SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT AUTHORITY

REQUEST FOR PROPOSALS

ON-CALL FIELD SAMPLING AND LABORATORY ANALYSES SERVICES

ADDENDUM- December 23, 2022

Changes to RFP:

1. Added work element 2.3.5. Microplastics Laboratory Analysis (pages 29-30)
2. Added microplastics to target analytes (Table 1, page 42)
3. Added Table 10. Microplastics target size detection limit and number of subsamples for spectroscopy (page 52)
4. Added bid table for microplastics (page 66)

- Bidders are noticed that an additional non-mandatory bidders meeting will be held on January 9, 2023, at 1:00 PM at SCCWRP's offices in Costa Mesa, CA. This meeting is specifically to address questions regarding the added microplastics work element. Bidders may also participate virtually via Zoom: https://us02web.zoom.us/meeting/register/tZUtd-uoqjwuGdG9zG_Ru_O13J0ftNNLjpeL

- The deadline for bidders to inform SCCWRP via email (bightrfp@sccwrp.org) or letter mail of their intention to submit a bid on the microplastics work element is extended to January 6, 2023. As with other work elements, the notification is not mandatory but is necessary to receive future updates to this bid notification.

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REQUEST FOR PROPOSALS

ON-CALL FIELD SAMPLING AND LABORATORY ANALYSES SERVICES

SECTION 1. INSTRUCTIONS TO BIDDERS

Five (5) copies of the bidder's complete proposal to provide the services detailed are to be enclosed in a sealed envelope marked "Field Sampling and Laboratory Analyses" and addressed to:

Bryan Nece, Administrative Officer
Southern California Coastal Water Research Project (SCCWRP)
3535 Harbor Blvd., Suite 110
Costa Mesa, CA 92626

All supplemental materials requested within this proposal must be attached to the Proposal. Any unauthorized conditions, limitations, or provisions attached to this proposal may be cause for rejection.

If a bidder wishes to withdraw its Proposal, the Bidder may do so without prejudice by delivery of written notice of withdrawal to the Administrative Officer at any time before the time fixed for the opening of bids.

Sealed bids must be received by 11:00 AM on January 20, 2023, at which time, the Office Manager will open the bids. Bids received by facsimile or email will not be accepted.

All bidders should inform SCCWRP via email (bightrfp@sccwrp.org) or letter mail by December 23, 2022 of their intention to submit a bid. The notification is not mandatory, but is necessary to receive future updates to this bid notification. SCCWRP will hold a non-mandatory bidders' meeting at 11:00 AM on January 4, 2023 at SCCWRP's Offices in Costa Mesa. Bidder's may also participate in this meeting virtually by registering for the meeting:

https://us02web.zoom.us/meeting/register/tZUtdOmoqzosGNUptZBWo0V9OmfFZpbskLjZ

This meeting is intended to provide bidders the opportunity to ask questions and request clarifications about this document. Bidders who are unable to attend may provide written requests for clarification prior to the meeting. SCCWRP's response to both written and oral questions will be sent to the bidders by email and posted on the SCCWRP web site (www.sccwrp.org).

This solicitation for proposals shall not be construed as obligating SCCWRP to award a contract or to pay any compensation for the information solicited.

CONTENTS

SECTION 2. SCOPE OF WORK

Southern California Coastal Water Research Project (SCCWRP), a public agency for environmental research, requires support services for field sampling and laboratory analyses. These services will be required on an "as needed" basis, so this RFP is structured on a unit cost, task-order basis. At present, the number and locations of sampling stations, as well as the number of samples for laboratory analyses, have not yet been determined. Bidders are asked to provide pricing for each applicable element within this Scope of Work. At the bidder's discretion, bidders may provide one price or specify price breaks at different possible levels of effort as determined by the bidders, indicating the appropriate price differences for different levels of work (e.g., cost per sampling site or sample analysis for 10-25, 26-50, 51-100, or 100-250 sites/samples). For field activities, if bid prices will differ due to geographic factors (i.e., by region) or depth factors (e.g., 3-200 m, 200-500 m, or 500-1000 m), indicate separate pricing for each region or depth. If bid prices will differ for habitat (e.g., ocean vs. estuaries) or geographic factors (e.g., northern vs. southern California Bight), indicate separate pricing for each. The bidder is asked to supply prices for the 2023/24 fiscal year. The successful bidder will be offered the opportunity to revise their price quotes to incorporate a mutually agreeable adjustment for inflation or conditions in subsequent fiscal years. The actual number of sampling sites and samples for analysis will be awarded to the successful bidder(s) on a task order basis following execution of contract(s).

Section 2 of this Proposal Form provides a summary of the methods to be used for each element of work. SCCWRP requires the highest quality work from its contractors and expects them to produce samples and laboratory results that are consistent with, and comparable to, SCCWRP's partner agencies. As a result, SCCWRP mandates that each bidder maintains the standards and procedures outlined by the Southern California Bight regional monitoring survey (hereafter referred to as "Bight Survey"). The work elements in this RFP will be similar to those described in the field methods manuals, quality assurance manuals, and laboratory manuals used in past Bight Surveys, which can be found at https://www.sccwrp.org/about/research-areas/regional-monitoring/southern-california-bight-regional-monitoring-program/bight-program-documents/. Where differences exist between this RFP and any Bight Survey document, this RFP takes precedence.

Successful bidders will be required to participate in Quality Assurance/Quality Control (QA/QC) activities to demonstrate comparability in data quality with SCCWRP partner agencies. QA/QC activities will include pre-survey and in-survey audits of equipment, taxonomic identification exercises, and instrument intercalibration exercises as detailed in the Scope of Work section below. Participation in these activities shall be at the bidders' own expense, and the costs of

participation must be included in the bid prices provided in this Proposal Form. NOTE: Failure to participate, or unsatisfactory performance, in these QA/QC activities will result in the cancellation of SCCWRP's contract with the bidder.

It is anticipated that field sampling and laboratory analysis will commence in July 2023. While the Bight Survey also commences in July 2023, the successful bidder will provide the scope of services described in this RFP for up to a period of five years on an annual renewal basis. This work is not guaranteed and the quantity of these additional task orders is currently unknown.

