RMP
REGIONAL MONITORING PROGRAM
FOR WATER QUALITY IN SAN FRANCISCO BAY
A Cooperative Program Managed by the San Francisco Estuary Institute

FALL 2013
Update

www.sfei.org/rmp

CELEBRATING 20 YEARS OF MONITORING SAN FRANCISCO BAY

ROBIN MEADOWS, Science Writer, robin@nasw.org, http://about.me/robinmeadows

Two decades ago, our knowledge of San Francisco Bay's health was as cloudy as the water in it. We suspected the water contained toxic heavy metals from industry, and the sediment contained mercury from historical gold mining and polychlorinated biphenyls (PCBs) from old electrical equipment. But we didn't know if contaminant levels were high enough to harm wildlife and people, what else was in the Bay, or where it all came from, which is key to keeping pollutants out in the first place. **Today,** that picture is much clearer — and the Bay is cleaner — thanks to a monitoring program that is as forward-thinking as the Bay Area itself.

Continued next page

Continued

CELEBRATING 20 YEARS

Established in 1993, the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) united regulators and dischargers, turning water quality stakeholders who are at odds elsewhere into collaborators with the common goal of assessing and improving the Bay's health. "The RMP is outside the regulatory box," says Tom Mumley of the San Francisco Bay Regional Water Quality Control Board, which co-founded the Program. "We don't have to force compliance through command-and-control permits — we're all doing this because it's the right thing to do."

The RMP, run by independent scientists at the San Francisco Estuary Institute (SFEI), made its debut along with the 1993 Comprehensive Conservation and Management Plan (CCMP). The US EPA requires such plans to be developed for all national estuaries of concern under the Clean Water Act. CCMP framers hoped the RMP would help the region more collaboratively address not only those contaminants discharged directly into the Bay by local cities and industries, but also those washing down from the 60,000 square mile watershed that starts in the Sierra Nevada and drains 40% of the state.

At the time, the region had just gone through two decades of tremendous advances in the health of the Bay, as cities went from dumping raw sewage to building sewage treatment plants in the 1960s and 70s. But new contaminants soon rose to the forefront, including heavy metals like copper as well as PCBs and other organic chemicals that accumulate in living things. "The RMP came of age with these problems and we didn't have a handle on them," says David Sedlak, a UC Berkeley water quality scientist who, like many UC researchers, has worked with SFEI since the early days of the RMP.

"Lack of information cuts against dischargers" —Jim McGrath

FIRST STEPS TO BAY-WIDE MONITORING

The RMP had its origins in the late 1980s, when the Regional Water Board proposed to set standards for heavy metals in the Bay. Back then, monitoring was done piecemeal by individual dischargers, which include dredgers that stir up sediment at the bottom of the Bay as well as local governments that manage sewage treatment plants and the stormwater (also called urban runoff) that washes pesticides, flame retardants and other chemicals from the land into the water.

"It was disjointed and inefficient," recalls Dave Tucker, who heads San Jose's water recycling program and helped set up the RMP.

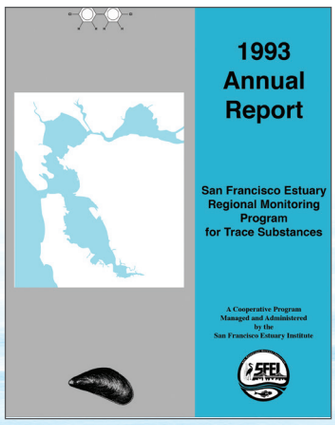
Steve Ritchie, who led the Regional Water Board at the time, changed all that. "He got us all in the same room to talk to each other instead of at or over each other," says Tucker. "Everyone has a say in the program. We all own it."

