Marinas Interagency Coordinating Committee (MIACC) & Anti-Fouling Strategies Workgroup (AFSWG) –

Notes from June 17, 2020 Online Meeting

Hosted by the State Water Resources Control Board and California Coastal Commission

Note: The following meeting notes are paraphrased. The opinions expressed by Committee members, presenters, or any other participant who speaks or otherwise expresses an opinion at a meeting do not necessarily reflect the official policy or position of the State Water Resources Control Board, California Coastal Commission, or Marina Interagency Coordinating Committee and Antifouling Strategies Workgroup. Meetings of this Committee and Workgroup provide an open forum where all participants are invited to share their input and opinions with mutual respect for other participants.

1. Introductions and Announcements

Coordinators:

- **Michael Hanks**[1] **–** NPS Program, State Water Resources Control Board
- **Vanessa Metz**[2] **–** Coastal Water Quality Program, California Coastal Commission
- **Christopher Marquis**[3] **–** Coastal Water Quality Program, California Coastal Commission

Purpose:

- Participants introduce themselves and their affiliation.
- Updates and announcements from participants.

Participants:

- Colin Anderson American Chemet Corporation
- Shelly Anghera Moffatt & Nichol
- Tom Bischoff American Chemet Corporation
- Neal Blossom American Chemet Corporation
- Scott Bodensteiner Haley and Aldrich
- Joanne Brasch California Product Stewardship Council
- Aniela Burant California Department of Pesticide Regulation
- Shane Burkle City of Newport Beach
- Annabelle Burruss Environmental Protection, Port of San Diego

[1] Michael.Hanks@waterboards.ca.gov
[2] Vanessa.Metz@coastal.ca.gov
[3] Cristopher.Marquis@coastal.ca.gov

- Rhett Cash American Coatings Association
- Johnathan Dolan Ocean Standards Unit, State Water Resources Control Board
- Natasha Dunn San Francisco Estuary Partnership
- Rikki Erikson California Marine Sanctuary Foundation
- Bruce Fritz Alameda County Department of Environmental Health
- Dalai Gonzalez The Bay Foundation
- Mike Hanks State Water Resources Control Board
- Jim Haussener California Marine Affairs and Navigation Conference
- Ray Hiemstra Orange County Coastkeeper
- Karen Holman Port of San Diego
- John Kappeler City of Newport Beach
- Sue Keydel U.S. Environmental Protection Agency
- Sandy Lea Kop-Coat
- Huy Lee San Francisco Department of the Environment
- Chris Marquis California Coastal Commission
- Jeanie Mascia State Water Resources Control Board
- Vivian Matuk California Coastal Commission & California State Parks
- Vanessa Metz California Coastal Commission
- Jennifer Mongolo Los Angeles County Department of Beaches and Harbors
- Matt Peterson California Professional Divers Association
- Michael Quill Los Angeles Waterkeeper
- Shanna Rappaport Los Angeles Regional Water Quality Control Board
- Elizabeth Rouan City of East Palo Alto
- Barry Snyder Amec Earth & Environmental
- Kelly Tait Port of San Diego
- Maral Tashjian Los Angeles County Department of Beaches and Harbors
- Michael Tripp Los Angeles County Department of Beaches and Harbors
- Katherine Walsh Ocean Standards Unit, State Water Resources Control Board
- Dave Werneburg Ventura Harbor District
- Frank Winkleman Kop-Coat Marine Group, Pettit Paint

Participant Updates and Announcements:

- [Natasha Dunn (San Francisco Estuary Partnership)]: We jointly developed, with the Division of Boating and Waterways, a pumpout finding app called Pumpout Nav App. It is specifically for recreational boaters to find the nearest functioning pumpouts in the S.F. Bay/Delta area, as well as Monterey, and on the south coast from Santa Barbara to San Diego. We've added recent updates to the Pumpout Nav App, so please download the updated app. Email Vivian Matuk[4] if you have any questions.
- [Vivian Matuk (Division of Boating and Waterways)]: With the free app you can get information by geolocation on nearby pumpout dump stations and floating restrooms, and also videos and other information for boaters. It is the first in the nation, and has been so successful that other states and some Canadian provinces are joining this effort. Boaters can also use the app to report any issues they're having with the pumpouts, and the program will get an email and will follow up with the marine operator to make sure the issue gets resolved.
- [Joanne Brasch (California Product Stewardship Council)]: CPSC has current grants we've received for marine flare collection and education events. We're also applying for the next round of grants, including for marine flares disposal. If there are any jurisdictions that want to apply together for the next round of grants, email me (Joanne Brasch).[5] The deadline for applying is July 17. CPSC is a non-profit that works on waste issues, focusing on hard-to-manage products; marine flares have been one of our top priorities.
- [Rikki Erikson (California Marine Sanctuary Foundation)]: CMSC has funding available for marinas, harbors, bait and tackle shops, and ocean recreation businesses for signage that has information about clean and safe boating, wildlife disturbance, fishing gear disposal, and access to key information. This is at no cost to the recipients. If anyone has ideas for locations for signage, contact me (Rikki Erikson[6]). We're in the process of finalizing funding for signage projects in California now.