2.1 Field Sampling: Ocean and Embayments

2.1.1 Water Column Sampling in ocean and embayments greater than 3m in depth

Product

The objective of this element is to characterize ambient water quality conditions and nutrient sources that are most associated with algal bloom events in the Southern California Bight (SCB). Water-column profiling using conductivity-temperature-depth profilers (CTDs) will describe depth gradients in temperature, salinity, hydrogen ion content, transmissivity, dissolved oxygen, concentration of chlorophyll, and colored dissolved organic matter (CDOM) at each station. The final products will be a file of CTD data in digital format including the agency, station, date, depth (m), temperature (°C), conductivity (Siemens/m), oxygen (mg/L), light transmission (%), salinity (PSU), hydrogen ion content (pH), potential density anomaly as sigma theta (kg/m3), relative chlorophyll fluorescence (VDC), and CDOM (ug/l), plus associated voltages for dissolved oxygen, chlorophyll, and CDOM.

In addition, up to 3 discrete water sample depths will be sampled at each site for chlorophyll, pH, total alkalinity, suspended solids, metals, nutrients, organic compounds, phytoplankton, and/or environmental DNA (eDNA). These discrete samples will require on board filtration and/or preservation.

The final field products will consist of records of the collecting agency, station, sampling date and time, depth (m), and chain of custody sheet for all samples and filters to be transported to laboratories. The data shall be submitted electronically in a prespecified format by SCCWRP, which will be similar to the format used in the previous Bight Surveys (https://www.sccwrp.org/about/research-areas/regional-monitoring/southern-california-bight-regional-monitoring-program/bight-program-documents/).

Equipment

The following equipment is required: a Seabird 9/11 (model SBE 9 that interfaces with an SBE 11 deck box) or SBE-25 CTD. Recent (within 6 months) factory calibration certification data is required. CTDs must be equipped with sensors that measure temperature, conductivity, pressure, dissolved oxygen, transmissometry (either a Sea Tech or WET Labs 25 cm pathlength with 660 nm wavelength), chlorophyll sensitive fluorometry (preferably SeaTech or WET labs with excitation centered at 440 nm and emission centered as -680 nm), and pH. Other CTDs are acceptable, but they must: a) compare well to other participating agencies' CTDs in an intercomparison exercise; b)

sensors must be calibrated (specifically temperature and conductivity) at an acceptable national calibration facility; c) all sensors and housing must be capable of profiling to at least 200 m below the ocean surface; and d) CTD must collect data from sensors at a minimum of 8 scans per second.

Discrete water samples can be collected with a CTD/rosette system, a stand-alone rosette system, or individual bottles hung from a wire. Each bottle should hold a minimum of 5 liters sample volume. An onboard filtration system is required to immediately process water samples for chlorophyll samples and eDNA. A second bottle of 5 liters sample volume (identical in volume to the first or larger) will be used to sample water for nutrients, pH, total alkalinity, and organic compounds.

Methods

Methods will be similar to those described in the workplans and field manuals for Bight '08 Offshore Water Quality: http://ftp.sccwrp.org/pub/download/DOCUMENTS/BightPlanningDocuments/Bight08/Bight08_WQ_FieldManual.pdf), Bight '13 Nutrients: (http://ftp.sccwrp.org/pub/download/DOCUMENTS/BightPlanningDocuments/Bight13/Bight13_Nutrients_Workplan.pdf) and Bight '18 Ocean Acidification: (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18OAWorkplan.pdf). A pre-cruise equipment checkout must be conducted less than or equal to 24 hr prior to the survey cruise. This includes a pre-cruise calibration and visual inspection of the equipment (such as, plugs are secure and waterproof, computer output test for CTD sensors, and checking battery status).

During the survey, routine visual inspection of cast profiles is required to spot potential sensor problems so immediate action can be taken to replace sensor and resample sites with bad data. Before beginning a cast, a 3-minute equilibration upon initial start-up and 90 seconds at each station thereafter will be required to bring the CTD sensors to thermal equilibration with the ambient seawater. The CTD must be lowered to within 2m of bottom when possible, with a descent rate not to exceed 1 m/sec; the recommended optimum descent rate is 0.25-0.50 m/sec. The instrument should have a scan rate of no fewer than 8 scans/sec. All raw data will be submitted to SCCWRP. All processed data will be averaged to one-second intervals and submitted to SCCWRP.

A post-cruise calibration will be required within 24 hr of the last site sampled. The goal is not to recalibrate the instrument, but to record the sensor reading of air saturated water so sensor drift can be calculated. Hard copies of all sensor and equipment factory maintenance, pre-and post-cruise calibration sheets and CTD field data sheets should be maintained and made available upon request.

At least one person on the field team must have experience conducting discrete sampling, filtering, and preserving chemistry and primary producer samples. The collected water from discrete samples will be prepared on board ship as necessary for laboratory delivery. Water quality sampling must be conducted such that no contamination of samples occurs that may bias results. Due to the low concentrations of trace metals in seawater, special techniques must be employed to prevent contamination of the samples. Discrete water samples to be analyzed for trace metals

will need to be collected using trace metal clean techniques and analyzed under a trace metal clean hood as described by Bruland and Franks (1979) and Bruland et al. (2005). The contractor shall conduct equipment calibrations and maintain pre- and post-calibration logs for the field equipment used during the project. Constituents to be collected for laboratory analyses for marine waters are shown in Table 1. Total nitrogen and total phosphorus samples (from whole water samples) should be placed in a 1-liter sample container and frozen immediately. Chlorophyll will require immediate filtration of up to 1-liter on 0.7 µm GF/F type filters. The filter should be stored in an aluminum foil container and frozen immediately. Suspended solids samples must be filtered (1 liter) within 24 hr of collection on GF/F pre-weighed filters. Dissolved organic carbon (DOC) and dissolved organic and inorganic nutrients should be syringe filtered through a 0.45µm PES filter. The DOC sample should be fixed immediately with hydrochloric acid and stored at 4^0 C in a glass scintillation vial with minimal headspace. Dissolved nutrients (total dissolved nitrogen, total dissolved phosphorus, phosphate, ammonia, nitrate+nitrite, silicate, urea) should be placed in their respective sample vials and frozen immediately. A 500 mL pH and total alkalinity sample should be collected with less than 1% headspace and preserved with mercuric chloride in a pyrex or borosilicate glass bottle, sealed with grease, and stored at room temperature for later analysis. A 1-liter trace metals sample shall be fixed with analytical grade nitric acid and stored at room temperature for later analysis, and a phytoplankton sample shall be placed in a 1-liter container and fixed in 2% formalin. Samples must be shipped frozen (if required), in the dark, and within 2 days of collection to a designated laboratory for immediate analysis. Chlorophyll sample filters can be stored frozen (before acetone addition) for no more than 28 days prior to analysis.

