

**SAN FRANCISCO BAY
NUTRIENT MANAGEMENT STRATEGY**

**FY2023 Annual Report &
Overview of FY2023-2024 Work Activities**

February 2024



SFEI Contribution #1174

1. INTRODUCTION

This report presents an overview of the San Francisco Bay Nutrient Management Strategy (NMS) FY2024 Program Plan. After a brief summary of the program plan development process, *Section 2* provides an overview of FY2024 revenue and approved projects, and then outlines major work activities and project status. *Section 3* presents a table of 2023 and early-2024 NMS-related work products, along with weblinks to available products. Lastly *Section 4* summarizes the status of recent grant proposals submitted to support NMS-related work.

2. FY2024 PROGRAM PLAN

2.1 Process for Developing NMS Program Plans

The NMS annual calendar (July-June) is organized to allow multiple opportunities for upcoming science priorities to be discussed with and reviewed by the NMS Steering Committee (SC). In general, priorities for the following fiscal year are discussed at the NMS SC's fall meeting, and then explored again in more detail at its winter meeting. The proposed Program Plan is then reviewed, discussed, and voted on at the NMS-SC's May meeting.

The specific projects pursued in each year's annual Program Plan are based on science priorities and related work activities mapped out in the NMS Science Plan (v2), a multi-year workplan (FY2020-FY2024) developed through a series of priority-setting discussions with the NMS Steering Committee during 2018-2019. The goal of that planning process was to identify a multi-year set of projects that targeted the highest priority management questions, science needs, and updated goals for the second NMS Permit. Background is summarized [here](#) (program structure, management questions, program areas and science focus areas).

2.2 FY2024 Revenue

FY2024 revenue came from several sources and totaled \$2,475,000 (Table 1). Funding from the Bay Area Clean Water Agencies (BACWA) via the Bay-wide Nutrient Permit was \$1,800,000 (R.1 Nutrient Permit FY2024). This amount is lower than the annual average for Permit #2, because funding had been front-loaded earlier in the permit to support the launch of multi-year projects. The San Francisco Bay Regional Monitoring Program (RMP) contributed Special Study funding (R.2 \$250,000) to support the moored sensor network, along with contributing to ship-based monitoring (R.3 \$250,000). Lastly, funds that were remaining under FY2023 NMS Program Coordination were carried-forward to FY2024, and were included as an additional revenue source (R.4 \$175,000).

Table 1 FY2024 Revenue

	Revenue Source	Revenue
R.1	BACWA Nutrient Permit, FY2024 Funds	\$1,800,000
R.2	RMP CY2024 special study funds	\$250,000
R.3	RMP Contribution to ship-based monitoring	\$250,000
R.4	Carry-forward funds, from FY2023 C4	\$175,000
	FY2024 Total Revenue	\$2,475,000

2.3 FY2024 Program Plan Work Activities and Work Status

The approved FY2024 Program Plan is summarized in Table 2A, and is presented in more detail [here](#). Planned work during FY2024 is divided into two broad categories: Core Program (C1-C4) and Projects (P1-P6). The Core Program includes two major monitoring activities (ship-based monitoring and the NMS moored sensor network), numerical modeling, and science program management coordination. In addition to the Core Program, six targeted projects were approved. Two-thirds of the overall shoal biogeochemical mapping project (P5) was supported with funds from a recent EPA grant (\$100,000); and funding for project P6, installing and maintaining additional dissolved oxygen sensors (mid-depth, near-bottom) at both the Dumbarton and San Mateo Bridges was supported by carry-forward monitoring funds from FY2023. In addition, several NMS projects that started prior to FY2024 and will be continuing during this year are presented in Table 2b.