Action Items:

Notes, presentations, and materials from this meeting will be posted on the Coastal Commission's Marinas and Recreational Boating webpage,[7] under the heading '**Archive of Meeting Notes & Presentations**' – 2020, June.

2. Marine Flares Disposal: A Bay Area Pilot Project to Help Boaters

Speakers:

- **Vivian Matuk**[8] - CA State Parks and CA Coastal Commission

[4] Vivian.Matuk@coastal.ca.gov
[5] Joanne@CalPSC.org
[6] Rikki@CaliforniaMSF.org
[7] https://www.coastal.ca.gov/water-quality/marina-boating/

- **Huy Le**[9] – San Francisco Department of the Environment
- **Bruce Fritz**[10] – Alameda County Department of Environmental Health

Purpose:

Provide a presentation and discussion of the marine flare disposal pilot project.

Background:

Disposal of expired marine flares has long been a problem for recreational boaters. With flares expiring every 42 months, boaters have few disposal options and tend to accumulate old flares. Agencies that could collect flares for disposal are faced with very high costs and strict requirements to store or transport these explosives. San Francisco, San Mateo, and Alameda Counties sought a grant from CalRecycle to address the problem through pilot collection events in 2019. This presentation will describe the successful events held so far and discuss lessons learned. Some hopes for future collection events are offered, and your suggestions for conducting events are requested.

Materials:

- **Marine Expired Flares: A Bay Area Pilot Project to Help Boaters (PowerPoint).** Vivian Matuk (Calif. State Parks and Calif. Coastal Commission), Huy Le (San Francisco Dept. of the Environment), Bruce Fritz (Alameda Co. Dept. of Environmental Health), and Wesley Won (San Mateo Co. Environmental Health Services). (June 2020). Presented by Vivian Matuk.
- **Marine Flare Pilot Collection Events (PowerPoint).** Huy Le (San Francisco Dept. of the Environment), Bruce Fritz (Alameda Co. Dept. of Environmental Health), and Wesley Won (San Mateo Co. Environmental Health Services). (June 2020). Presented by Huy Le and Bruce Fritz.

Notes from Vivian Matuk's Presentation:

Vivian has been working on this issue for 10 years, and gave previous presentations on this issue to this committee. Marine flares are typically pyrotechnic devices that produce brilliant light or a plume of colorful smoke, as a distress signal. The two most common types are handheld flares and aerial flares (fired into the air). Not all boaters are required by the U.S. Coast Guard to carry marine flares; the number and type of flares required depends on the size and type of boat, and whether operating at night.

The average shelf life of marine pyrotechnic flares is 36 to 42 months. Expired marine flares are hazardous waste because they are toxic, reactive, and ignitable. U.S. EPA has recognized ingredients in marine flares as water pollutants of concern.

[8] Vivian.Matuk@coastal.ca.gov
[9] huy.le@sfgov.org
[10] bruce.fritz@acgov.org

Several years ago, Vivian heard that California didn't have a proper system to accept and treat expired marine flares. So she talked to experts, and formed an IACC sub-group called the California Expired Marine Flares Working Group, with the Dept. of Toxic Substance Control (DTSC), Cal Recycle, the San Francisco Certified Unified Program Agency (CUPA), the Coast Guard, and the Governor's Office of Emergency Services (OES), to research what to do with expired marine flares.

Their research indicated that Florida and some provinces in Canada ran mobile marine flare collection events, but stopped because they were very expensive. Only two household hazardous waste (HHW) facilities in California were accepting expired marine flares (Alameda and Santa Cruz counties, and sometimes San Francisco on an emergency basis). In California, there are no commercial treatment facilities for marine flares (there are only three in the nation). Flares need to be properly packaged and transported to a treatment facility by an approved hauler, and numerous permits are required.