Quality Assurance/Quality Control

The contractor will be required to participate in a presurvey intercomparison exercise with all participants in the survey to evaluate the precision, accuracy and comparability of CTDs. The exercise will involve placing all the CTDs in a common temperature-controlled, aerated seawater tank.

2.1.2 Unvegetated Soft Sediment Sampling In Ocean or Estuaries

Product

The objective of sediment sampling is to collect sediment for a variety of data types, including benthic infaunal analysis, sediment chemistry and sediment toxicity. A minimum of four successful benthic grabs will be required: 1 for benthic infauna, 1 for sediment chemistry, and 2 for sediment toxicity. The final product will be properly preserved (as specified by the SCCWRP staff) and labeled samples for benthic infauna, sediment chemistry (e.g., metals, nutrients, organic compounds, sediment grain size, TOC, TN, CECs, microplastics, etc.), and sediment toxicity along with associated chain-of-custody forms. Field observations and sampling positions will be recorded on Cruise logs and Benthic Sampling data forms. These will be retained by contractor for 4 years. A computer file of this information in specified formats are to be submitted within 5 working days of completion of field sampling.

Equipment

In marine and estuarine waters deeper than 2-m will require the use of a 0.1 m^2 single or tandem Van Veen grab deployed via A-frame or davit and 1.0 mm sieves for benthic infauna will be used for sediment sampling. At least one person on board must have previous experience with collecting, sieving, and preserving samples using this set of gear. In estuarine settings less than 1-m deep, use of smaller hand-operated gear (petite ponar grabs or push cores) and 500-µm sieve size are required. Separate bids may be submitted for hand-collected sediment in shallow systems and boat mounted collections.

All surfaces of the gear must be free of rust. Each boat utilized for sampling must have appropriate facilities for 1.0 mm sieving or screening of samples, including a means to filter the vessel's wash water to preclude inclusion of planktonic organisms into the sample.

Samples for sediment chemistry and toxicity should be collected with a stainless steel, Teflon-coated or plastic scoop, depending on the specific analytes to be measured as specified by SCCWRP staff.

Methods

Methods will be similar to those described in the Field Manual for Bight'18 (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityFieldManual.pdf). Station occupation is to be guided by use of a high accuracy global positioning system (e.g., dGPS, WAAS). All sampling is to be conducted within 100 m of the nominal site coordinates. The actual position of the vessel at the point at which samples are collected (i.e. the point at which the grab contacts the seafloor) is to be recorded for each benthic grab. Field sampling is to be conducted between sunrise and sunset.

All samples collected with a winch-mounted gear (i.e., Van Veen grab) will be collected with samplers lowered at 2 m/sec until it is 5 m above the bottom; then it should be lowered at 1 m/sec. Upon retrieval of the grab, the surface of the grab must be inspected for acceptability. To be acceptable, the surface of the grab must be even, with minimal surface disturbance and little or no leakage of overlying water. If the grab is acceptable, the overlying water should be carefully drained. For infaunal samples, the overlying water must be screened; any organisms captured on the screen should be added to the infaunal sample.

The depth of the sediment in the grab will then be measured. To be acceptable, penetration depth must be at least 5 cm. If a grab is found not to be acceptable, additional grab samples must be taken. If after 3 successful attempts (with no mechanical problems), no sample with at least 5 cm penetration is collected, the station location should be repositioned within 100 m. If successful grabs cannot be collected from two successive sites within 100 m, the site may be abandoned with no penalty to the contractor.

Samples for benthic infaunal analysis will be screened through a 1.0 mm mesh screen in marine and estuarine waters greater than 2m and 500 µm mesh in brackish systems less than 2m. All vessel wash water must be filtered. All material retained on the screen will

be placed in a jar. Samples will be fixed in a 10% formalin solution (final concentration) using the following workflow: 1. a solution of relaxant will be added to the jar; 2. after 30 minutes, 10% sodium borate buffered formalin should be added to fix the sample.; 3. samples will be rinsed and transferred from formalin to 70% ethanol 3-14 days after collection.

Samples for sediment chemistry and toxicity will be collected from the top 2 cm of the grab. Sediment within 1 cm of the sides of the grab should be avoided. The number of grabs must be sufficient to obtain at least 1.0 liters of this surficial sediment at ocean stations and at least 6.0 liters at each estuarine station. Sediments from all grabs taken at a station will be composited and homogenized prior to filling jars. Constituents collected for laboratory analyses are identified in Table 1. Sediment grain size and total organic carbon will each require one 4 oz jar of sample. Trace metals and organics will each require two 8 oz jars of sample. A total of 5.0 liters of sample should be stored in 1-liter glass jars for toxicity samples. Any remaining sediment may be archived. Jars will be provided by SCCWRP. Samples for sediment grain size and toxicity should be stored at 4°C on ice or in a refrigerator. Other samples may be stored at 4°C, but must be frozen within 24 hr. Samples should be returned to the laboratory within one week. Maximum holding time for laboratories to begin toxicity testing is two weeks.

Quality Assurance/Quality Control

Quality assurance should follow the requirements listed in the Bight '18 regional monitoring QA Plan (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityQAPlan.pdf). No intercalibration is required for this element. However, the contractor must be available for a pre-cruise inspection of equipment, a demonstration of sampling techniques, and an in-field audit will be required.