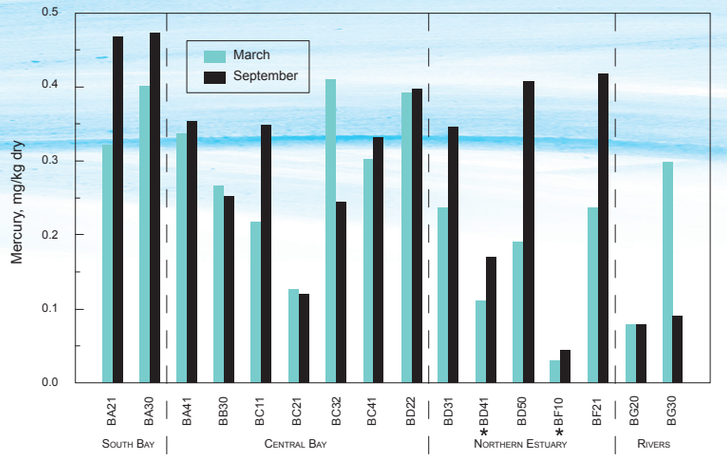
The RMP works for dischargers because without good data, regulators are likely to err on the side of caution. This can mean setting standards that are more stringent — and more expensive to comply with — than needed for the health of the Bay. "Lack of information cuts against dischargers," Jim McGrath, an engineer and current Regional Water Board member who was then with the Port of Oakland and, like Tucker, was an early proponent of the RMP. "The RMP was good for the Port. There had been 150 years of unregulated discharge, and people were worried that dredging would stir it all up."

The Program also benefits regulators, clearly showing what is and what isn't a problem. "Regu-

The RMP has evolved in many important ways over the past 20 years, in response to changes in the Bay ecosystem, shifts in water quality management priorities, and advances in scientific understanding. Processes within the Program and approaches to monitoring, interpretation, and communication have been continually refined.The reporting of RMP sediment mercury data illustrates some of this evolution. Reporting in 2013 has a greater focus on delivery of the rich dataset that has been created in a concise, understandable, and engaging manner.

1993





lation is an easier sell when it's founded on good science," Mumley says.

Dischargers initially chipped in $1.5 million per year and have since bumped this up to $3.5 million. "It's more cost-effective for dischargers to buy into the RMP than to monitor on their own," says Jay Davis, an ecologist who manages the Program.

Pooling their resources to get solid information also assured dischargers that they were being regulated fairly, helped regulators identify and tackle the biggest problems, and gave the public the peace of mind that the Bay was in good hands. Under the RMP, monitoring went from looking just near discharge outlets to sites across the whole Bay, following the vision of UC Santa Cruz environmental toxicologist Russell Flegal. "The RMP was one of the first to take state-of-the-art monitoring from oceanographers and apply it to an estuary," says Sedlak. "The data are very high quality."

MONITORING AS A RESEARCH TRIGGER

At the outset, the RMP monitored water and sediment at fixed points in the Bay. "It was pretty bare bones in the beginning," says Karen Taberski of the Regional Water Board, who helped set up the program. Over time, this monitoring produced the "status and trends" contaminant data at the heart of the Program, telling regulators today how far we've come, how far we have to go, and what we have to watch out for.

Evolution came easily, built into the Program by design via regular stakeholder meetings and periodic reviews by outside scientists. "They're always adjusting to meet the next challenge," Sedlak says. "I'm an admirer." Monitoring grew more sophisticated, extending to the Bay's edges to track trends where contaminants settle first, for example, and adding biological indicators to document contaminant effects on wildlife and people.

Adaptation was also driven by more in-depth research, which rapidly became an integral part of the Program and continues to grow today. "Special studies help us address ever-changing information needs in a nimble way," Davis says. Early studies explored fish contamination and episodic toxicity after rainstorms, leading to the incorporation of these indicators into the RMP near its 10th anniversary. Later studies teased out major pollutant sources and priority cleanup targets, and uncovered new contaminants. "They don't wait for the EPA," Sedlak says. "They adapt monitoring based on their own experience."

Even as the RMP became more complex, however, it made information on the Bay's health easier to absorb. "The annual report used to be heavy on data," Davis says. "Now it includes more interpretation and application to management questions. It's a more useful tool for managers."

Local regulators use RMP data to focus on the most important pollutants and to develop federal cleanup plans called Total Maximum Daily Loads (TMDLs), which the EPA has required since 1979 for waters listed as impaired. These watershed-wide plans set progressive targets for restoring listed waters, and strive to meet these targets by identifying where contaminants come from and finding ways to reduce them.