The Work Group's research showed that California produces about 174,000 expired marine flares annually, and boaters often improperly stockpile or dispose of expired flares. One accomplishment is that Cal Recycle started a HHW grant program that offers counties funding to hold marine flare collection events. The Work Group and DTSC also wrote a White Paper on producer responsibilities. In response to the Work Group's conversations, a San Diego company (Sirius Signal) created the first-in-the-nation non-pyrotechnic flare, which is approved by the Coast Guard. These LED flares cost $80 - $90, can last 6 hours using C batteries, produce an SOS signal, and float. During collection events, counties are educating boaters on the use of LED flares instead of traditional flares. Collection events are expensive (about $20,000, not including staff time), and require lots of permits.

Notes from Huy Le's Presentation:

This presentation is on the marine flare pilot collection events held in the S.F. Bay Area last year. (Wesley Won did not join today's meeting, but participated in a previous presentation, so his name remains on the PowerPoint). Marine flares include smoke flares, which they accepted at their collection events. But marine flares should not be confused with road flares, which can be taken to the local HHW facility.

It is difficult and frustrating for boaters to figure out how to dispose of expired marine flares. The local Fire Dept., Bomb Squad, and Coast Guard Auxiliary do not take expired marine flares. Prior to these events, no one knew what boaters were doing with their expired flares. As part of the events, boaters were asked to complete a survey, including describing what they've been doing with the expired flares.

These are the first counties in California to hold these events while following all of the rules and regulations. A host of regulations make it difficult to store, transport, and dispose of marine flares, and a number of permits and approvals are required to hold a collection event. Since marine flares are both household hazardous waste and explosives, they have to be

transported directly to an approved treatment storage disposal facility (TSDF), and there are only two of these in the nation that accept marine flares (they used the TSDF in Louisiana).

Costs for holding an event are high, including packing, transporting, and disposal of flares, as well as staff time; it can cost $30,000 or more per event. In the Bay Area, Alameda County, San Mateo County, and the City & County of San Francisco received funding for collection events from CalRecycle HHW Grants. The East Marina Triangle was chosen for the San Francisco event in April 2019. Alameda County chose the Alameda County HHW collection facility for their two events in May and Nov. 2019. San Mateo County held their event at two sites in Nov. 2019, at Pillar Point Harbor and Oyster Point Marina.

Notes from Bruce Fritz's Presentation:

The pilot collection event results had very good attendance for the San Francisco event, but Alameda County had less attendance than expected for their first event (which was held during Memorial Day weekend). In November, Alameda and San Mateo counties held events on consecutive days, as proof of concept that they could save money by doing multiple flare pick-ups by the vendor in one day.

A survey of participants asked how many flares they carry on their boat at one time. Most participants had over 10 flares, and kept them for a long time. Boaters may have brought in flares from multiple people and boats to the event, although state law requires the generator of hazardous waste to bring in their own waste. The survey also asked what boaters did with their expired flares prior to this event. Most participants kept expired flares as a backup on their boat, but there can be dangerous failures when shooting off old flares.

Contractor costs for these events were high, from $8,000 per event up to about $30,000 for a series of events over a weekend. In total they collected 5,901 flares, but it cost $13 per flare collected. Lessons learned from the pilot event series include that it was hard to get participation; timing and outreach were critical. Choosing a site was difficult. Reducing costs by holding regional multi-collection events worked well. A budget for outreach is needed. Finding help with outreach is critical; Vivian Matuk was an incredible help with outreach for these events through her network.

Next steps may include switching to LED flares. Flare manufacturers and distributors may be agreeable to help out with outreach or in other ways. The California Product Stewardship Council[11] has taken steps towards a product stewardship initiative for marine flares. If any stakeholders want to get involved, get in touch with the Product Stewardship Council.

The organizers of these pilot events (Huy Le, Wesley Won, and Bruce Fritz) want to support and encourage other jurisdictions to hold similar events. They set up a special permit with the Dept. of Transportation (DOT) for packing and transporting all kinds of flares in various stages of decay. Having a continuing series of events using this permit will help keep the

[11] https://www.calpsc.org/

permit active, and hopefully convince the DOT to make this a permanent allowance. Also, if events are continued to be held, vendors may compete and get better at providing the services. CalRecycle is currently offering grant funding for these events. The organizers are happy to share documents and what they've learned with anyone setting up an event.

