

IN-WATER DRY DOCKING SYSTEMS

PILOT STUDY ADDENDUM

1 OVERVIEW

As part of the Phase II In-Water Dry Dock Extended Pilot, Los Angeles County Department of Beaches and Harbors (DBH) purchased two in-water dry docks for use by two privately-owned boats at the County-operated Anchorage 47. The first in-water dry dock (FAB Dock #1, **Figure 1**) was installed June 25, 2019 and the second (FAB Dock #2, **Figure 2**) was installed October 28, 2019. This addendum to the In-Water Dry Docking System Pilot Study (In-Water Dry Dock Pilot) Report describes the 3-year pilot period for these two devices at Anchorage 47, including observations over the pilot period, qualification and quantification of the device benefits, and summary of the barriers to extended implementation.

Figure 2: 1991 Beneteau powerboat, 28' long, 10' beam, twin stern drives, on FAB Dock #1 at Slip #1226



Figure 2: 2006 Safe Boat Defender, 26' length, 8' beam, twin outboard, on FAB Dock #2 at Slip #1222



2 MONITORING PERIOD SUMMARY

FAB DOCK #1

FAB Dock #1 (FD25XDD) was in use from June 25, 2019 to October 6, 2019 at slip #1226 at Anchorage 47. In October 2019, the owner of the boat using the FAB Dock vacated the slip. The Anchorage 47 Marina Manager kept the FAB Dock inflated and functional by connecting pump to a battery on the dock. A photo of FAB Dock #1 empty at slip #1226 is provided in **Figure 3**. The pump continued to remove water from the device following rain events. GoPro video monitoring documented fouling around the water line and underneath the device. Overall, the device showed no damage from the fouling and did not appear weighted down by the growth. A summary of the underwater video monitoring schedule is provided in **Table 1**. Photos of FAB Dock #1 during the monitoring period showing fouling under the device are provided in Appendix A.

Figure 3: FAB Dock #1 Empty at Slip #1226



FAB Dock #1 remained empty at slip #1226 until August 2022 when it was moved to slip #1222 by the slip #1222 boat owner to replace FAB Dock #2 at that slip. The boat owner reported the FAB Dock was easy to move to the new slip by towing it. By October 2022, the pump at the center of the lining (underneath the boat location) stopped working. The boat owner reported the device is still functional with only one pump, but that it takes longer to remove water from between the boat and the lining. As of May 2023, the boat owner continues to use the device without the second pump, with the intention of replacing the non-functional pump.

Table 1: Video Monitoring Dates

Date	FAB Dock #1	FAB Dock #2
February 11, 2020	X	X
March 26, 2020	X	X
July 8, 2020	X	X
August 3, 2020	X	X
September 23, 2020	X	X
December 3, 2020	X	X
June 21, 2021	X	X
April 3, 2023	X	

FAB DOCK #2

FAB Dock #2 (FD25) was in use from October 28, 2019 to August 2022 at slip #1222. The boat owner reported being very happy with the device. Video monitoring documented fouling around the water line and underneath the device. Overall, the device showed no damage from the fouling and did not appear weighted down by the growth. A summary of the video monitoring schedule is provided in **Table 1**. Photos of FAB Dock #2 during the monitoring period showing fouling under the device are provided in Appendix B.

Figure 4: Damaged Seam

In July 2022, FAB Dock #2 started sinking due to one seam coming apart (**Figure 4**). The boat owner and DBH attempted to reach the manufacturer via email but were unsuccessful. County Operational Services Division (OSD) staff were unable to repair the device. Due to a lack of local

FAB Dock maintenance professional, the device was removed from the water by OSD. OSD reported it being very difficult to remove the device out of the water due to the weight. A photo of the fouling under FAB Dock #2 after removal is shown in **Figure 5**.

FAB Dock #1 was moved to slip #1222 in August 2022 to replace the damaged device.

