* observed on each sweep with SE bars shown





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