2.1.3 Trawling for fish and marine macrobenthic invertebrates

Product

The purpose of the trawl survey is to (1) collect samples for analysis of demersal fishes and megabenthic invertebrates for assemblage analyses; (2) estimate the prevalence of external anomalies and diseases of fishes and invertebrates; and (3) estimate the amount of marine debris. The final product will be data from each station on field observations and sampling positions (positions when the net lands on the bottom and beginning of trawl retrieval); species identification, abundance, biomass, anomalies, and length (fish only) of fish and invertebrates; and the relative amount of debris collected in each trawl. The data, including Cruise logs and Trawl Sampling data forms, will be provided in computer files using specified formats. The electronic formats will be similar to those used in previous Bight regional surveys (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf). Data files should be submitted within 20 working days of completion of field sampling through relevant submission portals as required by the project (e.g., https://bight-sccwrp.opendata.arcgis.com/pages/a6bff01549c44c95bcbf051538023787).

Equipment

Station occupation is to be guided by use of a high accuracy global positioning system (e.g., dGPS, WAAS). All sampling is to be conducted between one hour after sunrise and one hour before sunset. The trawl track is to pass within 100 M of the nominal site position on the mainland and within 200 M of the nominal site at the Channel Islands.

Trawling will require semi-balloon otter trawls with the following dimensions: a) 7.6 m (25 ft) head rope; b) 1.2 cm (0.5 in) cod-end mesh; and 76 cm (30 in.) x 51 cm (20 in) doors, weighing 16 kg (35 lb).

Trawl processing will require the following equipment: 1) a range of hanging spring scales (cylindrical with a hook at bottom) capable of weighing fish in buckets; the range of scales shall be capable of weighing from 0.1 to 6 kg; 2) a measuring board with meter stick for measuring centimeter size classes; 3) appropriate species identification aids recommended by field operations manual; and 4) a camera suitable for producing good quality voucher photographs of large specimens.

Qualified field staff will be required for doing all work in field. A fish taxonomist and megabenthic invertebrate taxonomist knowledgeable of the species encountered on the mainland shelf and slope of southern California must be onboard the sampling vessel during all surveys. The contractor must fix voucher and anomalous fish and invertebrates in 10% buffered seawater-formalin solution on board vessel as needed. If sufficient animals exist, an additional invertebrate voucher must be vouchered in 95% ethanol (not denatured alcohol) for DNA analysis.

Methods

Methods will be similar to those described in the previous regional monitoring Field Manual (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityFieldManual.pdf). At each station, a 10-minute trawl will be made at a speed of 1.0 m/sec (2 knots) along the isobath. After retrieval, the trawl will be inspected to determine that the net fished as required. If the trawl is deemed acceptable, the fish and invertebrates will be sorted and identified to lowest possible taxon (i.e., species for all fish and most invertebrates). Species that cannot be identified must be returned to the laboratory for identification.

All fish will be measured to centimeter size class on measuring boards. Very large specimens may be measured with a meter stick or tape measure. Maximum (board) standard length will be measured on bony fish and total length will be measured on sharks, ratfish, and hagfish, with wingspan also being recorded for stingrays. For less abundant species, the size class will be listed on the species data page. All fish will be measured. If there is a huge catch of a single species, a subsample of at least one hundred fish should be measured. Lengths of invertebrate species will not be measured, unless specifically mentioned.

Most invertebrates will be enumerated following identification. However, counts of particularly abundant species may be estimated from the biomass. Fish are enumerated indirectly during the measurement of lengths. However, a complete count is required for all species (whether all individuals are measured or not). Biomass of each species of fish

and invertebrate will be measured to the nearest 0.1 kg with a spring scale. The tare of the container will be subtracted from the gross weight. Small species weighing less than 0.1 kg will be combined into a composite weight. There will be one composite weight for fish and one for invertebrates per trawl sample.

During measurement and identification, fish and invertebrates will be examined and recorded for external gross pathology, including fin and tail erosion, tumors, lesions, external parasites, and color, skeletal or other anomalies.

Debris in the trawl will be classified by type (e.g., cans, bottles, fishing gear, rocks, terrestrial vegetation, marine vegetation, benthic debris, etc.) and classified into abundance and weight categories recorded (trace, low, moderate, and high). Debris should be assessed using tally sheets similar to what was used during previous surveys (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18TrashWorkplan.pdf).

The contractor will be responsible for assembling a voucher collection of all species identified in the field. A voucher specimen of each species collected in the contractor's portion of the survey must be returned to SCCWRP following the survey. In almost all cases, this will consist of a specimen fixed in 10% buffered seawater-formalin solution and preserved in 70% ethanol for fish and invertebrates. Specimens for DNA analysis must remain in 95% ethanol. Photographs are not suitable for most specimens. The only exception is the vouchers of very large specimens that may consist of good quality photographs. Photographs must show taxonomic characters critical for identification of the specimen to species. In addition, incompletely identified specimens and fish with tumors or other anomalies should be preserved by freezing or by fixation in buffered formalin and returned to the laboratory.

Quality Assurance/Quality Control

The successful bidder will be expected to participate in QA/QC exercises that will include presurvey and in-survey equipment and protocol assessments. For taxonomy, this will include participation in any presurvey training and intercalibration exercises, in-survey audits, and collection of a voucher specimen of each species collected during the contractor's portion of the survey. Presurvey training exercise will consist of one field and one laboratory information exchange session, and participation in an intercalibration exercise requiring identification of species in a bucket of fish and a bucket of invertebrates.

2.1.4 Bongo Net Tows for Pelagic Zooplankton Collection

Product

The purpose of the bongo net survey is to (1) collect samples for analysis of ocean acidification impacts on zooplankton communities and (2) estimate zooplankton species distribution. The final product will be data from each station on field observations and sampling positions (positions of the net when in the water column and on board) and collection and preservation of zooplankton sample in buffered ethanol. The data, including Cruise logs and Tow sampling data forms, will be provided in computer files using specified formats. The electronic formats will be similar to those used in previous Bight regional surveys

(http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf). Data files should be submitted within 20 working days of completion of field sampling through relevant submission portals as required by the project (e.g., https://bight-sccwrp.opendata.arcgis.com/pages/a6bff01549c44c95bcbf051538023787).

Equipment

Station occupation is to be guided by use of a differential global positioning system (dGPS). high accuracy global positioning system (e.g., dGPS, WAAS). All sampling is to be conducted between one hour after sunrise and one hour before sunset. The tow track is to pass within 100 M of the nominal site position on the mainland and within 200 M of the nominal site at the Channel Islands.