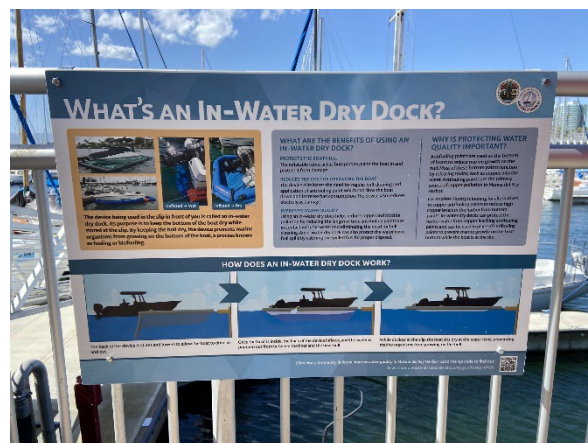
Figure 5: Fouling Under FAB Dock #2**SEAPEN**

Solstice Docking Solutions, the US vendor of SeaPen, expressed interest in conducting a short-term demonstration in Marina del Rey in 2020. Because the device works best for new vessels without bottom paint, the vendor had difficulties finding a boat for the demonstration. Additionally, the vendor did not have local maintenance representatives and did not want to implement the pilot without local knowledgeable parties to provide maintenance and repair, if needed. Due to these logistical difficulties, the demonstration was put on hold.

OUTREACH

During the In-Water Dry Dock Pilot, DBH developed an educational sign to post on the gate near the two in-water dry docks at Anchorage 47. The sign explains what an in-water dry dock is, the benefits of using an in-water dry dock, and how an in-water dry dock works. The sign was posted on the gate at near the Fairwind Yacht Club Dock (62803 Mindanao Way) in June 2022. A photo of the sign on the gate is shown in **Figure 6**.

Figure 6: In-Water Dry Dock Educational Sign



3 COST AND BENEFIT EVALUATION

Costs and benefits of the FAB Dock device were assessed over the 3-year trial period to evaluate potential long-term cost savings. Because one boat was removed from the pilot, only cost savings for the boat at slip #1222 were evaluated. Potential cost savings include elimination of hull cleaning, reduced hull painting needs, and overall reduced boat maintenance. **Table 2** summarizes the hull cleaning cost information obtained from the boat owner at slip #1222 in of February 2023.

Table 2: Hull Cleaning Cost Savings

Frequency of Cleanings Prior to FAB Dock	Cost per Cleaning	Frequency of Cleanings with FAB Dock	Hull Cleaning Cost Savings	Savings Over 3-Year Pilot	Projected Savings over 10-Year Device Lifespan	Purchase Price of FAB Dock #1	Purchase Price of FAB Dock #2
24/year	\$48	None	\$1,152/year	\$3,456	\$11,520	\$12,990*	\$10,735*

*Wholesale price, excluding state taxes

If extrapolating the annual \$1,152/year hull cleaning cost savings over the anticipated 10-year lifespan on the device, there would be a potential cost savings of \$11,520 from reduced hull cleaning alone. Additional cost savings from reduced electrolysis and hull painting are also anticipated. The 10-year cost savings from hull cleaning is comparable to the original capital cost of the device purchased for the slip #1222 boat (i.e., FAB Dock #1), prior to taxes.

The primary benefit noted by the boat owner was the insulation provided by the FAB Dock, which reduced stray current in the marina from damaging their aluminum hull (i.e., reduced

electrolysis). Additionally, the boat owner noted that they expect to get 4-5 years out of the non-copper paint on their boat before needing to repaint. These maintenance savings are not included in **Table 2** above but would increase the benefit to cost ratio.

4 LESSONS LEARNED

Overall, the pilot provided useful information about long-term use of in-water dry docking systems including device longevity and resiliency to fouling, changes in boat maintenance, and owner satisfaction. Cost savings from eliminating hull cleaning and reduced damage to the boat from electrolysis alone may be enough to incentivize many boaters to invest in an in-water dry dock. The lack of local company representatives and trained maintenance companies is the primary challenge for product implementation in Marina del Rey. Lessons learned are summarized below.

- Without a local device representative, repairing minor issues like a tear in a seam or a simple pump replacement resulted in one device being removed from the water and another device having ongoing issues. A local representative is needed to help with maintenance.
- The underside of the device accumulates some fouling, but the growth does not seem to damage the material, weigh it down, or impact function.
- Lifecycle disposal of the product material should be considered.
- While hull cleaning needs were eliminated, the boat owner still repainted their hull with antifouling paint during the pilot study, so full elimination of repainting should not be included in cost savings comparisons. The device may increase the longevity of antifouling paint by eliminating hull cleaning and reducing damage to the paint from the dock.
- While both FAB Docks were ordered for the dimensions of a specific boat, the boat at slip #1222 was able to use the in-water dry dock that was ordered for the boat at slip #1226 demonstrating that marinas may be able to purchase a device for a specific slip and allow different boats to use it.