Work is overall progressing on-schedule for the FY2024 Core Program and Projects. After some mid-summer engine troubles that placed the USGS research vessel *R/V Peterson* in drydock, deep-water cruises (C1) have been moving ahead as planned, and most of the cruises that were on the schedule during drydock were carried out with smaller boats. Water quality data collection through the SFEI/NMS mooring network (C2) has been proceeding well. With the addition of an Alcatraz station (P1), the NMS mooring network now extends from Lower South Bay to Central Bay. In addition, as noted above, mid-depth and near-bottom dissolved oxygen sensors were added at the Dumbarton and San Mateo Bridges (P6), augmenting the on-going surface-water data collection at those locations by SFEI/NMS sensors. Data from Alcatraz and the at-depth DO sensors at the San Mateo and Dumbarton Bridges are telemetered and can be accessed in real-time (see Table 3). During 2024, telemetry is being added at additional NMS mooring sites, and real-time data will be merged into a water quality dashboard, both supported by the recent NOAA HAB grant. A nitrate sensor was added to the Alviso Slough mooring site in Fall 2024. Through a data-sharing/work-sharing agreement with a group working on a Lower South Bay restoration project (SCVWD project, led by Stillwater), the NMS is now contributing to the maintenance and data-management for two water quality moorings installed in partially-restored ponds, and data from these locations will be available for NMS work. For more information, see the mooring program quarterly reports (Table 3). In addition, six high-speed mapping surveys were carried out between March and October 2023 with USGS collaborators (P5).

Table 2a NMS FY2024 Program Plan Budget, New FY2024 Projects

	FY	Projects/Tasks		Budget	Spending to Date Jan 2024*	Encum-bered**	Balance Jan 2024***	% Spent + Encum-bered	Notes
	FY2024 Projects								
1	FY24	C1 Monitoring: Ship based Sampling	total	\$519,000	\$62,999	\$450,670	\$5,331	99%	Biweekly/monthly water quality monitoring at deep channel, throughout the entire Bay (Lower South Bay to the Sacramento River). Some vessel repairs/downtime during Summer 2023, but most dates were made up with smaller boat
			Labor	\$6,377	\$1,065	\$0	\$5,331		
			Direct/Sub	\$512,623	\$61,935	\$450,670	\$0		
2	FY24	C2 Monitoring: Moored Sensor	total	\$490,000	\$224,634	\$143,672	\$121,694	75%	Network of 10 moorings (now including Central Bay). Work on-schedule. Limited downtime due to instrument problems and bridge repairs (limited access to San Mateo Bridge). Nitrate sensor recently added to Alviso Slough, and chlorophyll-a sensor added to a station on Alcatraz, now a joint USGS/SFEI-NMS station.
			Labor	\$276,709	\$155,015	\$0	\$121,694		
			Direct/Sub	\$213,291	\$69,619	\$143,672	\$0		
3	FY24	C3 Core Modeling	total	\$499,319	\$310,377	\$126,984	\$61,959	88%	Modeling work thus far in FY2024 focused primarily on permit-related modeling (estimating changes to DIN concentrations, based on load reduction scenarios). Work did not move forward substantially on other goals (e.g., MAG recommendations: applications/synthesis, model refinements); those will be the focus March-June.
			Labor	\$221,458	\$159,499	\$0	\$61,959		
			Direct/Sub	\$277,861	\$150,877	\$126,984	\$0		
4	FY24	C4 Science Program Coordination	total	\$559,605	\$298,247	\$7,283	\$254,075	55%	These funds cover the cost of NMS program management and science coordination, including: lead scientist effort (~50% program management, 50% managing/working-on science projects); stakeholder engagement; monitoring program management/coordination; project management; and financial management.
			Labor	\$536,493	\$282,418	\$0	\$254,075		
			Direct/Sub	\$23,112	\$15,829	\$7,283	\$0		
5	FY24	P1 Install water quality mooring in Central Bay	total	\$100,000	\$4,151	\$65,570	\$30,279	70%	Teamed with USGS to upgrade an existing mooring instrument package on Alcatraz. SFEI/NMS covering the cost of chlorophyll and dissolved oxygen measurements, and cost-sharing/coordinating with USGS on maintenance. Data available by telemetry, here . Additional Central Bay station(s) to be added over coming months, supported by a combination of the NOAA grant (instruments, deployment cost) and the NMS (reconnaissance, maintenance).
			Labor	\$30,526	\$0	\$0	\$30,526		
			Direct/Sub	\$69,721	\$4,151	\$65,570	\$0		
6	FY24	P2 LSB Dissolved Oxygen Assessment Framework, continuation	total	\$162,394	\$20,772	\$23,000	\$118,622	27%	Funding has supported the drafting of the Dissolved Oxygen Conditions in Lower South Bay Sloughs Report . Remaining funds are for the expert/stakeholder meeting that will be in the spring, and the summary technical report to be shared at the end of the fiscal year. Additional funds are earmarked for a more in-depth, overarching technical report, pending approval from the Steering Committee.
			Labor	\$107,394	\$20,772	\$0	\$86,622		
			Direct/Sub	\$55,000	\$0	\$23,000	\$32,000		
7	FY24	P3 Model Advisory Group, Continuation	total	\$40,000	\$0	\$10,000	\$30,000	25%	Funds allocated to reconvene the Model Advisory Group (MAG) in FY2024. During 2022-2023, three sets of meetings were held with the MAG (May 2022, November 2022, February 2023). After the Feb 2023 meeting the MAG produced a summary document, including recommendations for on-going work. The next MAG meeting will focus on status/progress on model improvements, performance evaluation, and applications.
			Labor	\$0	\$0	\$0	\$0		
			Direct/Sub	\$40,000	\$0	\$10,000	\$30,000		