Discussion:

- [Joanne Brasch (Product Stewardship Council)]: In the outreach for the events, did you focus on disposal messages, or did you include the LED and reusable options?
  - [Vivian Matuk (Division of Boating and Waterways)]: We used both angles. We have a great partnership with boating facilities, marinas, yacht clubs, and recreational boaters. The flyer or announcement referenced the issues related to flares. My program partnered with West Marine supply store to offer discount coupons for boaters to transition to LED flares.
- [Vivian Matuk (Division of Boating and Waterways)]: When we advertise these events, we get questions from other jurisdictions and boaters across the state asking why we don't hold the events in their area, especially in southern California boating hubs. We tell them to put pressure on county jurisdictions, as they're the ones that apply for the grants. CalRecycle has a lot of grant funds waiting to be used, so we need to make sure counties apply. So please promote these grants among your jurisdictions. If you apply for the grant and need any help, contact me (Vivian Matuk).[12]
  - [Bruce Fritz (Alameda Co. Dept. of Environmental Health)]: Running a collection event is a HHW event. HHW programs are run by counties, and generally will not accept waste from outside of their jurisdiction, because the program is funded by the county.
- [Huy Le (San Francisco Dept. of the Environment)]: I've put together a marine flare collection event toolkit that provides all the info you need. If you're interested, contact me (Huy Le)[13] and I will send you the pamphlet.
  - [Mike Hanks (State Water Resources Control Board)]: If you send me that, I will send it out to the group so everyone has access to it.
- [Jim Haussener (California Marine Affairs and Navigation Conference)]: Boat owners pay property tax for a boat in a marina, so even if I don't live in Alameda County, my boat's in that county, do I get a break that way?
  - [Bruce Fritz (Alameda Co. Dept. of Environmental Health)]: During outreach for all the events, this question was answered. For Alameda County, residents of the county or people who berthed their boat in the county are eligible to drop their flares off.
- [Jim Haussener (California Marine Affairs and Navigation Conference)]: What does the Coast Guard or U.S. Maritime Administration do with their flares? They must go through a lot of flares; is there any way to package with them for shipping flares?

[12] Vivian.Matuk@coastal.ca.gov
[13] huy.le@sfgov.org

- [Bruce Fritz (Alameda Co. Dept. of Environmental Health)]: There is a big difference between a commercial generator of flares (military, cruise liner, or fishing boat) and the public. We address the public, and their unique issues. A member of the public doesn't generate enough flares to make it economically feasible to get rid of. A commercial entity typically uses just one type of flares, and it's much easier for them to contract with a commercial hazardous waste hauler to arrange for packaging and disposal. Our program is set up to accept flares just from recreational boaters.
- [Jim Haussener (California Marine Affairs and Navigation Conference)]: Is it possible to collaborate with the U.S. Coast Guard in Alameda when they dispose of their flares? Can we piggy-back with them when they're doing a flare disposal event?
- [Bruce Fritz (Alameda Co. Dept. of Environmental Health)]: Hazardous waste vendors don't have motivation to do this. Coordinating transportation with other jurisdictions could work, as transportation was the highest cost of the collection events.
- [Jim Haussener (California Marine Affairs and Navigation Conference)]: To clarify, it is possible, but it is up to the local jurisdiction to connect with the Coast Guard to piggy-back with them and save on transportation costs.
- [Bruce Fritz (Alameda Co. Dept. of Environmental Health)]: Yes.
- [Vivian Matuk (Division of Boating and Waterways)]: I've received many calls from active coast guard members about what to do with marine flares as individuals. But I don't know what they do as a federal agency with their flares. We approached the fireworks industry to ask if they can absorb marine flares, and they said no, as they haven't produced them. We discussed producer responsibility, and Orion was open to adding an electronic fee to the purchase price for proper disposal. Two years ago, Vermont passed a law that they would collect flares, but they didn't know it requires special permits and approved waste hauler. California is leading the way on this.

3. 2019 Review of the California Ocean Plan

Speaker:

- **Katherine Walsh**[14] **–** Ocean Standards Unit Chief, State Water Resources Control Board

Purpose:

Share issues identified in the 2019 Review of the Water Quality Control Plan for Ocean Waters of California (Ocean Plan).

