

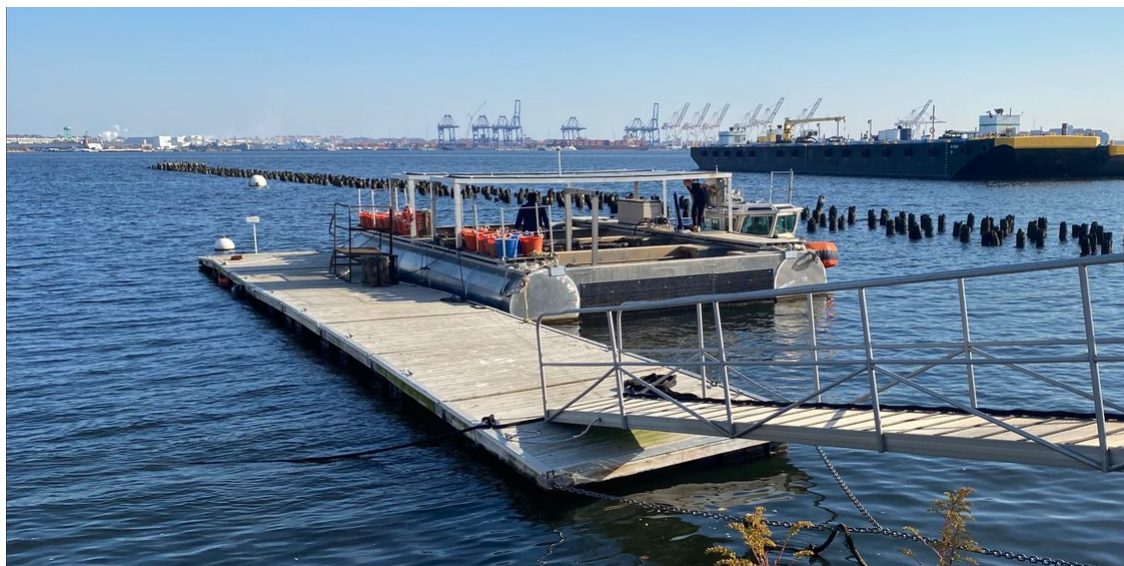
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## An Update from Solar Oysters, LLC

*From the Desk of Solar Oysters Business Manager Steve Pattison...*

Greetings! On behalf of the Solar Oysters LLC team, thank you for your interest as we progress to automate aquaculture through solar energy for a sustainable future. In 2022 we made great strides in the continued development of the Solar Oyster Production System (SOPS). I am pleased to share this update with you. If you have any questions, please reach out to me at [steve@solaroysters.com](mailto:steve@solaroysters.com)



# *SOPS Prototype: Successes, Lessons Learned & Goals*

## **Successes:**

In the 2022 growing season, SOPS provided high survival of spat-on-shell oysters on rotational ladders compared to the stationary ladder and cages. Growth of spat-on-shell and seed oysters was consistent throughout the growing season, but shape of the oysters varied between rotational and static ladders with oysters in rotation having a more uniform shape. Biofouling was also significantly reduced on rotating cages; quantifying this reduction is taking place currently. On the technical side, the solar panel configuration provides more than sufficient energy to power automatic rotation and the power washing system year-round.

SOPS provided about 40,000 oysters to Chesapeake Bay Foundation as a part of their oyster gardening program which were outplanted to a restoration reef effort at Fort Carroll in Baltimore, MD. A new cohort of spat-on-shell oysters estimated at approximately 490,000 spat was onboarded to SOPS the same day which will be grown, evaluated, and outplanted to the same reef in 2023.



### **Lessons learned/improvements made to SOPS:**

Many technological lessons were learned in the 2022 growing season, lending the opportunity to make improvements to SOPS currently and on future iterations of the platform. Improvements made on the prototype include:

- Design and implementation of a new cage clip attachment. Original SEAPA cage clips hung from ladder rungs and created too much motion when cages flipped in rotational sequence. Clips also became detached with heavy wave action resulting in loss of cages. The new design affixes cages to ladder rungs.
- Guards placed on either side of the platform to prevent large wood pieces and other debris from jamming ladders.

### **Goals for 2023:**

- Find the optimal rotational speed for oyster growth.
- Host a larger sample size of spat-on-shell oysters to evaluate their success (this is our second cohort of spat-on-shell provided to Solar Oysters by Chesapeake Bay Foundation as part of their oyster gardening program to restore wild oyster reefs). Gather more data points each sampling period.
- Host a larger sample size of single seed oysters to evaluate their success. (onboard approximately 65,000 seed)
- Evaluate labor inputs of employees working on the SOPS to get accurate estimation of labor hours and tasks.
- Evaluate and log energy use of the system more comprehensively.
- Build and evaluate a semi-automatic spray wash bar system.