Table 2a cont'd

	FY	Projects/Tasks		Budget	Spending to Date Jan 2024*	Encumbered**	Balance Jan 2024***	% Spent + Encumbered	Notes
8	FY24	P4 Synthesis: Analysis of mooring data to estimate transformation rates/processes	total	\$60,000	\$5,624	22150	\$32,226	46%	The NMS moorings measure a range of water quality parameters every 15 min (O2, chl, turbidity, T, S; NO3 at some locations), and provide valuable data re: ecosystem condition. The data can also be used to estimate transformation rates, e.g., gross primary production, respiration, net ecosystem metabolism, etc. These funds are supporting method testing/refinement for env'l rate estimates, and analysis/interpretation.
			Labor	\$32,800	\$573	\$0	\$32,227		
			Direct/Sub	\$27,200	\$5,051	\$22,149	\$0		
9	FY24	P5 Shoal mapping, South Bay & Central Bay	total	\$50,000	\$32,727	\$12,809	\$4,464	91%	These funds supported high-speed water quality mapping surveys in South and Central Bays. Total cost for this field work and sample analysis was ~\$150,000. Remaining funds came from the recently-awarded EPA WQIF grant. Six surveys were conducted between March-October 2023. This was the third year with six shoal surveys, and results from all three are being explored through a synthesis project (FY23 P7)
			Labor	\$6,000	\$1,536	\$0	\$4,464		
			Direct/Sub	\$44,000	\$31,191	\$12,809	\$0		
10	FY24	P6 DO sensors at additional mooring depths	total	\$49,230	\$8,302	\$40,928	\$0	100%	Install mid-depth and near-bottom DO sensors at Dumbarton and San Mateo Bridges (USGS/SFEI collaboration). Augments on-going near-surface DO measurements (SFEI), with data from deeper sensors (USGS/SFEI collaboration) available via telemetry (DMB ; SMB). The deep-DO measurements started during the Aug 2022 event, with FY23 remainder funds (monitoring) used to continue the measurements.
			Labor	\$0	\$0	\$0	\$0		
			Direct/Sub	\$49,230	\$8,302	\$40,928	\$0		
		subtotal		\$2,529,548	\$967,833	\$903,065	\$658,649	74%	
	*Spending to date Jan 2024: Total spending (labor, direct, subcontracts) through January 2024.								
	**Encumbered: Funds that are included in subcontracts but not yet spent or invoiced.								
	***Balance Jan 2024 = Budget - (Spending to Date Jan2024 + Encumbered)								

