

SUPPLEMENTARY MATERIAL

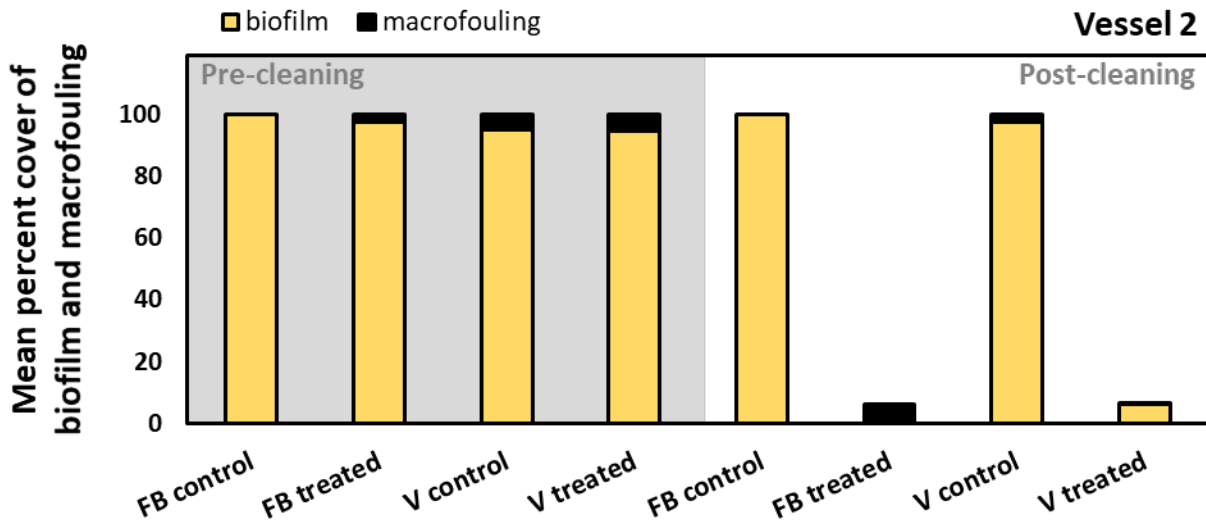


Figure S1. Mean percent cover of biofilm and macrofouling organisms recorded on different hull areas of Vessel 2 (Alameda) before and after the cleaning event. Data are based point-count surveys for flat bottom (FB) and vertical (V) hull surfaces. Broad cover of biofilm interspersed with patchy cover of macrofouling was a characteristic of biofouling observed on Vessel 2. This was not the case for Vessel 1 (Baltimore) where macrofouling dominated all surfaces (see Figure 2).

Supplementary Tables 1Sa, 1Sb and 1Sc provide basic background water quality conditions in Baltimore. Background stations B1, B2, and B3 were collected from a boat located 5 m, 50 m, and 100 m away from the ship's hull, respectively. The data presented are from samples collected one day prior to the test, 1 hour before testing started, and at the midpoint of testing.

Table 1Sa shows the temperature and salinity conditions in Baltimore. The data are the average of the three stations. The background TSS concentrations from stations B1, B2, and B3 are shown in Table 1Sb. Table 1Sc shows the dissolved and particulate copper and zinc concentrations from stations B1, B2, and B3.

Table 1Sa. Mean (SD) water conditions observed during testing in Baltimore.

Sample Time	Temp (°C)	Salinity (psu)
1d prior	23.9 (0.1)	1.3 (0.4)
1 hr pre-test	24.8 (0.0)	4.4 (0.1)
Midpoint of test	24.8 (0.1)	4.5 (0.1)

Table 1Sb. Mean (SD) background and ambient total suspended solids concentrations in Baltimore.

Sample Time	Total Suspended Solids Mean (SD) (mg/L)		
	B1	B2	B3
1d prior	19.3 (0.0)	20.5 (0.4)	21.0 (0.3)
1 hr pre-test	10.8 (1.0)	10.8 (0.1)	13.7 (0.4)
Midpoint of test	11.5 (0.5)	11.8 (0.5)	11.8 (1.1)

Table 1Sc. Mean (SD) concentrations of dissolved and particulate copper and zinc in Baltimore.

		Copper		Zinc	
		Dissolved Mean (SD) (µg/L)	Particulate Mean (SD) (µg/L)	Dissolved Mean (SD) (µg/L)	Particulate Mean (SD) (µg/L)
1d prior	B1 – T0	2.20 (0.03)	1.67 (0.28)	5.75 (0.69)	5.59 (0.99)
	B2 – T0	1.70 (0.02)	1.18 (0.06)	2.67 (0.90)	2.74 (1.77)
	B3 – T0	2.10 (0.02)	1.52 (0.14)	2.31 (0.09)	6.71 (0.84)
1 hr pre-test	B1 – T1	1.95 (0.03)	1.05 (0.17)	4.55 (0.45)	5.50 (2.51)
	B2 – T1	1.51 (0.05)	1.08 (0.18)	4.73 (1.18)	17.64 (13.05)
	B3 – T1	1.50 (0.20)	0.70 (0.71)	2.78 (0.57)	3.86 (0.51)
Midpoint of test	B1 – T2	1.49 (0.05)	1.13 (0.23)	2.00 (0.43)	24.40 (8.87)
	B2 – T2	1.40 (0.06)	0.75 (0.10)	1.49 (0.41)	6.94 (4.61)
	B3 – T2	1.61 (0.01)	0.80 (0.03)	1.10 (0.12)	4.12 (0.58)