Background:

The State Water Resources Control Board (State Water Board) adopted the 2019 Review of the Ocean Plan (Review) on December 3, 2020. The Review was conducted by State Water

[14] Katherine.Walsh@waterboards.ca.gov

Board staff in coordination with the coastal water boards and with input gathered from four public meetings held earlier this year. Using this input, staff prepared the draft report and related work plan that lists and ranks 22 issues as potential future projects. The five highest-ranked issues in the Review are: Tribal Beneficial Uses, Bacteria Objectives for Water Contact Recreation, Areas of Special Biological Significance General Exception, Desalination Implementation Provisions, and Ocean Acidification, Hypoxia, and Climate Change Impacts. See the Final Staff Report and Work Plan for the 2019 Review[15] for more information.

Materials:

- **2019 Ocean Plan Review. (PowerPoint).** Katherine Walsh, Ocean Standards Unit, State Water Resources Control Board. (June 2020).

Presentation Notes:

The Ocean Plan was adopted in 1972, and most recently amended in February 2019 to add the Bacteria Provisions Amendment. The Ocean Plan identifies beneficial uses for ocean waters of California, establishes water quality objectives to protect these beneficial uses, and sets forth programs of implementation that describe the actions necessary to achieve the beneficial uses. The Ocean Plan was last reviewed in 2011, identifying 26 issues for improvement, of which six issues were ranked very high, and 10 were ranked high. Since 2011, the State Water Board has addressed seven high and very high ranking issues, and adopted the following amendments:

- State Water Quality Protected Areas and Marine Protected Areas Amendment (2012)
- Model Monitoring, Vessel Discharge, and Non-substantive Changes Amendment (2012)
- Trash Provisions Amendment (2015)
- Desalination Amendment (2015)
- Bacteria Objectives Amendment (2018)
- Wetland Definition and Procedures for Discharge of Dredge or Fill Materials (2019)

Triannual reviews of the Ocean Plan are required by the Clean Water Act and California Water Code. The purpose of the reviews is to identify, evaluate, and rank issues to ensure the continued adequacy of the Ocean Plan, as well as allow input from stakeholders and other state agencies. The 2019 Ocean Plan review resulted in a Staff Report and Work Plan. The State Water Board adopted the review in December 2019, and submitted the review to the U.S. Environmental Protection Agency (EPA) for approval. In the 2019 review, 22 issues were identified, with 4 ranked very high, 8 ranked high, and 10 ranked medium or low. Of these 22 issues, only the highest ranking issues will be the focus of the staff in this three-year period. Evaluation criteria were assessed for each issue, divided into two groups of criteria. Group 1 criteria evaluate the value or impact of addressing an issue, including the potential to improve water quality consistent with the Water Board's mission, providing

[15] https://www.waterboards.ca.gov/water_issues/programs/ocean/

improved customer service, and aligning statewide needs among the Regional Water Boards. Group 2 criteria evaluate the potential for success, including resources already invested, resources likely available, and potential for completion.

Tribal beneficial uses, shellfish harvesting beneficial uses, and water quality objectives are all likely to be selected for focus within the next five years. Tribal beneficial uses are likely be selected first, because the Water Board already developed the definitions for tribal beneficial uses in the Inland Surface Waters Plan. The toxicity water quality objectives within the Ocean Plan will be amended once the Inland Surface Waters Plan has been developed. Ocean Acidification, Hypoxia, and Climate Change impacts may be picked up as a regulatory amendment, but not likely within this three-year period. Ocean Standards Unit staff has begun collaborating with other agencies to address microplastics and microfibers.

Discussion:

- [Shanna Rappaport (Los Angeles Regional Water Quality Control Board)]: Can you explain the Areas of Special Biological Significance exception?
  - [Katherine Walsh (Ocean Standards Unit, State Water Resources Control Board)]: The Ocean Plan has a prohibition of discharges into Areas of Special Biological Significance (ASBSs). The state's 34 ASBSs are a type of Marine Managed Areas that the Water Board manages. The Ocean Plan allows exceptions to the prohibition of discharge if there is significant benefit, and if there's not an alteration of natural water quality. In 2012, the State Water Board adopted a general exception for stormwater and nonpoint source discharges into ASBSs from 24 coastal communities or agencies (e.g., the City of Trinidad, and the Navy Base on San Nicholas Island). It allows these areas to continue discharging into these protected areas, but requires monitoring and installation of Best Management Practices to protect the natural water quality. The reason why this is listed in the Triennial Review is that there were some issues with implementing the general exception. Because of the drought in 2012 to 2014, many of the participants in the general exception were not able to complete the required monitoring. So we need to look at the general exception to see if we need to make any modifications to it, or require more from those agencies.
- [Mike Hanks (State Water Resources Control Board)]: Can you talk about why Vessel Discharges and invasive species are ranked so low?
  - [Katherine Walsh]: The ranking is not due to overall importance. For invasive species, there is not enough information to make a specific regulatory amendment, and it's not clear that the Water Board has authority to implement this amendment. For vessel discharges, the Ocean Standards Unit is looking to see what changes will need to be made to the Ocean Plan after U.S. EPA establishes standards for vessel discharges.
- [Mike Hanks]: Do you have any idea what implementation actions will be able to be accomplished within the next three years?