4 CONCLUSION

With the completion of the pilot, DBH continues to consider in-water dry docking systems a viable option for reducing copper pollution in Marina del Rey Harbor. Successful implementation of these devices though would require a local representative for managing maintenance. Additionally, the lifecycle impacts of the devices should be considered, particularly if materials cannot be recycled.

Impacts to water quality were not evaluated as part of the In-Water Dry Dock Pilot, but could be assessed if additional pilots are conducted. In-water dry docking systems are made from plastic materials, which may contribute known and emerging pollutants to the water column. Local reductions in copper loading from using the devices were also not assessed during the In-Water Dry Dock Pilot, but could be evaluated during future studies.

APPENDIX A – FAB DOCK #1 UNDERWATER PHOTOS

Appendix A: FAB Dock #1 Underwater Photos

Video sceenshots under the dry dock from February 11, 2020

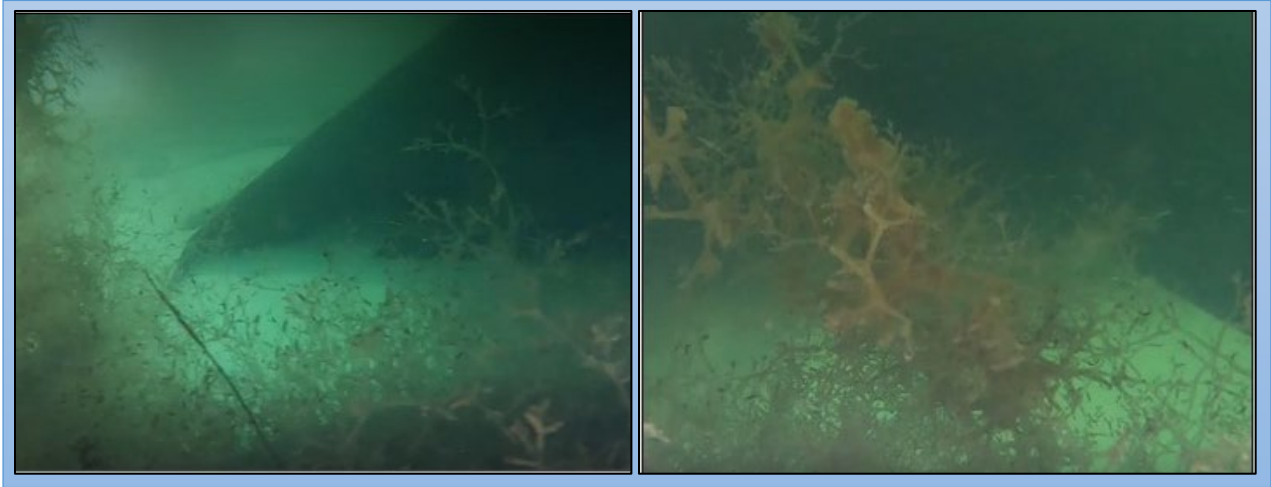


Photo of the empty device and video sceenshot under the dry dock from March 26, 2020

