

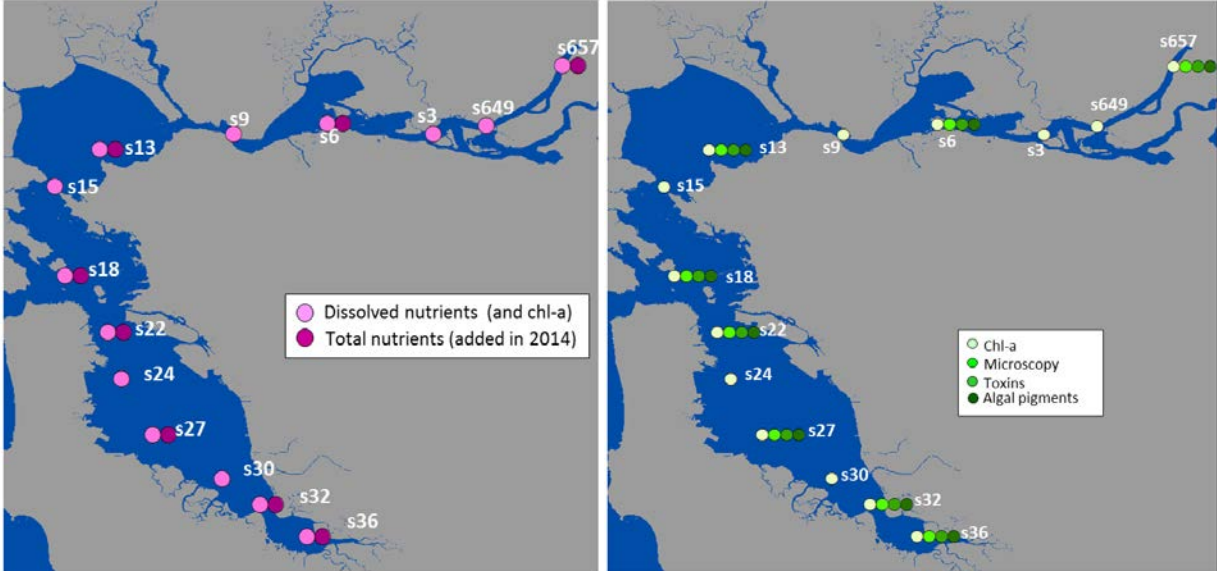
<b>Ship-based channel monitoring: sampling and analysis</b>
FY20 Estimated Cost = \$165,000
Collaborators: USGS, UCSC, SFEI

**Background**

The core NMS ship-based observations are carried out through a collaboration with USGS, building on USGS’ long-term Bay water quality program (USGS 2017). USGS has been conducting regular surveys of the Bay since the early 1970s, collecting data along its deep channel. The field program includes monthly full-Bay cruises aboard the R/V Peterson and a second biweekly cruise in South Bay. These cruises measure numerous parameters relevant to the NMS through a combination of in situ measurements and laboratory analysis of discrete samples, including: nutrients (N, P, Si), chlorophyll-a (chl-a) as a measure of phytoplankton biomass; phytoplankton community; and numerous ancillary parameters (e.g., salinity, temperature, suspended particulate matter, light penetration). Data from the ship-based program play critical roles in nearly all of NMS’ activities, including condition assessment, hydrodynamic and biogeochemical model calibration and validation, and improved understanding of nutrient behavior and nutrient-related effects within SFB.

**Major FY19 activities**

Ship-based sampling continued throughout FY19 on 11 full-bay cruises (one was missed due to the federal furlough) and 12 South Bay cruises, with SFEI staff also participating as field technicians during cruises. CTD casts were conducted throughout the bay, and discrete samples were collected using flow through water (surface) and a niskin sampler (bottom) for total and dissolved nutrients, chlorophyll-a, algal toxins, phytoplankton microscopy, and algal pigments at a subset of stations (Figure C1.1).



**Figure C1.1** Station locations for discrete sample collection for nutrient-related parameters during biweekly and monthly USGS cruises

**Proposed FY20 activities**

1. Ship-based monitoring, including sample analysis

- a. Ship-based sampling will continue aboard the R/V Peterson on ~12 full-bay cruises and an additional ~12 South Bay cruises. This activity includes all field components of the study as well as sample analysis
2. Data management
  - a. Most of the data generated from this activity is managed by USGS staff, however, SFEI should set aside some funds for internal data management and organization

### **FY20 Deliverables**

Nutrient and chl-a data will be made publicly available through USGS's website. Datasets for toxins, phytoplankton microscopy, and pigments will also be made publicly available through the NMS. Results will be summarized in the NMS Annual Report (funded through other projects). Similar to past years, data will be used within numerous other NMS activities (e.g., model calibration [see C.3], condition assessment, and assessment framework development).

### **Budget Justification**

Over the course of the year, 300 station-date samples will be analyzed for a suite of nutrients (ammonium, nitrate + nitrite, reactive phosphorus, dissolved silicate; total N and total P will be measured at 75% of the sites) at the USGS national laboratory at a total cost of \$40,000. A portion of FY19 nutrient analyses were covered by the FY18 NMS budget, leading to lower nutrient analysis costs in FY19 (\$24,000). Phytoplankton taxonomy will be performed by microscopy on ~250 samples for phytoplankton community composition (225 grab samples, 25 net tows) and biovolume (\$45k); additional phytoplankton or harmful-algae (HA) related measurements (molecular/sequencing techniques, phycotoxins, algal pigments, etc., total of \$50k) for cross-validation with microscopy data and imaging flow cytobot output, and to inform monitoring program refinement and to support investigation of HA-related mechanistic science and management questions. The SFEI staff labor budget covers the following effort (0.3 FTE, \$43,542): participating as field technicians on all USGS cruises; and overall project management, including coordinating laboratory analyses (with UCSC and other non-USGS labs), cruise and sample collection planning, and data management.