Bongo net sampling will require two paired bongo nets, 60 CM X 200 CM X 333 micron mesh and one 60 CM X 200 cm X 200 micron with respective diameter PVC cod end with detachable lower section with lateral apertures and ballast weight attached to a bongo net frame with two 60 cm diameter paired rings with triple tie bars (5/8" SS x 316 rod stock) free swiveling polyethylene towing yoke with opposing forged lifting eyes and ballast weight.

The contractor must collect samples in SCCWRP provided jars and preserve zooplankton samples in ethanol buffered with ammonium hydroxide on board vessel.

Methods

Methods will be similar to those described in the previous regional monitoring Ocean Acidification Workplan (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18OAWorkplan.pdf).

At each station, before bongo net sampling, a CTD cast and bottle samples for pH and total alkalinity sample should be collected from the surface and 100 meters depth (as described above).

A 40-minute tow will be made at a speed of 1.0 m/sec (2 knots) along the isobath. The net will be towed at 4 depths for approximately 45 minutes total: (1) ~150 m for ~15 minutes, (2) ~100 m for ~10 minutes, (3) ~50 m for ~10 minutes, (4) ~25 m for 10 minutes, depth permitting. Adjust amount of line let out to accommodate for line angle to achieve target depth.

Following sample collection, each cod end will be decanted into a cooler and dense zooplankton material collected into SCCWRP provided sample jars. Seawater can be decanted off the top of the sample, minimizing disturbance to the settled material and collected into a wide mouth jar. Excess water should be decanted until the sample is approximately 1/5 of the volume of the sample jar. Buffered ethanol should be added in a 1:4 ratio of sample to ethanol.

Quality Assurance/Quality Control

The successful bidder will be expected to participate in QA/QC exercises that will include presurvey and in-survey equipment and protocol assessments. Presurvey training exercise will consist of one field information exchange session.

2.1.5 Submerged Aquatic Vegetation

Product

The purpose of this element is to sample sublittoral and littoral submerged aquatic vegetation (SAV)/seagrass beds using field-based measurements and collection of material for subsequent laboratory analysis. This work will be focused on different species of eelgrasses (*Zostera* spp) in embayments and shallow coastal waters.

Deliverables will include spatial coordinates and GIS shape files of targeted beds, electronic submission of SAV metrics and basic environmental features, sediment cores for grainsize, TOC, and TN analysis, sieved sediment cores of benthic infauna preserved as specified by SCCWP staff, above ground SAV plant matter, and below ground SAV plant matter. Field crews will collect water samples for subsequent measurement of nutrients, TSS, phytoplankton, eDNA, etc.

Equipment

Required scientific equipment includes submergible GPS units, depth gauges, underwater navigation tools, secchi disks, scientific dive slates or other data recording devices, 0.5m^2 quadrats (with a minimum of four subdivisions), 100m submergible measuring tapes, sediment push cores (6cm i.d.), and submersible photography/ videography.

Field crews will be accredited scientific divers with experience working in SAV habitats. Crews will provide their own SCUBA gear and necessary safety equipment that has been regularly inspected and maintained.

Field crews are expected to secure the required access and scientific collection permits for working in each sample site. SCCWRP staff will coordinate with field crews and the appropriate authorities as needed.

Methods

Field methods would be expected to follow McCune et al. 2020 (http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/1136_SeagrassAssessmentFramework.pdf). Core data and sample collection will entail:

Site Recon and sample bed selection – Prior to sampling, SCCWRP staff will provide a list of sampling locations. Sites should be reconnoitered to determine accessibility issues (logistical and permit-based) and diver safety, as well as confirming the presence of the target SAV species. If SAV are present, suitable sample beds of contiguous SAV should be identified – suitability should encompass size of the bed/patch, presence of protected species, and diver safety (e.g., boat traffic, currents, underwater hazards).

Sample bed mapping – Bed perimeter and area should be recorded with GPS. GPS units can be used in kayak or other small craft following divers below water (or their bubble trail) or directly used by divers swimming the sample bed perimeter. Deviations from the bed perimeter path should be noted by both divers and surface support as needed. These data will be used to produce a georeferenced GIS polygon, which can be "hand

corrected" based upon diver/kayak notes on deviations. Water depth should be recorded along the perimeter, either continuously or at set intervals (e.g., every 5m) along the perimeter. Photographs of the bed should be taken as well.

Field measurements – A primary transect is laid through the middle of the sample bed along its longest axis (typically parallel to shore). A secondary axis is laid approximately perpendicular to, and in the middle of the primary transect, running from the shallowest edge of the bed to the deepest edge. Five sampling points are established at equidistant points along the primary transect beginning at the outer edge of bed (1A -1E). Two sampling points are established on the shallow and deep ends of the secondary transect (2a & 2b). At each sampling point (7 total), a quadrat is placed and percent cover, shoot density, shoot height are measured. A photograph should be taken of each quadrat for reference. All data should be recorded with site location, date, and sample point, and data type. After exiting the water, divers should discuss their measurements and make sure dive slates are legible. Pictures of the dive slate for each sample point should be photographed individually.

Sample material collection – At 5 sample points a sediment sample for TOC, TN, and grainsize will be collected and eventually placed in a container. At these same sample points, samples for above ground and below ground plant biomass. Biomass samples must be kept in sealed containers/bags underwater to preserve epiphytes on the leaf material and small roots on the rhizome material. At 1 sample point a core for benthic infauna will be collected; it can be the same core used to collect the below ground plant biomass. At the water's surface or on the shoreline, cores should be sieved and 500µm sieve, with all root material placed in the appropriate below ground biomass container/bag and the remaining sediment/detritus/fauna placed in a plastic jar with the preservative (95% ethanol or 10% formalin) specified by the SCCWRP staff. All samples should be labelled and logged with site location, date, and sample point, and data type. Once samples are removed from the water, they must be kept a light-proof wet ice cooler.

Quality Assurance/Quality Control

Sample beds identified during pre-sampling site recon should be located at maximum 200m of the site location coordinates provided by SCCWRP staff. Alternative site coordinates will be provided if no seagrass is detected within the 200m buffer during site recon or the site is inaccessible.

