City of Santa Barbara
Parks and Recreation Department

Memorandum

DATE: June 15, 2022

TO: Creeks Restoration/Water Quality Improvement Program
Citizen Advisory Committee

FROM: Jill Murray, Water Quality Research Coordinator

SUBJECT: **WATER QUALITY RESEARCH AND MONITORING PROGRAM UPDATE AND PROPOSED FISCAL YEAR 2023 RESEARCH AND MONITORING PLAN**

COMMITTEE DIRECTION – FOR ACTION

That the Committee receive an update on the Water Quality Research and Monitoring Program and concur with the staff recommendation to implement the proposed Research and Monitoring Plan for Fiscal Year 2023 (FY 23).

DISCUSSION

Background

Creeks staff have monitored water quality in local water bodies since the Division was formed in 2001, and in 2004 a focus on research was added to form the Water Quality Research & Monitoring Program. Every year the research and monitoring plan is revised to answer new questions and focus on relevant issue areas, with relatively minor changes year to year.

In FY 22, with the 20 year anniversary of the Creeks Division, staff felt it was appropriate to re-evaluate the goals and focus areas of the program. Based on lessons learned, new opportunities, and environmental challenges, the Creeks Division seeks to evaluate the current program and develop a contemporary, updated plan that looks toward the next twenty years. As storm water management and science have matured, areas of inquiry have shifted to the roles of infiltration and source reduction. In addition, the impacts of climate change and sea level rise on creeks and shallow groundwater require new lines of inquiry, with interdisciplinary and contemporary approaches. Recent developments have made automated equipment, analytical methods, data management, and computing far more affordable and dependable than in the past and these methods should be employed where they can help answer questions. The Creeks

Advisory Committee approved this direction in June 2022. The FY 23 Research Plan will continue the line of work that was started in FY 22.

Fiscal Year 2023 Research and Monitoring Plan

The following are the goals and focus areas for FY 23.

The purpose of the monitoring program is to obtain information that can be used to:

1. Develop strategies for water quality improvement, including evaluation and prioritization of projects and programs.
2. Understand changes over time in surface water quality.
3. Communicate effectively with the public about water quality.
4. Understand the role of climate change and sea level rise in altering creek conditions.

The goals of the monitoring program are to:

1. Assess the impacts of chemical and microbial pollutants:
    a. Identify suspected pollutants of concern, including traditional pollutants such metals, organics, nutrients, fecal indicator bacteria, trash, and sediment, and emerging contaminants such as personal care products, newer pesticides, microplastics, per- and polyfluoroalkyl substance, and pathogens; and evaluate laboratories for testing opportunities. Include field properties such dissolved oxygen, pH, temperature, conductivity, and chlorophyll a.
    b. Quantify the levels (concentration, flux, and/or load) of microbial contamination and chemical pollution in watersheds.
    c. Evaluate impacts of pollution on beneficial uses of creeks and beaches, including recreation and habitat for aquatic organisms.
        i. Compare pollutant levels to known toxicity thresholds.
        ii. Use toxicity testing and bioassessment to assess impacts.
    d. Identify sources of pollutants to creeks and storm drains, including interactions with groundwater and infrastructure.
2. Evaluate the effectiveness of the Creeks Division projects on improving water quality, which includes collecting baseline data for future projects.
3. Implement hydrologic models of creeks in order to predict alterations in flow due to climate change.
4. Evaluate the role of infiltration and groundwater movement on creek water quality and quantity, including the intersection with sea level rise.
5. Where feasible, evaluate the effectiveness of City programs such as street sweeping and outreach in reducing pollutants.
6. Evaluate long-term trends in water quality and quantity.
7. Meet monitoring requirements for grants.
8. Meet General Permit monitoring requirements.
9. Investigate 303(d)-listed waterbody impairments.

10. Employ contemporary tools to conduct advanced research and monitoring with rigorous quality standards and data management methods.

In FY 23, the Research Plan will focus on four main efforts. The Research Plan follows very closely the FY 22 Plan, as all efforts are ongoing. First, required long-term and project sampling will be conducted. Second, source tracking in the Laguna Watershed will be conducted in order to further identify sources of dry and weather contamination in Laguna Channel. Third, the Creeks Division will continue to expand automated monitoring of creek water quality and quantity. An addition to the FY 23 Research Plan is a risk assessment of beach swimming that will be conducted by UCSB.

FY 23 Monitoring Efforts

During FY 2023, the Creeks Division will continue sampling required by the City's NPDES General Permit, including outfall testing, 303(d) sampling (biweekly indicator bacteria sampling at several locations), and Special Studies sampling, which requires calculations of load reduction based on rainfall rates. Dry-weather monitoring at long-term monitoring sites will also be conducted. Project assessment monitoring will include sampling at the Bird Refuge, Arroyo Burro Open Space, Barger Canyon, and the City's bioretention planters. As in prior years, contracts will be awarded to Ecology Consultants, Inc. for bioassessment monitoring and Dr. Holden (UCSB) for annual microbial source tracking.

Laguna Watershed Source Tracking

Results from dry weather microbial sampling conducted by UCSB and wet-weather chemical sampling conducted by the Creeks Division detect a signal suggestive of potential contamination in Laguna Channel, which discharges into Mission Lagoon and East Beach at Mission Creek. The Creeks Division will review FY 22 results and develop and fund a project to sample in select locations in order to further investigate the findings.

Automated Water Quality/Quantity and Field Sampling Equipment

Over the past several years the Creeks Division has employed automated sensors and loggers for dissolved oxygen and water level in several creek locations and project sites. Additional multi-parameter sondes which record temperature, pH, conductivity and more recently chlorophyll, were deployed at Bird Refuge locations. Creeks staff have gained knowledge of the immense benefits automated loggers provide, including a far more complete picture of water quality over time compared to spot measurements and the ability to compare multiple locations across the same time period. However, obstacles and challenges have also been identified, such as the need to service the equipment regularly and manage big data, which includes prompt retrieval, data cleaning, calibration corrections, identification of sensor failure, and data storage, visualization, and statistical analysis. In FY 22, existing automated equipment was upgraded. In order to meet the goals of the Research Plan, the Creeks Division seeks to

conduct additional research, purchase, and install permanent level and data loggers at several creek and estuary locations. These sites will also be outfitted with equipment to facilitate frequent deployment of auto samplers. In FY 23 a purchase and installation plan will be developed, to be funded in FY 24. This effort will align with needs of the Sea Level Rise Adaptation Shoreline Monitoring Program.

Beach Swimming Risk Assessment

Many years of water quality research conducted by UCSB have focused on finding sources of human waste entering storm drains, creeks, and beaches in Santa Barbara. Recent work has found mostly low, or undetected, levels of human waste markers and infrequent detections of human pathogens in the environment. In addition, recent scientific advances have identified seagull waste as potentially harboring bacteria that can cause infections in swimmers. Unknown to the Creeks Division is the expected risk to swimmers represented by these findings. A study by UCSB will perform a quantitative microbial risk assessment study to answer this question.

Budget

Sufficient funds exist in the Creeks Budget for the proposed sampling and equipment.

Timeline

Staff will begin implementing the FY 23 Research and Monitoring Plan and perform scheduled monitoring beginning July 2022. The FY 22 Annual Report will also be completed and presented to the Committee in December 2022. Equipment purchase, installation, and development of a data management plan will take place in 2023.

cc: Cameron Benson, Creeks Division Manager
Jill E. Zachary, Parks and Recreation Director