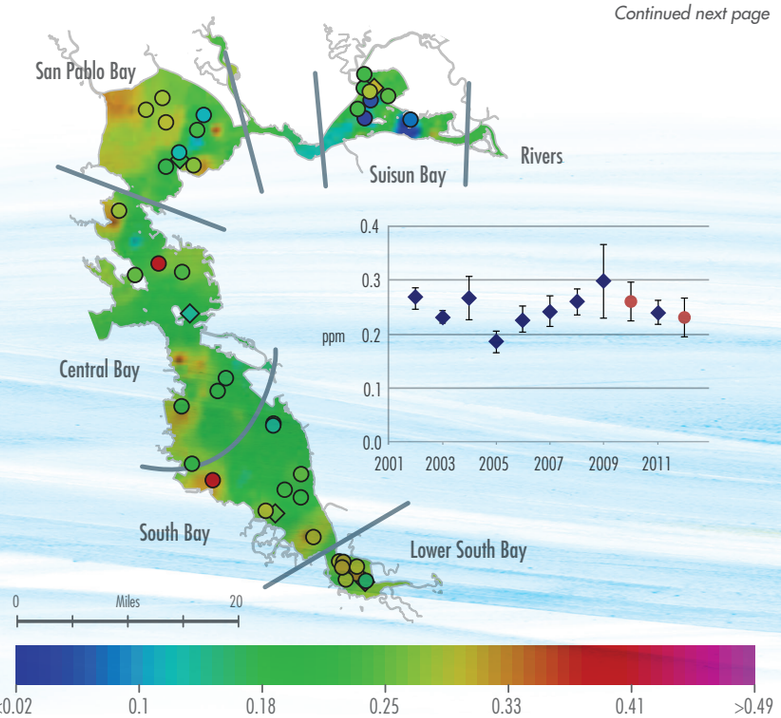
DEALING WITH THE PAST

Early RMP priorities included mercury and PCBs, which cling to sediment and have been building up in the Bay for decades. These contaminants are particularly worrisome because they bioaccumulate, with concentrations rising up the food web, which means trouble for top predators from birds and seals to people.

These legacy contaminants mostly reflect the past: mercury that was used to extract gold in the 1800s continues to wash down with sediments from the Sierra Nevada today. This pollutant also enters the Bay in stormwater from the South Bay, which once had one of the biggest mercury mines in the world. Likewise, while PCBs were banned in 1979, these widely-used chemicals poured into the Bay for 50 years.

Continued next page

2013



Footnote: Colored symbols on map show results for wet season samples collected in 2012: circles represent random sites; diamonds represent historic fixed stations. Contour plot based on 360 RMP data points from random stations collected over nine rounds of dry season sampling from 2002-2009 and 2011 (data from wet season sampling in 2010 and 2012 are excluded). Trend plot shows annual Bay-wide random station means with error bars indicating 95% confidence intervals of the means. Red circles on trend plot indicate wet season samples; blue diamonds indicate dry season samples. The maximum dry season concentration was 0.94 ppm in Central Bay in 2009. Concentrations presented on a dry weight basis.

Continued

CELEBRATING 20 YEARS

The RMP provides information managers will need five years down the road so they'll be able to make informed decisions when the time comes

Once in, pollutants linger because turnover in the Bay is slow. "It's hard when you have a contaminant that went into the estuary 100 years ago — there's not much you can do," Taberski says. Natural processes will eventually bury sediment-bound contaminants or carry them through the Bay's narrow mouth and out to sea, but this can take decades or longer.

In the meantime, the RMP has eased the sting of legacy contaminants. Monitoring identified hotspots that were then cleaned up and also pointed toward safer ways to dredge, allaying concerns about stirring up contaminated sediments and enabling the use of dredged material to restore wetlands.

More importantly, the Program now monitors mercury and PCBs in sport fish to protect people's health, informing the state advisory about fish consumption that has been in effect since 1994. "The advisory is based on levels in fish instead of water because that's how people are exposed to contamination," Davis says. "We're still concerned about mercury and PCBs but we have better indicators of them now."

In addition, RMP data inform TMDLs that address ongoing inputs for legacy contaminants. For example, urban runoff continues to be high in PCBs despite the ban, leading the Program to search for and clean up sites where these toxicants were used historically. Another possible fix includes configuring storm drains to catch the PCB-contaminated sediment, before they get into the Bay.