A minimum of 50% of sample points across a project should be re-measured for field observations – shoot density, shoot height, percent cover – by a second diver as a measure of diver-to-diver variability. These data should be labelled as a diver replicate. A minimum of 10% of sample beds should be resampled in their entirety (perimeter, field observations, and material collection) as a measure of method variability. These data and samples should be labelled as a field replicate.

Electronic copies of all data will be submitted to the SCCWRP data portal using the data forms provided. Data will undergo standard quality checking during upload. Data will be checked to ensure usage of proper units and spellings. It is incumbent upon the data submitter to ensure all data types were successfully accepted through the data portal.

2.2 Field Sampling: Watersheds

2.2.1 Freshwater flows during storm events

Product

The objective of this work is to conduct stormwater sampling over the course entire storm flow events to produce a concentration-time series pollutograph or a flow-weighted composite sample, and concurrent hydrograph. Sampling will be from a large variety of developed and natural homogenous land use sites, as well as from larger mixed land use watershed sites. Bidders should assume storm flows for this site will last 8 hours.

The Contractor will be responsible for the following:

1. Measure and record flow at the site throughout the storm event(s). In all instances, the sites will be rateable for flow.
2. Precipitation data must be collected from the sample site(s). Use of existing precipitation gages is not allowable unless they are coterminous with a sampling location.
3. Collect water quality samples. Water quality samples must be collected across the entire hydrograph of the storm.
4. Prior to initiation of sampling, the contractor shall prepare a site sampling plan that will at a minimum include the following:
    a. a description of the sampling location including a map of the sampling site, sampling techniques or schematic, and information about land use and hydrography. Special considerations associated with specific locations (e.g. access or confined space issues) shall also be included
    b. a list of constituents to be sampled at each location
    c. a discussion of the equipment to be used, including the typical precision associated with the sampling equipment and minimum measurement units
    d. documentation of pre-installation instrument calibration, and calibration checks and corrective actions (where applicable) throughout the sampling season
    e. a protocol for ensuring that data can be collected from all appreciable storms during the sampling period
    f. copies of necessary encroachment permits.

g. an ArcView shape file, or similar GIS file, that includes locations (with < 3-meter accuracy) of all sample sites and a table of latitude and longitude for each sampling site using a global positioning system.

One draft copy of the sampling plan will be provided to SCCWRP for review and comment. Following receipt and incorporation of comments, the contractor will prepare and transmit one hard copy and one electronic version of the final sampling plan to SCCWRP.

The contractor will be responsible for tracking storms into their sampling site(s). The decision to sample or not sample a specific storm event will be made in consultation with the SCCWRP project manager based on criteria for storm selection agreed to with SCCWRP during the sampling set-up phase.

The contractor will also be responsible for collating all precipitation, flow, and water quality data in spreadsheet-compatible electronic format (e.g., .csv or .xlsx); .pdf format will not be accepted. The electronic file structure for data submittal shall be in a relational database structure that will be supplied to the contractor by SCCWRP. The data shall be submitted electronically in a prespecified format by SCCWRP, which will be similar to the format used by the Stormwater Monitoring Coalition https://smc.sccwrp.org/).

The pricing shall reflect the elements of storm sampling; site setup and storm sampling. Site set up shall include all labor and materials necessary to establish a monitoring site such as reconnaissance, permitting, equipment, installation, and completion of the site sampling plan. Site setup shall also include the removal of a storm monitoring station following completion of the required number of storm events at that site. After removal, the contractor must return the site to its original condition prior to installation. Storm sampling shall include all labor and materials to collect samples such as weather tracking, storm mobilization/demobilization, precipitation/flow/water quality sample collection, and sample delivery to the laboratory. Since the number of storms per site is uncertain, the contractor shall provide a cost estimate for a single site set up or a sampling a single site-event.

Site set up and storm sampling at urban sites comprised of highly impervious areas with well-defined, concrete-lined channels are inherently different than site set ups and storm sampling at nonurban sites with large proportions of pervious area and unlined, earthen channels. For example, urban sites are generally easier to rate for flow, have better access to power and telecommunications, and flow for shorter periods of time than a comparable nonurban site; however, there are often greater risks for vandalism and equipment loss. For this reason, SCCWRP is requesting separate pricing for site set up and storm sampling for urban versus nonurban sites.

SCCWRP avoids site setups/installations that require enclosed space entry. However, if enclosed space entry is required, SCCWRP expects the contractor to comply with all safety rules and regulations in order to maintain safety on the job site. For this reason, a separate line item is provided for urban sites that require enclosed space entry.

Methods

Precipitation, flow, and water quality sampling must occur over the entire course of the storm event. Precipitation and flow should be recorded at 1-5 min intervals where the catchment time of concentration is less than 1-hr Longer recording intervals are acceptable for larger catchments, but shall not exceed 15-min. Water quality sampling should target 10-12 individual samples over the entire hydrograph, and must capture rising flows, peak flows, and receding flows. More samples may be required for long-duration events, and will be determined according to project-specific needs, but for this RFP bids should reflect the target stated above. Samples will be collected for total dissolved and suspended solids, total and dissolved organic carbon, nutrients (nitrate+nitrite, ammonia, total dissolved nitrogen, total dissolved phosphorus, total phosphorous, total nitrogen, and orthophosphate), bacteria (total coliforms, fecal coliforms or *E. coli*, enterococcus), trace metals, polynuclear aromatic hydrocarbons (PAH), and chlorinated hydrocarbons (total DDT and total PCB).

Water quality sampling must be conducted such that no contamination of samples occurs that may bias results. The contractor shall conduct equipment calibrations and maintain pre- and post-calibration logs for the field equipment used during the project.

The contractor will be responsible for supplying all sampling containers. The contractor will also be responsible for maintaining communication with the analytical laboratory and delivering samples to the analytical laboratory. The contractor will be responsible for initiating a sample chain of custody and shall not violate required holding times specific to each constituent.