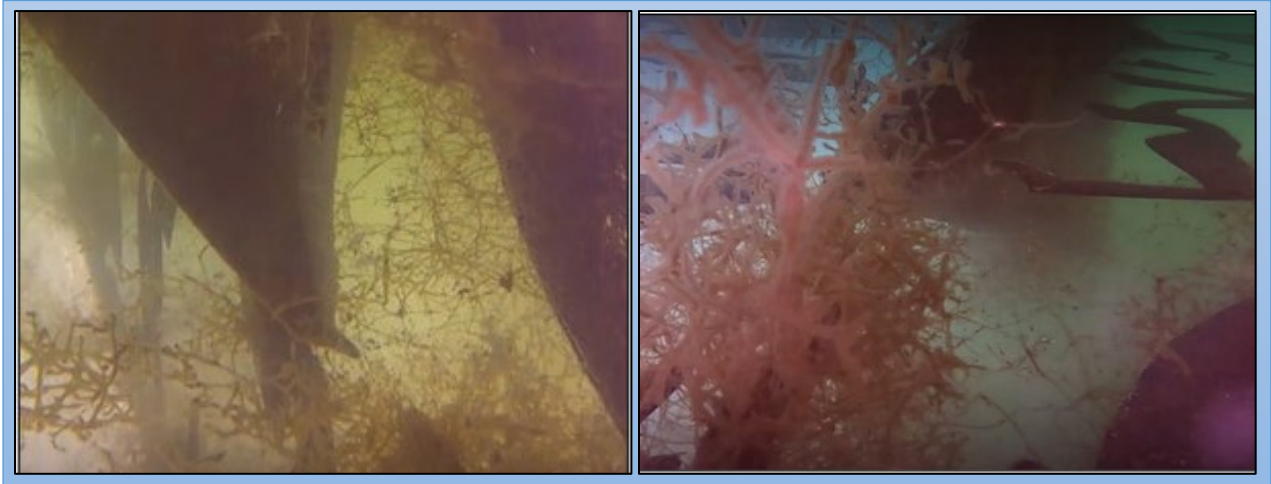


Appendix A: FAB Dock #1 Underwater Photos

Video sceenshots under the dry dock from July 8, 2020

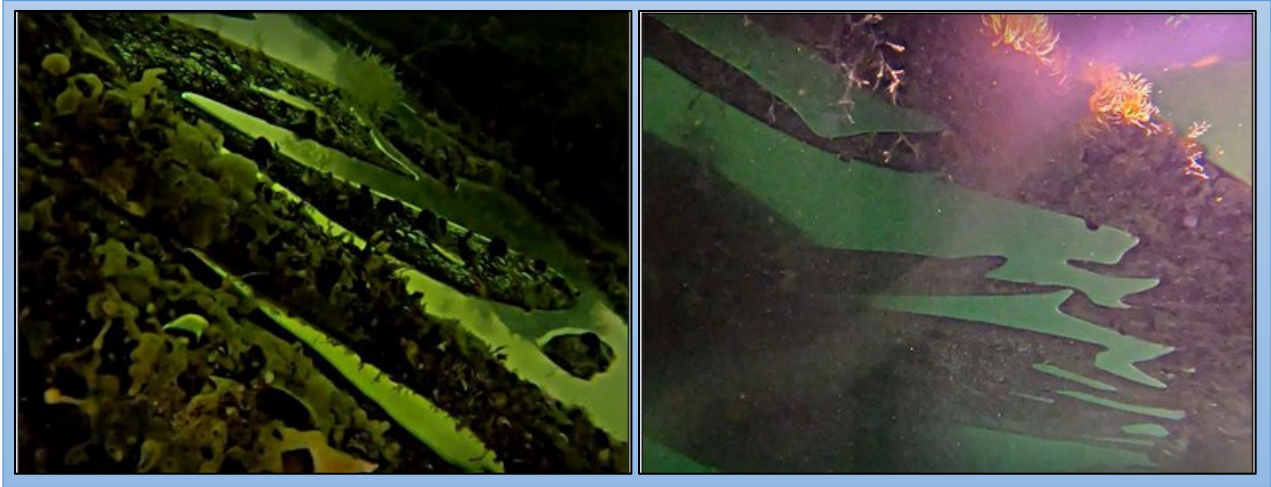


Video sceenshots under the dry dock from August 3, 2020

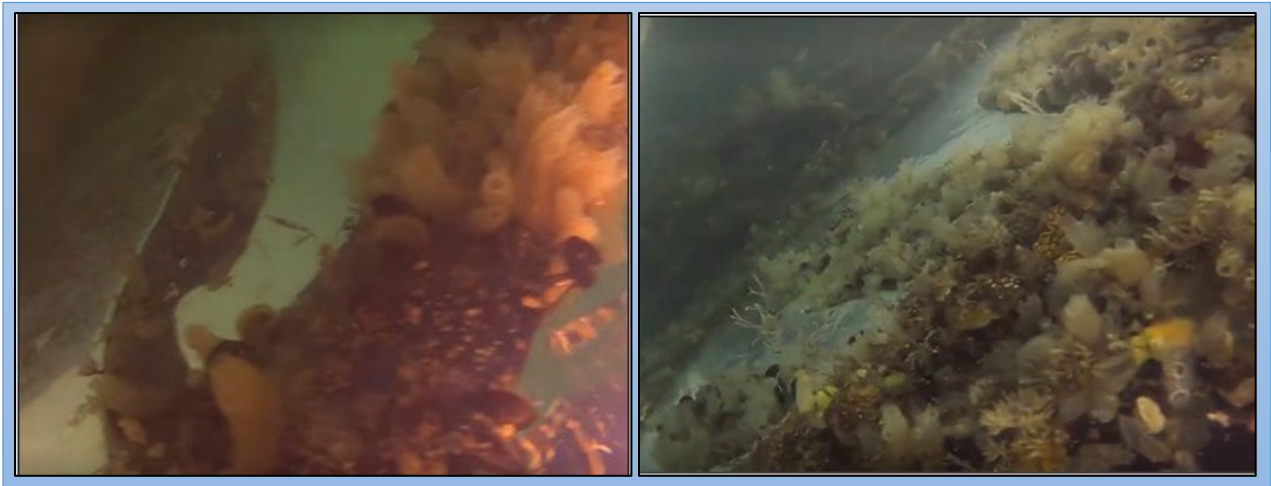


Appendix A: FAB Dock #1 Underwater Photos

Video sceenshots under the dry dock from September 23, 2020



Video sceenshots under the dry dock from December 3, 2020



Appendix A: FAB Dock #1 Underwater Photos

Photos of the empty device and video sceenshots under the dry dock from June 21, 2021



Appendix A: FAB Dock #1 Underwater Photos

Video sceenshots under the dry dock from April 3, 2023