- [Katherine Walsh]: Tribal beneficial uses will most likely be able to be completed within the next three years, as the Inland Surface Water Plan has already developed definitions for tribal beneficial uses, and it would only take modifications to these definitions to adapt them to the Ocean Plan. Other issues like ocean acidification, hypoxia, and climate change would require substantial more work and staff time, which would likely take between 5 to 8 years to complete. Shellfish harvesting beneficial uses and ocean acidification are likely to be worked on within this three year period. Ocean acidification will have dedicated staff, and will likely begin stakeholder outreach. As for shellfish harvesting, the Ocean Standards Unit will likely start with stakeholder engagement, but it will not likely be taken to the Board for adoption within the next three years. The staff report did identify how much staff time and approximately how many years will be needed to address each of the identified issues.

➢ [Sue Keydel (U.S. EPA)]: Did you assess which of these issues have work being done by ocean and coastal partners (e.g.; San Francisco Estuary Institute, and Southern California Coastal Water Research Project)?

- [Katherine Walsh]: Yes, part of the second group criteria, resources already invested and resources likely available, looked at this. For ocean acidification, SCCWRP and other agencies have begun modeling to identify hot spots and likely causes of ocean acidification, which may be used to support a regulatory amendment.

4. Monitoring of Dissolved Copper in California Coastal Waterbodies

Speaker:

- **Aniela Burant**[16] **–** Surface Water Protection Program, Calif. Dept. of Pesticide Regulation

Purpose:

Provide information on the first year of sampling of CDPR's new long-term marine waterbody monitoring project.

Background:

Dissolved copper is a water quality concern due to its toxicity to non-target organisms. Dissolved copper is often measured at levels above toxicity thresholds in California coastal marinas. In response, CDPR promulgated a leach rate cap regulation on copper antifouling paints to reduce copper concentrations in California marinas.

[16] Aniela.Burant@cdpr.ca.gov

Materials:

- **Monitoring of Dissolved Copper in California Coastal Waterbodies. (PowerPoint)**. Aniela Burant, California Department of Pesticide Regulation. (June 2020).

Presentation Notes:

Copper is one of the most commonly used biocides in antifouling paint, and can be toxic to target and non-target organisms. In California, species of concern are Blue and Mediterranean Mussels. Throughout the state, many recreational marinas have high concentrations of dissolved copper, attributed to large concentrations of boats spending long periods of time in marinas, as well as the design of marinas to protect boats from hydro-dynamic actions (which leads to poor flushing of marinas). The California Toxics Rule has enforceable water quality standards imposed by the State and Regional Water Boards, and identifies acute and chronic water quality criteria for dissolved copper. The listing of many California marinas on the 303(d)-list of impaired waterbodies led the California Department of Pesticide Regulation (CDPR) to monitor marinas for dissolved copper, and to examine the copper leach rate from antifouling paint used on recreational vessels. Toxicant identification evaluation tests indicated that dissolved copper was likely the cause of toxicity in marinas.

Assembly Bill 425 tasked the CDPR with determining a leach rate cap for dissolved copper from antifouling paint, as well as making mitigation recommendations for antifouling paint. The Marine Antifoulant Model was developed to predict environmental concentrations of dissolved copper in marinas, and set the chronic criterion for dissolved copper based on the California Toxics Rule. For recreational boats in California, the leach rate cap was set in July 2018 at 9.5 $\mu g/cm^2$/day, and any registered paint above that leach rate was canceled.

In 2019, the CDPR started a long-term monitoring study that included these objectives:

- Determine the concentration of dissolved copper in selected, representative waterbodies.
- Determine the temporal and spatial trends of dissolved copper across and within waterbodies.
- Determine the potential toxicity of samples based on measured water chemistry parameters, using the saltwater biotic ligand model.