Flow Monitoring. Continuous flow measurements can be made using acoustic velocity (AV) flow meters, or stage monitoring devices at sites with pre-established stage discharge relationships, or comparable approach. Velocity, stage, and instantaneous flow data should be transmitted to a data logger/controller at 15 min, or less, intervals. All flow-related sensors must be mounted securely to prevent damage due to high flows or theft during non-storm flow.

Water quality sampling. Water quality sampling can be conducted either manual or using automatic samplers. Manual sampling will require on-site staffing using a depth integrating sampler such those used by the USGS. Automatic samplers, such as ISCO™ or Hach Sigma™, is preferred to limit variability introduced by human error. Between 10 and 12 discrete samples, at a minimum, will be collected per storm at flow-paced intervals for each site-event. Where pollutographs are generated, at least 1 discrete sample shall be collected prior to initial ascension of the storm hydrograph and continue until flows have returned to near baseflow levels. Typical storm sampling durations may vary from 8-24 hours depending on precipitation. Samples will be collected more frequently when flow rates are high or rapidly changing and less frequently during lower flow periods. After collection, the samples should be stored in pre-cleaned bottles appropriate to the analytical constituents (e.g., PTFE or glass) on ice with Teflon-lined caps until shipped to the laboratory for analysis.

Automated samples should be collected using peristaltic pumps with Teflon® tubing and stainless-steel intakes fixed at the bottom of the channel pointed in the upstream

direction in areas of undisturbed flow. All sampler intakes must be mounted securely to prevent damage or fouling due to high flows or theft during non-storm flow.

Quality Assurance Procedures

Components of each monitoring system, including flow sensors and peristaltic pumps, will undergo calibration and verification during installation, maintenance, and pre-storm visits.

The calibration of water level/ stage recording equipment shall be verified in the laboratory prior to field deployment. Sensors shall be placed in a graduated cylinder or similar vessel. Water shall be added at ~2.5 cm increments for 0-15 cm depths, then ~5 cm increments until the total depth anticipated in the field is reached. The sensor shall log data for at least 30 min at each incremental depth. Depths shall be manually measured and recorded at each depth. The average depth measured by the sensor for each 30-min steady-state depth should be regressed against the manually measured depth. The calibration check will be deemed successful if the regression results in R^2 >0.99, slope 1.00±0.03, and the standard error $\leq$ 0.2 cm.

At least once per wet weather monitoring season, or within one week of a predicted storm following at least 3 weeks of dry weather, water level / stage recording sensors should be checked for precision and accuracy by placing water level sensors in a bucket or other vessel of water and subjected to several known depths. The sensor should be mounted in testing bucket the same orientation as it will be in the field. At least 3 water levels should be verified representing the depth range expected in the field, plus a "zero" (i.e., sensor in the air). One of the water levels checked should include the lowest expected water level, e.g., approximately the equivalent depth to the level off-set if a weir or flume is used. At each tested water level, data should be logged at 1-min intervals, and should remain constant for at least 10 minutes. The average water level and standard deviation for the 10-min period should be calculated. Repeat the test if the standard deviation on any average water level exceeds 0.05 cm, increasing the measurement period to 15 min between water levels. If the standard deviation exceeds 0.05 cm on a repeated test, the field crew will repeat the calibration check performed at the beginning of the monitoring season.

Immediately prior to a monitoring event, equipment will be inspected for obstructions, debris, sediment accumulation, or other conditions that may interfere with flow measurement. If the sensor is moved to clear the obstruction, level offsets must be verified, and the activity recorded in the field log. New placement (if applicable) must be documented.

Experienced field crews will install all field equipment and sensors. Sensors and intakes will be securely fastened using noncontaminating stainless steel brackets, screws and anchors. In closed-pipe conveyances, expandable stainless-steel bands may be used to secure the sensors within the pipe.

All sampling equipment must be decontaminated before installation. All sample bottles must be cleaned according to USEPA-approved protocols consistent with approved methodology for analysis of storm-water samples (USEPA, 1983 and subsequent

revisions). Teflon® hoses should be rinsed three times with a 2% Micro® solution or equivalent. All other Intermediate sampling equipment will be washed with a 2% Micro® solution and scrubbed with a clean plastic brush. All sample tubing will be triple purged with ambient and de-ionized water between samples if/where manual sampling is conducted in large channels. If/where automatic samplers are used in small channels or pipes, a single or double purge (depending on anticipated flow) is required.

Quality assurance samples will include equipment blanks, sample bottle and Teflon tubing rinsates, and field duplicates. All water samples must be kept properly chilled and must be transferred to the analytical laboratory within holding times. To ensure proper tracking and handling of the samples, documentation must include a proper Chain of Custody.

2.2.2 Wadeable stream bioassessment

Product

The purpose of this element is to collect biological samples, water chemistry, and physical habitat information for assessments of wadeable streams following the workplan for the stream survey of the Stormwater Monitoring Coalition (SMC Workplan; SCCWRP TR 1174, v2). Briefly, the workplan requires benthic invertebrate, benthic algae, and physical habitat data collection following SWAMP Standard Operating Procedures (SOP, Ode 2016). The multi-habitat method of sampling will be used, wherein one location be sampled at eleven transects using a D-frame kicknet (for benthic macroinvertebrates) or appropriate collection device (for benthic algae). Algal samples will be collected for taxonomic analysis (including quantitative and qualitative samples for diatom and soft-bodied algae analysis), as well as biomass (specifically, chlorophyll-A and ash-free dry mass). The California Rapid Assessment Method for riverine wetlands (CWMW 2013) will be applied at each site. Data for hydromodification screening tool shall be collected as described in the "Hydromod PHAB Module Data Submission Guide". Channel engineering information, hydrologic state, and aquatic vertebrates shall be assessed as described in the SMC Workplan.

Samples will be collected for water chemistry analysis. Specifically, samples for these analytes will be collected:

- Nutrients: Total nitrogen (directly measured), total phosphorous, nitrate-N, nitrite-N, orthophosphate-P.
- Major ions: Chloride, sulfate, calcium, sodium, magnesium, alkalinity as CaCO3, Hardness as CaCO3
- Solids: Total suspended solids, suspended sediment concentration
- Benthic algal biomass: chlorophyll-a and ash-free dry mass
- Chemical oxygen demand

Water quality probes and field measures shall be taken for:

- Water temperature

- Dissolved oxygen
- Turbidity
- Total dissolved solids
- pH
- Specific conductivity

Deliverables include samples preserved in 70% ethanol (for benthic macroinvertebrates) or appropriate preservatives (for benthic algae), field data sheets, chains of custody, and data in a pre-specified electronic format.