Table 2b NMS Continuing Projects

	FY	Projects/Tasks		Budget	Spending to Date Jan 2024*	Encum-bered**	Balance Jan 2024***	% Spent + Encum-bered	Notes
	Continuing Projects								
11	FY23	P2 Technical Report: revisiting/updating Assessment Framework for deep subtidal habitats	total	\$170,553	\$74,819	\$84,541	\$11,193	93%	This project is building on prior work (from 2015) related to assessment framework development for deep subtidal habitat. The second phase of the project started in FY2023, but was put on hold due to August 2022 HAB event. A key focus is on examining the expanded phytoplankton (and HAB) record collected from 2015-2022, and revisit potential indicators for assessing condition. Work is currently on-target to wrap-up in Jun/Jul 2024.
			Labor	\$85,553	\$74,360	\$0	\$11,193		
			Direct/Sub	\$85,000	\$459	\$84,541	\$0		
12	FY23	P5 High-Level Synthesis	total	\$50,000	\$0	\$11,105	\$38,895	22%	This FY23 project was originally intended to support preparing high-level summaries of priority NMS projects and results/interpretations. While the goal remains the same, that work will likely be carried out to inform and support an update to the NMS science plan.
			Labor	\$38,895	\$0	\$0	\$38,895		
			Direct/Sub	\$11,105	\$0	\$11,105	\$0		
13	FY23	P6 Multi-year, high-level synthesis report	total	\$65,651	\$51	\$950	\$64,650	2%	High-level write-up of NMS work pursued, new insights, and continuing priorities. Work is underway on this report, being developed alongside the identification of science priorities for the next permit. The goal for report is May 2024.
			Labor	\$64,701	\$51	\$0	\$64,650		
			Direct/Sub	\$950	\$0	\$950	\$0		
14	FY23	P7 Synthesis shoal mapping/mooring data: three years, South/Central Bay: condition, mechanisms	total	\$65,000	\$18,628	\$0	\$46,372	29%	This project is analyzing/interpreting water quality data collected in South/Central Bays during high-speed mapping surveys in 2021, 2022, 2023 (6 surveys/yr) and with moored sensors. Goals include characterizing spatial variability in key parameters to inform monitoring program design, and improved understanding of the factors causing that variability and/or regulating production, O2 budgets, and N transformations. This work is supported by 50k from FY23 + 15k from FY24.
			Labor	\$59,000	\$18,628	\$0	\$40,372		
			Direct/Sub	\$6,000	\$0	\$0	\$6,000		
15	FY23	P11 Trend Synthesis cont'd: long-term trends in SFB water quality	total	\$104,382	\$51,309	\$18,849	\$34,224	67%	Continuation of long-term data analysis project, assessing long-term trends in SFB water quality parameters. Work was paused due to Aug 2022 HAB event (and related field work, analysis, etc.). Products thus far include Beck et al. (2022) and de Valpine et al. (<i>in review</i>). This project is picking up again in spring 2024; one technical report will be available in by Apr 2024, with a second report shared in Summer 2024.
			Labor	\$84,484	\$50,260	\$0	\$34,224		
			Direct/Sub	\$19,898	\$1,049	\$18,849	\$0		
16	FY22	P1B Tech Synthesis: factors influencing high-biomass/low-DO in Lower South Bay	total	\$120,000	\$74,915	\$36,107	\$8,978	93%	This project is investigating the tidally-driven exchanges of nutrients, biomass, and dissolved oxygen between restored ponds, sloughs, and Lower South Bay using high-frequency mooring data, targeted sampling, and numerical models. A key goal is to use mass balance approaches (aided by models) to quantify nitrogen influx to and biomass efflux from ponds, and the additional biomass entering LSB. A technical report is planned for May/June 2024.
			Labor	\$60,671	\$51,693	\$0	\$8,978		
			Direct/Sub	\$59,329	\$23,222	\$36,107	\$0		
17	FY21	P4 LSB Model Development	total	\$108,096	\$93,228	\$6,578	\$8,290	92%	Funds supported a round of model calibration (in collaboration with RMA), in prep for its use for applications (FY22 1B above). SFEI began work on the LSB model began in 2017 (higher-res, resolve creeks/pond connections); RMA used the model for a SCVWD project (and made substantial improvements), and passed the updated model back to SFEI. A technical-memo describing model calibration/validation is being prepared (complete Mar/Apr 2024).
			Labor	\$11,686	\$3,396	\$0	\$8,290		
			Direct/Sub	\$96,410	\$89,832	\$6,578	\$0		