The study emphasized marinas in southern California, as higher water temperatures in the south can lead to more biofouling, and thus more frequent hull cleaning, and sometimes more abrasive cleaning methods. San Francisco Bay has site-specific objectives for local water quality that are higher than the California Toxics Rule requires for marinas throughout southern California. The size of the marinas was an important aspect of the study, which emphasized larger marinas with high numbers of boats; however, the study included medium and small sized marinas as well. The study included Coyote Point Marina in San Mateo County (with less than 1,000 vessels); Berkeley, Santa Barbra, and Redondo Beach Marinas (with less than 2,000 vessels); and Channel Islands Harbor, Marina Del Rey, Newport Bay,

and Shelter Island Yacht Basin (with more than 2,000 vessels). The most important aspect of the study was the cooperation of the Marinas' owners, operators, and managers.

The number of samples collected within each marina depended on the size of the waterbody. A standardized sampling process was used that included in-line filtering. A local reference site was also sampled, to determine the background concentration of copper; Marina Del Rey and Newport Bay had two local reference sites each. Secondary constituents tested included pH, salinity, and water temperature at time of sampling, as well as dissolved organic carbon for some of the marinas.

There was a 100% detection frequency of copper in all waterbodies sampled, and all marinas had higher copper concentrations than their local reference sites. The study found that 79% of marinas exceeded the chronic copper criterion, and 52% of marinas exceeded the acute copper criterion. LASSO regression modeling was used to determine a best-fit model for dissolved copper concentrations. The model included 18 explanatory variables, 7 of which were found to be significant. Noteworthy regional trends include latitude, yearly average temperature, and temperature at time of sampling. The model indicated a negative correlation of latitude to dissolved copper, whereas yearly average water temperature and temperature at time of sampling both had a positive correlation to dissolved copper. As for noteworthy spatial trends, the further the mouth of the marina was to the sampling site, the greater the concentration of dissolved copper was found. The depth of the harbor was also a significant variable for spatial trends, as there was a positive correlation between the depth of the harbor and the concentration of dissolved copper. For waterbody characteristics, a negative correlation was found between the surface area of the marina and dissolved copper concentration. Also, the larger the marina, the lower the concentration of dissolved copper was found. Newport Bay, the largest marina sampled, is 3.3 times larger than Marina Del Rey, the next largest of the marinas sampled.

Biotic Ligand Modeling of dissolved organic carbon was conducted at four marinas: Coyote Point, Berkeley Marina, Marina Del Rey, and Newport Bay. Temperature, pH, and salinity were measured in-situ. A model was used to try to predict toxicity, but only samples from Marina Del Rey were able to correctly predict toxicity.

One limitation of the study is that no distinction was found between spikes in passive copper leaching due to hull cleaning. Vertical concentration gradients and tidal influence are additional variables that will be investigated in the near future, because dissolved copper concentrations were found to be heterogeneous throughout the water column, and tidal flushing affects dissolved copper concentrations.

Discussion:

- [John Kappeler (City of Newport Beach)]: For the California Toxics Rule chronic criterion of 3.1, we back-calculated that a 9.5 leach rate should get us there. What about the commercial vessels in the marina that are not subject to the 9.5 $\mu g/cm^2$/day rate set for the residential boat paint?

- [Aniela Burant (California Department of Pesticide Regulation)]: Newport Bay is a special area, it was the largest waterbody included in this study, and it's not just a marina, it's a collection of marinas, open water, and mooring areas. Since Newport Bay has many more commercial vessels than the other areas sampled, a separate study and modeling would be needed to determine the leach rate needed to meet the criterion. When this model was started, the assumption was that no commercial vessels were part of the model.