TACKLING TODAY'S PROBLEMS

Looking back, several early RMP priorities had happy outcomes. Initial monitoring showed, for example, that copper and nickel were too high in the Bay, leading Silicon Valley industries to focus on pollution prevention. But RMP data eventually suggested that copper levels were less dangerous than had been thought. "Copper was a big concern in the '90s because concentrations exceeded federal criteria," Davis says. "We showed that copper could be higher than national standards without harming creatures in the Bay, which meant we didn't have to mandate costly restrictions." This is because the organic matter floating in the water binds copper, keeping much of it out of the food web.

Just when heavy metal fears were put to rest, a new scare emerged: flame retardants called polybrominated diphenyl ethers (PBDEs), which are ubiquitous in products from electronics to building materials to foam padding in furniture and carpets. "The Bay was a hot spot for PBDEs 10 years ago, with world record concentrations," Davis says, adding that PBDEs were also high in women's breast milk locally. But two of the three commercial PBDE mixtures were banned in 2006 and are dropping off nicely, and the last one is being phased out this year.

In contrast to the positive outcomes with heavy metals and PBDEs, pesticides have been an ongoing problem. Stormwater monitoring showed the need to manage organophosphate pesticides such as diazinon that replaced DDT. "Diazinon is less persistent than DDT but is very toxic," Taberski says. Now regulated by the EPA, diazinon is still allowed for agricultural use but was banned for residential use in 2004.

Pyrethroid pesticides have since replaced organophosphate pesticides for residential use, showcasing another happy outcome of the RMP: the ability of the Program to detect a problem it's not looking for. In this case, monitoring by the RMP and others showed unusual toxic effects on the aquatic invertebrates that fish eat in urban streams, which were eventually traced to the new pyrethroids. "Regulated contaminants couldn't explain these effects," water scientist Sedlak says. "This raised awareness that not all toxicants are monitored or regulated." Instead of getting caught up in the cycle of endlessly regulating replacement pesticides, the Regional Water Board's urban creek TMDL now covers all pesticides that are toxic in water.

PREVENTING TOMORROW'S PROBLEMS

Keeping an eye out for new contaminants is a major focus of the RMP today. "We're trying to nip problems in the bud with early detection and management," Davis says. "We're looking hard but none are rising to the high concern category that would require regulation."

The Program is keeping a particular watch on excess nutrients or eutrophication, which elsewhere causes algal blooms that use up all the oxygen, killing fish. The Bay, while high in nutrients, has so far escaped the downsides of eutrophication partly because suspended sediments are also high, blocking the light algae need to grow. But long-term monitoring by the US Geological Survey, done in partnership with the RMP, shows that suspended sediment is dropping and algae is rising. The water is likely to keep getting clearer because the excess sediment from rocks crushed during the Gold Rush may finally be washing away. "We have a window to figure out the best way to manage nutrients and hopefully head off eutrophication," Taberski says.

These days, the RMP also starts collecting data well before regulators need it. "We've become more and more forward looking," Davis says. "Just as a great hockey player plays to where the puck will be, we provide information managers will need five years down the road so they'll be able to make informed decisions when the time comes."

In anticipation of upcoming requirements for a regional approach to managing urban runoff, for example, the RMP recently began monitoring small tributaries that feed into the estuary. "There are more than 100 and we selected the best for modeling loads for the whole Bay Area," Davis says. "We're setting the stage for updating the municipal stormwater permit."

The RMP has come a long way since it was originally brokered between regulators and dischargers to track pollutants. Today, the Program is a leader in estuarine management, asking key questions about the Bay's health and initiating studies to answer them. The RMP's success has inspired others to follow suit. Says the Water Board's Mumley, "We're cited as a model effort that other parts of the state, country and world are now trying to emulate — and we've been doing this for 20 years."

Comments or questions regarding the RMP can be addressed to Dr. Jay Davis, RMP Lead Scientist, (510) 746-7368, jay@sfei.org

SAN FRANCISCO ESTUARY INSTITUTE
4911 Central Ave., Richmond, CA 94804
www.sfei.org

For a PDF, please go to www.sfei.org/rmp

CREATED: 10.17.13 • LINDA WANCZYK, lindaw@sfei.org