Table 2b cont'd

	FY	Projects/Tasks		Budget	Spending to Date Jan 2024*	Encum-bered**	Balance Jan 2024***	% Spent + Encum-bered	Notes
18	FY22	P7 Phyto-HAB monitoring	total	\$105,000	\$67,083	\$29,450	\$8,467	92%	Includes funds from FY21 & FY22. Method development, HAB measurements, including DNA-sequencing techniques, w/ particular focus on method refinements or improvements. Two technical reports completed (SFEI 2020, 2021). Going forward, the new NOAA grant will take on the bulk of HAB method development
			Labor	\$39,726	\$31,259	\$0	\$8,467		
			Direct/Sub	\$65,274	\$35,824	\$29,450	\$0		
19	FY22	P14 HAB synthesis	total	\$125,000	\$65,354	\$44,602	\$15,044	88%	This project is focused on developing a overall synthesis of HAB-related data in SFB (HAB organisms, toxins biota). An expert advisor group was convened for two meetings, and an interim draft technical report written (SFEI 2023). Work is temporarily paused while some issues with DNA-based HAB data are resolved. (Method troubleshooting is being carried out by project FY22 P7). Current goal is for a final report by late-Spring/Summer 2024.
			Labor	\$30,766	\$15,722	\$0	\$15,044		
			Direct/Sub	\$94,234	\$49,632	\$44,602	\$0		
20	FY22	P19 Coastal Nutrient Fluxes and evaluating coastal impacts	total	\$325,000	\$137,992	\$177,008	\$10,000	97%	Combines FY21&FY22 funds. This project, a multi-group collaboration (UCSC, UCLA, SCWWRP, SFEI), is investigating the effects of SFB nutrients along the coast. The project experienced a pause due to postdoc turnover early during covid, but work has resumed. The project has two work products so far (Zhou et al. 2023; Cooper et al. 2024), and biogeochemical model products anticipated in ~1-1.5 years.
			Labor	\$10,000	\$0	\$0	\$10,000		
			Direct/Sub	\$315,000	\$137,992	\$177,008	\$0		
21	FY22	P6 HAB toxins in SFB mussels	total	\$241,453	\$223,936	\$16,986	\$531	100%	(FY21&FY22 funds). Mussels were collected biweekly from 6-8 locations around Central and South Bays from 2015-2022, and measured for three algal toxins (saxitoxin, domoic acid, microcystins). FY21&FY22 funding supported sampling/analysis during those years. UCSC lab work was originally delayed due to covid. Sample prep/analyses are ~90% complete; data for two toxins have been shared, with the third expected by April.
			Labor	\$67,570	\$67,039	\$0	\$531		
			Direct/Sub	\$173,883	\$156,897	\$16,986	\$0		
		subtotal		\$1,480,135	\$807,316	\$426,176	\$246,643	83%	