APPENDIX B – FAB DOCK #2 UNDERWATER PHOTOS

Appendix B: FAB Dock #2 Underwater Photos

Photo of device and video sceenshots under the dry dock from February 11, 2020



Photo of device and video sceenshot under the dry dock from March 26, 2020

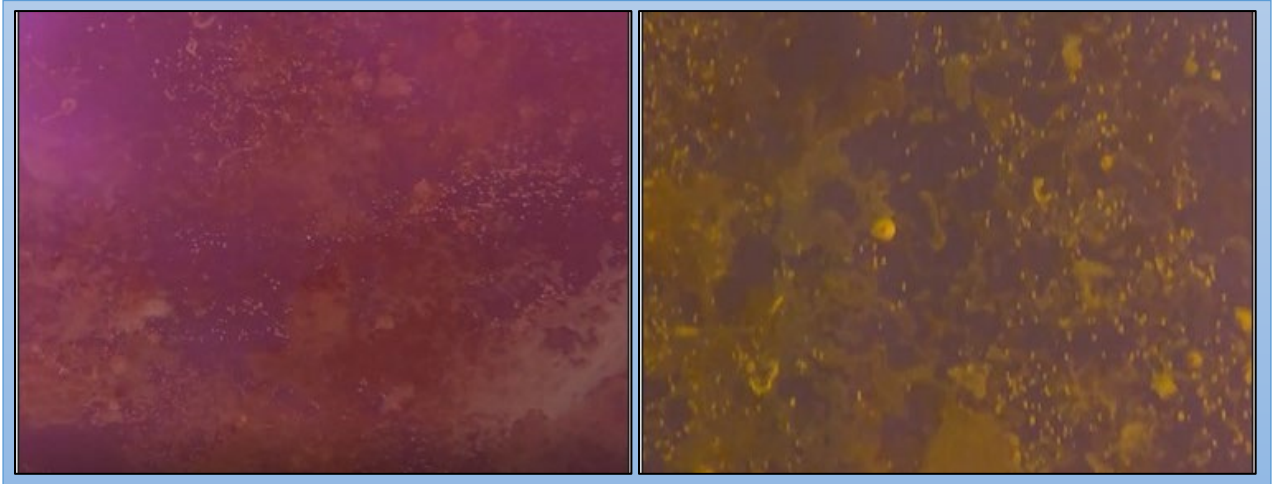


Appendix B: FAB Dock #2 Underwater Photos

Video sceenshots under the dry dock from July 8, 2020



Video sceenshots under the dry dock from August 3, 2020



Appendix B: FAB Dock #2 Underwater Photos

Video sceenshots under the dry dock from September 23, 2020



Video sceenshots under the dry dock from December 3, 2020



Appendix B: FAB Dock #2 Underwater Photos

Video sceenshots under the dry dock from June 21, 2021

