

WORKING GROUP FEEBACK ON USMS PULL TEST REPORT

November 4 and December 2, 2009 meeting

Summary:

The Tomales Bay anchor test final report 10/23/2009 provided by Michael Rawlings of U.S. Mooring Systems, Inc. is informative but remains inconclusive to adequately support a comprehensive comparison with other mooring technologies, including the one currently in use.

Major concerns:

Planning

The working group was under the impression that a survey of the substrate in the location used for testing would be provided by USMS yet no such report has yet been published.

The working group also expected to see an Engineering design report which would have set the parameters of the experiment to characterize the holding requirements for extreme Tomales bay sea and wind conditions. This report was not made available as yet.

The purpose of these two reports would have been to clearly define the scope and expectation of the experiment before its execution.

Note that some concerns were also expressed as to the impartiality of the process because the contractor who evaluated the test would profit from a sale of the product being tested.

Execution

The working group noted that the measuring device used to evaluate the pulling force failed in 3 out of 7 experiments.

To substitute for these failure USMS provided the rpm of the Mussel Point's motor, yet no protocol for the rpm measurement and no calibration relating the rpm to the load were provided

The working group expressed concern that an experiment limited to anchor effectiveness was insufficient and that explicit assessment of the behavior of the USMS tackle under stress was also needed to evaluate USMS technology.

Reporting

It was noted, in the last paragraph of the report that "staff and consultant at USMS have been working on [dealing with the constant beating of the boat in the short wave, or wind chop that is generated in Tomales Bays], and have many viable solution to the problem" but no specific solution has been suggested.

Conclusion:

December 7, 2009

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Effectiveness

The working group concurs with USMS that the Mata Ray anchor technology is not fit for use in Tomales Bay

The working group also agrees that the helix anchor system seems to work in some of the experimental sites, and could be shown to work anywhere with appropriate scaling (e.g. using larger, heavier anchor, October 16 test). However from these results alone no generalization can be made for lack of characterization of differentiating variables (e.g., substrate, weather conditions etc.).

Some group members felt that this lack of characterization may have biased the last test, which was performed in a new location instead of a location, previously tested which would have facilitated a comparative assessment.

One group member suggested that setting a complete USMS system with an attached load for several months to test the system effectiveness would help in the evaluation and acceptance of that system for Tomales bay

As a base line, another Working group member quoted the example of a 10,000 Lbs boat held by a 1,500 Lbs concrete drum that was able to withstand sustained 6' chop and 70 knots winds without damage.

Environment

The working group noted that since the Helix anchor needs to be embedded deep into the substrate, it will of necessity disturb the benthic habitat, to an extent that needs to be documented before an objective comparison of impact can be made between the various mooring technologies.

Furthermore since some mooring locations will require a 1/2" rod extension that can be as long as 30' to reach the sea floor, the working group was concerned that this rod will be subject to lateral motion which would also negatively affect benthic habitat.

In addition, it was suggested that under extreme conditions, the extension rod as well as their joints and connectors would be subjected to unknown and potentially fatiguing metal strains which could result in failure.

Cost

The working group estimated that the Installed cost of the current type of mooring is competitive with proposed cost for helical mooring (\$1,500 vs. \$2,500 on average).

Finally, the maintenance cost of the USMS helix mooring system is assumed to be limited to the semi-regular replacement of a single steel shackle, although it will also incur the cost associated with required yearly inspection, which will necessitate a diver. For comparison purposes the maintenance cost for current mooring system over 10 years remains to be quoted.