During 2022-2023, the NMS convened a group of external experts to serve on a Modeling Advisory Group (MAG). SFEI staff worked with regulators and stakeholders to develop charge questions to guide the MAG's review. Three MAG meetings were held, culminating in a 2-day in-person meeting at SFEI in February 2023. After the February meeting, the MAG produced a report-out document, providing a review of the modeling program's status and recommendations (see Table 3). Modeling work (C3) during FY2024 has thus far focused primarily on permit-related modeling (e.g., estimating changes to DIN concentrations, based on load reduction scenarios). Work has not moved forward substantially on other FY2024 priorities (e.g., MAG recommendations: applications/synthesis, model refinements); however, modeling effort will return to that focus during March-June 2024. If the spending rate for modeling labor were to continue at the July 2023 - Jan 2024 rate this project would go over budget. However, the reason for faster labor spending over the first seven months was because the full modeling team was focused on permit-related work (all under C3), instead of a more diverse set of work distributed across other projects (including non-NMS-funded projects, e.g., the EPA grant). With work returning to other projects we anticipate the modeling task finishing close to on-budget.

The majority of the continuing projects are from FY2023 and FY2022, along with one FY2021 project. These projects are moving forward in FY2024, with anticipated wrap-up dates in late-spring or summer 2024. All of these projects had either been paused or slowed to some extent due to work re-prioritization due to the August 2022 HAB event, and/or were impacted by covid-related slowdowns and have been steadily catching up. See Notes in Table 2b for additional information.

Over the last 1.5 years the NMS has also been investing in the use of remote-sensed (satellite) estimates for parameters like chlorophyll and turbidity (or suspended sediments). That work has yielded an improved chlorophyll algorithm for San Francisco Bay for the Sentinel-3 satellite that provides daily images of San Francisco Bay, with a multi-institution/multi-author manuscript describing that work recently submitted to a journal for publication by our collaborator at UCSC (R Kudela) at (see Table 3). In addition, prior to the start of Summer 2023, SFEI staff developed a set of automated scripts to process remote-sense chl estimates and serve as an 'early-warning' system: download daily imagery; perform atmospheric corrections, compute chl-a based on remote-sensed band data; and plot (see Table 3). This work is continuing through the NOAA HAB grant, and remote-sensed chl maps will be viewable within an online water quality dashboard.

As part of developing synthesis reports, SFEI has been building a set of web-tools for visualizing SFB water quality related data, either to accompany PDF-version of reports (for readers to explore data further) or as standalone, easy-to-update ways to track and present condition (see Table 3).

3. WORK PRODUCTS

NMS-related work products from 2023 and early 2024 are compiled in Table 3.

Table 3 Work Products, 2023 and early 2024

1	Dissolved Oxygen Conditions in Lower South Bay Sloughs (Draft Feb 2024)	Link
2	Technical Report Virginian Province Approach to Dissolved Oxygen in Lower South San Francisco Bay Sloughs (Updated draft Fall 2023)	Link
3	Lewis, LS. 2023. Fish communities and dissolved oxygen in wetlands of the San Francisco 22 Estuary. Final report submitted to the SFEI, CA. Prior related reports: <i>Analysis of Fish Abundance Patterns in the Alviso Marsh Complex</i> , UCDavis: link <i>Analysis of Fish Abundance Patterns in the Alviso Marsh Complex</i> , (Update summary) : link	link
4	Characterizing Lateral Variability in South Bay Water Quality to Inform Monitoring Program Design (shoal synthesis) (April 2023)	Link
5	San Francisco Bay Numerical Modeling: FY2021-FY2023 Update. (Feb 2023)	Link
6	Findings and Recommendations of the NMS Model Advisor Group Expert Panel	Link
7	Continuous Suspended Sediment Monitoring in South and Lower South San Francisco Bay	Link
8	Lower South Bay hydrodynamic model calibration –calibration completed, technical memo in preparation	memo in prep
9	Nonparametric and additive mixed meta-analysis (de Valpine et al. <i>in review</i>) [Note: if you would like to review the report/manuscript please contact D Senn*]	<i>manuscript in review</i> (see left)
10	Evaluation and Refinement of Chlorophyll-a Algorithms for High-Biomass Blooms in San Francisco Bay (USA):	manuscript in review
11	Modeling the dispersal of the San Francisco Bay plume over the northern and central California shelf. Zhou et al (2023)	Link
12	Remote sensing of SFB plume for validation and interpretation of the coastal model (Cooper et al) – compiled/QAed dataset for use in evaluating coastal biogeochemical model performance – technical report analyzing the data, being submitted as a manuscript [Note: if you would like to review the report/manuscript please contact D Senn*]	<i>manuscript in review</i> (see left)
13	NMS mooring network, Quarterly Update #1	link
14	NMS mooring network, Quarterly Update #1	link