Detection limits: Copper: Dissolved = 0.5 µg/L; particulate = 0.02 µg/L

Zinc: Dissolved = 1.0 µg/L; particulate = 0.9 µg/L

Supplemental Table 2S shows the results of the particle size distribution analysis from the Baltimore samples taken from onshore processing effluent (S5).

Table 2s. Particle size distribution for Baltimore effluent (S5) samples.

	2 – 5 (µm) counts/mL	5 – 15 (µm) counts/mL	15 – 25 (µm) counts/mL	25 – 50 (µm) counts/mL	50 – 100 (µm) counts/mL	100 – 200 (µm) counts/mL	200 – 400 (µm) counts/mL	>400 (µm) counts/mL
S5	3,577 (1,737)	6,027 (2,929)	5,641 (1,972)	4,494 (2,190)	123 (69)	0.83 (0.33)	BDL	BDL

BDL: below detection limits. DL: 0.1 counts/ml for all particle size ranges

Supplementary Tables 3Sa, 3Sb and 3Sc provide basic background water quality conditions in Alameda. Background stations B1, B2, and B3 were collected from a boat located 5 m, 50 m, and 100 m away from the ship's hull, respectively. The data presented are from samples collected one day prior to the test, 1 hour before testing started, and at the midpoint of testing.

Table 3Sa shows the temperature and salinity conditions in Alameda. The data are the average of the three stations. The background TSS concentrations from stations B1, B2, and B3 are shown in Table 3Sb. Table 3Sc shows the total and dissolved copper and zinc concentrations from stations B1, B2, and B3.

Table 3Sa. Mean (SD) ambient water conditions observed during testing in Alameda.

Sample Time	Temp (°C)	Salinity (psu)
1d prior	16.9 (0.0)	30.3 (0.2)
1 hr pre-test	16.8 (0.0)	30.4 (0.0)
Midpoint of test	16.8 (0.0)	30.4 (0.0)

Table 3Sb. Mean (SD) background total suspended solids concentrations in Alameda.

Sample Time	Total Suspended Solids Mean (SD) (mg/L)		
	B1	B2	B3
1d prior	5.8 (1.1)	5.4 (1.6)	6.8 (1.3)
1 hr pre-test	6.4 (0.2)	6.3 (0.1)	5.5 (1.4)
Midpoint of test	6.4 (0.2)	6.3 (0.4)	5.9 (0.3)

Table 3Sc. Mean (SD) concentration of total and dissolved copper and zinc in Alameda.

		Copper		Zinc	
		Total Mean (SD) (µg/L)	Dissolved Mean (SD) (µg/L)	Total Mean (SD) (µg/L)	Dissolved Mean (SD) (µg/L)
1d prior	B1 – T0	2.3 (0.1)	BRL	BRL	BRL
	B2 – T0	2.2 (0.1)	BRL	BRL	BRL
	B3 – T0	2.0 (0.1)	BRL	BRL	BRL
1 hr pre-test	B1 – T1	BRL	BRL	BRL	BRL
	B2 – T1	BRL	BRL	BRL	BRL
	B3 – T1	BRL	BRL	BRL	BRL
Midpoint of test	B1 – T2	BRL	BRL	BRL	BRL
	B2 – T2	BRL	BRL	BRL	BRL
	B3 – T2	BRL	BRL	BRL	BRL

BRL: below reporting limit (not detection limits)

Reporting limits: Copper: Total (T0) = 1.0 µg/L; total (T1, T2) = 20 µg/L; dissolved (T0) = 25 µg/L; dissolved (T1, T2) = 10 µg/L

Zinc: Total (T0) = 25 µg/L; total (T1, T2) = 500 µg/L; dissolved (T0) = 750 µg/L; dissolved (T1, T2) = 300 µg/L

Table 4S shows the results of the particle size distribution analysis from the Alameda samples taken from effluent (S5).

Table 4S. Mean (SD) particle size distribution for Alameda effluent (S5) samples.

	2 – 5 (µm) counts/mL	5 – 15 (µm) counts/mL	15 – 25 (µm) counts/mL	25 – 50 (µm) counts/mL	50 – 100 (µm) counts/mL	100 – 200 (µm) counts/mL	200 – 400 (µm) counts/mL	>400 (µm) counts/mL
S5	5,993 (608)	3,564 (797)	2,175 (434)	2,019 (401)	1,080 (215)	208 (27)	0 (1)	BDL

BDL: below detection limits. DL = 0.1 counts/ml for all particle size ranges