Figure 1. Sampling sites within Monterey Bay, California (USA) during the two sampling years (2013 and 2015). Integrated whole water samples (to a depth of 5 m) were obtained from Santa Cruz and Monterey Municipal Wharves. Quasi-daily samples were collected and analyzed onboard two moored Environmental Sample Processors: ESP North and ESP South (deployed at same location both years). Cross-bay transects were performed by a Dorado-class AUV with onboard, adaptive sample collection capabilities (the two chosen for further analyses are depicted). Additional samples were collected via boat casts targeting the chlorophyll maximum layer throughout the bay during both sampling years (locations not shown).

Figure 2. Weekly time series for *Pseudo-nitzschia* detection at Monterey (MW, south bay) and Santa Cruz (SCW, north bay) Wharves in 2013 and 2015. Cell concentrations at MW (2a, 2b) are based on light microscopy counts of 'seriata' and 'delicatissima' size classes, while cell abundances at SCW (2c, 2d) are combined results for *P. australis* and *P. multiseries* whole cell hybridization probes (the latter species was detected only on the following dates in 2015: April 8 [2.55×10^4 cells l^{-1}], April 15 [2.73×10^4 cells l^{-1}], April 22 [1.03×10^5 cells l^{-1}], April 29 [4.85×10^3 cells l^{-1}] and May 6 [1.65×10^3 cells l^{-1}]). Absence of a black dot indicates a negative pDA result for that week. Dashed lines indicate time period for ESP deployments, solid line indicates bloom threshold used for monitoring (Andersen 1996).

Figure 3. Particulate DA values for ESP, ship and AUV sampling during the 2013 and 2015 deployment periods. Note scale for 2015 is an order of magnitude greater than for 2013.

Figure 4. Results from ESP time-series in northern and southern Monterey Bay. (a) Abundance estimates from the two detectable *Pseudo-nitzschia* probes overlayed with pDA. Time points where HAB arrays were saturated with *P. australis* cells are represented with triangles; those cell abundances are considered as minimum values. Wire walkers deployed at each ESP location captured vertical chlorophyll (b) and temperature (c) profiles. White circles in (b) and (c) indicate depth and time of ESP samples.

Figure 5. (a) Dorado AUV transect crossed a cold upwelling filament on September 16, 2013 as depicted by the white line in the sea surface temperature (SST) map. The black contour line is the 14.65 ^{0}C isotherm. (b) Concentrations of total phytoplankton, total *Pseudo-nitzschia*, and 'seriata' size class *Pseudo-nitzschia* for each AUV sample based on light microscopy. (c) Chlorophyll distribution within the water column; the grey line is the 13.5 ^{0}C isotherm, illustrating the upwelling filament location where the isotherm outcrops to the surface; solid white circles indicate the locations of AUV water sampling; open white circles represent the concentration of particulate domoic acid (pDA) in each sample. Note: the sixth sample depicted outside the chlorophyll maximum was a targeted control sample. (d) Backscatter properties of the inshore and offshore phytoplankton

44 populations. (e) Species composition based on DNA fingerprinting analysis (ARISA
45 relative fluorescence).
46
47 Figure 6. Dorado AUV transect across the south bay on May 28, 2015 depicted by the
48 black line in Figure 6a (cloud cover precluded inclusion of SST data). (b) Concentrations
49 of total phytoplankton, total *Pseudo-nitzschia*, and 'seriata' size class *Pseudo-nitzschia*
50 for each AUV sample based on light microscopy. (c) Chlorophyll distribution within the
51 water column depicting a deep maximum layer; solid white circles indicate the locations
52 of AUV water sampling; open white circles represent the concentration of particulate
53 domoic acid (pDA) in each sample. (d) Optical backscattering, further distinguishing
54 phytoplankton populations across the upwelling filament. (e) Relative abundance of
55 *Pseudo-nitzschia* species based on DNA fingerprinting analysis (ARISA).
56
57 Figure 7. Shifts in dominant *Pseudo-nitzschia* species, uncovered by benchtop sandwich
58 hybridization assays on samples from ten stations (a,b) and whole cell hybridization at
59 the Santa Cruz Wharf (c). Period 1 includes samples prior to the start of the bloom (April
60 29, 2015), while Period 2 includes samples from after the start of the event (b). Whole
61 cell hybridization probes on weekly samples collected at the Santa Cruz Wharf captured
62 the shift from *P. multiseries/P. pseudodelicatissima* to *P. australis* between April 22,
63 2015 and April 29, 2015 (c).
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