15	Gross et al 2024 (in review) Estimating Biogeochemical Rates Using a Computationally Efficient Lagrangian Approach. Method development and application (Delta), techniques that are, highly relevant for bay-applications –Manuscript, funded by prop1 grant (PI: R Holleman); DS collaborator/co-author [Note: if you would like to review the report/manuscript please contact D Senn*]	manuscript in review (see left)
16	SFB, NMS State of the Science, updated thru Jul 2022, doesn't include HAB event	Link
17	Nutrients in SFB: Science & Management Priorities (high level overview)	Link
18	Nutrient trends: data explorer (<i>web application</i>). Updated to include longer data records (back to 1980s, when data available) and to include dissolved inorganic nitrogen (e.g., DIN).	Link
19	Lower South Bay Dissolved Oxygen: exploring DO condition (<i>web application</i>)	Link
20	POTW Loads over time: data explorer (<i>web application</i>)	Link
21	HAB Molecular Data: data explorer (<i>web application</i>)	Link
22	IFCB viewer: view time series of Imaging Flow CytoBot data (<i>web application</i>)	Link
23	San Francisco Bay Water Quality Data Viewer: USGS cruises 1980-present (<i>web application</i>)	Link
24	Chl, DO, and other data from Alcatraz mooring (chl, DO start August 2023), in collaboration with USGS	Link
25	DO sensors installed at near-bottom and mid-depth, San Mateo Bridge and Dumbarton Bridge; data available via telemetry.	DMB SMB
26	Remote sensing, daily chl-a: automated fetch, analyze/process, plot <i>link to the right is for Jul-Aug 2023 imagery</i>	JulAug2023 JanMar2024
27	Developing an interim space-time varying semi-empirical estimate for light attenuation/ $K_d(x,y,t)$ for use within biogeochemical simulations. The link to the right documents the approach, improvements, and results for this iteration.	Link

*Some of the manuscripts (submitted or in prep) are not able to be posted publicly at this time. But they are available for review by the NMS-SC. Please contact D Senn (davids@sfei.org) if you would like to review the manuscript and we will send it to you electronically.

4. RECENT GRANTS

Over the last 18 months, SFEI staff have pursued additional funding through federal grant proposals to support nutrient-related work (monitoring, modeling) in San Francisco Bay. The three successful grant proposals will support an additional ~\$7.8mill in nutrient-related work in San Francisco Bay over the next four 4-5 years.

- *Destination Clean Bay, Decision Support Tools for Multi-Benefit Water Quality Improvements*,
 - \$1.8million in nutrient-related funding
 - *submitted*: September 2022
 - *Grant Period*: December 2023 - November 2027
 - *Funder*: EPA Water Quality Improvement Fund
- *HAB Monitoring Program Development* ([one-pager](#); [NOAA project page](#))
 - \$2.99million (join proposal: SFEI, USGS, and DWR)
 - *submitted*: January 2023
 - *Grant Period*: October 2023 - September 2027
 - *Funder*: NOAA Monitoring and Event Response for Harmful Algal Blooms (MERHAB)
- *BayInsight: Integrated Science & Monitoring to Guide Nutrient Management for San Francisco Bay*
 - \$2.99million in nutrient-related funding
 - *submitted* September 2022
 - *Grant Period*: June 2024 - May 2028
 - *Funder*: EPA Water Quality Improvement Fund