- [Matt Peterson (California Professional Divers Association)]: Since the data you provided was collected in 2019, are we expecting decreased chronic and acute copper levels as new vessels are painted with reformulated paint? Do we expect these numbers to drop even further as more boats are repainted as needed? I would assume that most boats are not yet using the reformulated paint, since most boats haven't needed to be re-painted since 2018.
  - [Aniela Burant]: Yes, we do expect these numbers to go down as more boats are painted with approved reformulated paint. The 9.5 $\mu g/cm^2$/day also assumes a standard of cleaning using Best Management Practices (BMPs), using a soft carpet to clean the vessel as well as a once-per-month cleaning frequency. Using a less abrasive method and less frequent cleaning frequency will reduce the level of copper in these waterbodies. There are some other mitigation recommendations we released in 2018, including switching to alternative paints and boater education.
- [Vanessa Metz (California Coastal Commission)]: Did you see any indications of increased copper concentrations near treated wood docks, especially recently installed docks using a copper-based wood preservative for the treated wood?
  - [Aniela Burant]: We made notations if there were commercial vessels close by, if there are BMP cleaning programs in the marina, if there was an alternative paints program close by, and if there are hull cleaners nearby. Treated wood was not one of the factors we looked at; we tried to sample in the middle of fairways if we could, not close to the docks. I cannot really say whether or not that would have had an influence in the study, but that's not something that we took into consideration because we were most concerned with the vessels. We had a standardized sampling process, two meters away from the vessel and one meter down, so that there was no interference with the sampling vessel. With this standardized sampling process we knew that most of the samples were taken about the same distance from the vessel.
- [Vivian Matuk (Division of Boating and Waterways)]: Did you take into consideration any nearby storm drains? I was thinking about the copper issues with car brakes.
  - [Aniela Burant]: We did not indicate that in our study, but for most of our sites I would not say that would be an issue. Though in Newport Bay we took one sample from a site intentionally near San Diego Creek, to see if there could be an influence from copper coming from the creek. The reference site there was lower than 3.1 parts per billion. We intentionally did our sampling in the summer, so there wouldn't be storm

runoff contributing copper to these marinas and waterbodies. We assumed that if we sampled in the summer there would be lower concentrations of copper coming from these storm drains.

- [Shelly Anghera (Moffatt & Nichol)]: When you did your analysis of variance to understand the factors that control the copper distribution, one thing that was surprising was depth. My thought is, a deeper harbor would be more mixed and copper concentrations would be more diluted. But you said that with depth there was a greater concentration of dissolved copper. Since the Santa Barbra Harbor is the deepest harbor, I was wondering if that one harbor alone could be driving that observation.
  - [Aniela Burant]: I think other marinas had similar depths as Santa Barbara, I would have to go back and look at the data. With that standardized sampling process, going one meter down, surface area times depth is volume, something that we did consider would be volume. We are not exactly sure why water depth was significant here, but we think it has to do with size of the marina. As we continue to monitor and re-run the modeling that might change, we need more data to know why depth is a factor.
  - [Shelly Anghera]: When you did that surface area times depth to get volume, did you include number of boats to get some sort of scale?
  - [Aniela Burant]: The model did not include number of vessels as a significant variable. For any variables with high collinearity, the model does not select the variables that are highly correlated to each other. Looking at this data, you can see that number of vessels does have a role in the model, and as we collect more data and run the regression model this will be updated.
- [Vanessa Metz]: Did you do any sampling of the sediment in the bottom of the harbors for accumulated copper?
  - [Aniela Burant]: No, we did not, that is another thing we could include in future investigations. We only focused on dissolved copper in the water column because that's what our regulation and previous modeling focused on.
- [Kelly Tait (Port of San Diego)]: Two questions: We heard anecdotally from hull cleaners that the new category 1 paints require more habitual cleanings than previous copper paints; have you heard anything like that from other parts of California? And how often are paints reformulated, going through the DPR process?
  - [Aniela Burant]: For the paints being reformulated, it depends. We have to verify the traits of these paints for a number of reasons. If they add another color that could change the density of the paint, and that is something that could change the input in our calculation. If the paint company changes the name we will verify that. If they add another ingredient that is something we will have to take a look at. You can always reference the CDPR label database, when you find the data for these paints it will give you a date the paint was registered. By looking at the dates you can see how often these paints get reformulated.

- [Kelly Tait]: Did everything get reformulated since 2018?
- [Aniela Burant]: No, not all the paints were reformulated. We are still getting submissions to verify leach rates. Many of the companies took them off the market. The ones that did not need to be reformulated might not have needed to be updated. As for the anecdotal comment about hull cleaning, I think this would be a great venue for other people to answer this question and see if they know in their marinas if hull cleanings are being required more frequent because of the paint requirement. But I haven't heard anything about that.

- [Matt Peterson (California Professional Divers Association)]: I find just the opposite, as a professional I find that two different category 1 paints are used for antifouling products, and it's the other products I find to be less effective. More frequent gentle cleaning will keep the paint on the bottom of the boat longer, and the longer you wait between cleaning, the more aggressive the cleaning has to be.

5. Meeting Wrap-Up

Coordinator:

- **Michael Hanks** – NPS Program, State Water Resources Control Board

Purpose:

- Any additional announcements.
- Summarizing action items discussed during the meeting.
- Soliciting ideas for future topics and meeting locations for the Fall/Winter 2020 MIACC meeting.

~ End ~

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