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***Upcoming Presence at Aquaculture  
America 2023 & National Shellfisheries  
Association***

In 2023, Solar Oysters will be giving presentations at the Aquaculture America Conference and Exposition (New Orleans, LA) in February and the National Shellfisheries Association Meeting (Baltimore, MD) in March. Solar Oysters will discuss the technology and results and trends in the first and second growing seasons. These national conferences will provide Solar Oysters with exposure beyond Chesapeake Bay.

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# Chesapeake **OYSTER ALLIANCE** *10 Billion for the Bay*

## ***Chesapeake Bay Oyster Alliance Innovation Award***

Solar Oysters proposal for the Chesapeake Bay Oyster Innovation Award Program was accepted and awarded to fund the development and testing of a semi-automatic spray wash system for SOPS. The Chesapeake Oyster Alliance and Chesapeake Bay Trust have partnered to provide this award opportunity. The spray wash system will be mounted overtop of a ladder system in early summer 2023 and will allow for an entire ladder system to be washed in minutes. This will greatly cut the manual labor required for spray washing the oyster cages, a task usually taking an hour per ladder via the single wand pressure washing gun.



# *Chesapeake Bay Foundation Partnership Successfully Growing Spat on Shell for Restoration*



In partnership with the Chesapeake Bay Foundation (CBF) and the Chesapeake Oyster Alliance, Solar Oysters used the SOPS prototype to grow spat on shell oysters as part of CBF's Baltimore harbor oyster gardening program. This successful application of SOPS for restoration was a significant milestone in validating the technology. This partnership was partially funded with a grant from the Abell Foundation. On November 2, oysters were planted at an oyster reef near Ft. Carroll at the entrance to the harbor. On the same day, new spat on shell was placed on SOPS to grow in 2023 for restoration.

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## *Outreach Activities*

The Solar Oysters team continued to engage with interested stakeholders in 2022. Presentations on the SOPS prototype and Solar Oysters' activities were given to:

- Patuxent River Commission briefing, January 12, 2022
- Calvert County Watermen's Association Cove Point briefing, February 9, 2022
- Baltimore City STEM Teachers Tour, June 23, 2022
- Chesapeake Oyster Alliance Presentation, September 29, 2022, Presentation and Panel
- Interstate Shellfish Sanitation Conference's 74th Annual Interstate Seafood Seminar Presentation, September 7, 2022
- Chesapeake Oyster Alliance Presentation, September 29, 2022, Presentation and Panel

- Baltimore City Public Schools Science Teacher's Workshop, November 9, 2022, Presentation

We look forward to future opportunities to engage with and inform those interested in Solar Oysters' activities and accomplishments.

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## *Solar Oysters' Partnership with UMBC ICARE Program*

Solar Oysters collaborated with University of Maryland, Baltimore County (UMBC) Consortium for Applied Research in the Environment (ICARE) to host graduate student research on SOPS. The ICARE program's mission aims "to facilitate a cross-sector, interdisciplinary network of environmental scientists and to increase the diversity across the environmental workforce." Graduate student candidate, Darryl Acker-Carter, designed and implemented an experiment on SOPS to evaluate how rotation of the ladders on the prototype affects oyster growth.



For the duration of the experiment in April through October, all ladders on the system were loaded with spat-on-shell oysters while two ladders (one stationary and one rotational) hosted a small cohort of single seed oysters. Four ladders were placed in automatic rotation, moving a single position every 12 minutes, while one ladder remained stationary. Every 3 weeks, the oysters were sampled for growth and survival. Preliminary results favor the survivability of oysters on the rotational ladders. Further analysis of the condition index of the oysters and biofouling of equipment are currently in progress.

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# Solar Oysters Open House



On December 16, an Open House was held with organizations involved in growing oysters for restoration or consumption. The purpose was to demonstrate the SOPS technology, provide an update on progress, future plans and respond to questions. This resulted in a very engaged, informative discussion. Organizations participating included; Hollywood Oyster, Blue Oyster Environmental, Orchard Point Oyster,

SEAPA, Oyster Recovery Partnership, Madhouse Oyster and the Oyster Company of Virginia.

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## ***Future Plans for SOPS***

This past year was a significant milestone as it was the first full year operating SOPS successfully. Our partnership with CBF and the Chesapeake Oyster Alliance will continue in 2023 by using SOPS to grow spat on shell oysters for restoration.

Additional triploid seed oysters will be purchased and grown next year to continue to assess the effectiveness of SOPS.

We will continue to engage with stakeholders to identify future uses of SOPS.

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## ***Thank You to Our Partners!***

[The Abell Foundation](#)

[Chesapeake Bay Foundation](#)

[Chesapeake Oyster Alliance](#)

[F3 Tech Accelerator Program](#)

[University of MD Center for Environmental Science's Chesapeake Biological Laboratory, Maryland Industrial Partnerships \(MIPS\)](#)





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