Benthic biomass and qualitative algae samples shall be delivered to SCCWRP or a designated lab within SWAMP-approved holding times (typically, <1 week for qualitative algae samples). Biomass samples shall be delivered in the dark and on wet (not dry) ice.

Physical habitat of streams is to be assessed using the standard operating procedures adopted by SWAMP (Ode 2016). The full suite of measures includes: site location, pH, specific conductivity, dissolved oxygen, alkalinity, channel dimensions, streambed substrate, cobble embeddedness, canopy cover, gradient, sinuousity, human influence in the riparian zone, riparian vegetation, macro- and micro-algae presence or thickness, instream habitat complexity, water velocity, rapid habitat assessments, and photo documentation. Data will be delivered in both hard copy formats (using SWAMP datasheets provided with the Standard Operating Procedures) and digitally as an Access database, using pre-specified data formats similar to those found on the SCCWRP web site (https://smc.sccwrp.org/).

Costs should include time for site reconnaissance and sample collection, but not lab analysis (which are covered under other elements of this RFP). Costs should assume sites are “targeted” and that access and sampleability have already been determined.

Equipment

Required equipment for macroinvertebrate collection includes clean waders, a d-frame sampling net with 500-µm mesh, with a canvas bottom and an open top. A 500-µm sieve and 5-gal bucket may be used to remove large particles and organic matter from the samples.

Required equipment for benthic algae collection includes rubber/PVC/syringe delimiters, a sampling bucket, wash bottle, filtration kits, and sample containers.

Required equipment for physical habitat assessment includes 150-m measuring tape, surveying flags, an autolevel and stadia rod, digital stop-watch, convex spherical densiometer, clinometer, compass, pygmy flow meter (pinwheel-type or electro-magnetic), small metric ruler, range finder, GPS receiver, an alkalinity titration kit, a digital camera with date and time stamps, and probes. Probes will be used to measure pH, dissolved oxygen, temperature, and conductivity.

Methods

Full details of the sampling method are described in Ode et al (2016). Briefly, reaches are divided up into 11 equidistant transects (A-K, 15 m apart in small streams and 25 m apart in streams over 10 m wide). Ten inter-transects are established halfway between each transect. Water chemistry parameters (temperature, pH, specific conductivity, alkalinity, and dissolved oxygen) are measured prior to entering the stream, or at the upstream end of the sampling reach. Streambed substrate, cobble embeddedness, canopy cover, human influence in the riparian zone, riparian vegetation, instream habitat complexity, rapid habitat assessments, and photo documentation is assessed at each transect and/or intertransect, as specified in Ode et al (2016). Gradient and sinuosity are measured across the entire reach, as specified in Ode et al (2016). Water velocity is measured at one point within the reach (or within 250 m up- or downstream, if a more suitable stream cross section is identified), as described in Ode et al (2016). If water velocity is too low to measure with a flow meter, a neutrally buoyant object may be used, as described in Ode et al (2016). If water velocity is absent or too low to measure with a neutrally buoyant object, flow conditions will be documented by a narrative description and supported by additional photographic documentation.

All equipment must be calibrated and operated according to manufacturer's specifications, including water chemistry probes, flow meters, and global positioning systems.

All equipment must be cleaned of biotic material prior to deployment. Sampling procedures are described in the SWAMP Standard Operating Procedure (Ode et al 2016). All gear must be cleaned to prevent the spread of invasive species. Sampling gear (waders, nets, and other gear that can tolerate treatment) should be scrubbed with a stiff-bristled brush or high-pressure water, inspected for residue or clinging organisms, and then treated with a physical or chemical treatment. Physical treatments include freezing (below 26°F for at least 24 hours), hot water (above 120°F for 5 minutes), or drying (gear should be completely dry for a minimum of 48 hours). Chemical treatments include soaking gear for 5 minutes in benzethonium chloride (1,840 mg/L), Commercial Solutions Formula 409 Cleaner Degreaser Disinfectant (50% dilution), or copper sulfate (252 mg/L copper ion). Physical and chemical treatments are in addition to (not a substitute for) scrubbing. Sampling gear that cannot withstand physical and chemical treatment (e.g., pH probes) shall be rinsed and visually inspected to ensure that no material is transferred between sites. Hosea and Finlayson (2005) provide details on chemical treatments, and information about which treatment is best for which types of gear. Sites with known major infestations of invasive species (such as the New Zealand mud snail) shall be sampled using dedicated waders and nets.

Quality Assurance/Quality Control

Quality control shall be achieved through proper maintenance and calibration of all equipment, as per manufacturers' specifications, and through training. Field crews shall participate in training and intercalibration activities on collecting physical habitat data sponsored by the State Water Quality Control Program (or similar field training opportunities). In addition, field crews may be audited in the field by SCCWRP staff.

It is expected that completeness will exceed 95% of physical habitat variables. Replicate measures of water chemistry variables (i.e., water temperature, pH, specific conductivity, dissolved oxygen, and alkalinity) and water velocity shall be measured at a subset of 10% of sites. Replicate measurements shall be within 10% or repeated.

2.2.3 Ephemeral stream bioassessment

Product

The purpose of this element is to collect biological samples and physical habitat information for assessments of dry ephemeral and intermittent streams. Terrestrial arthropod and bryophyte communities will be sampled concurrently with physical habitat measurements using the methods described in the Standard Operating Procedures (Robinson et al. 2018). Arthropods will be collected from ramped pitfall traps and streamside vegetation at eight transects using appropriate collection devices.

Deliverables include arthropod samples preserved in 70% ethanol (for benthic macroinvertebrates) or dry (for bryophytes), field data sheets, and data in a pre-specified electronic format.

Physical habitat of streams is to be assessed using the standard operating procedures (Robinson et al. 2018). The full suite of measures includes: site location, pH, specific conductivity, dissolved oxygen, alkalinity, channel dimensions, streambed substrate, cobble embeddedness, canopy cover, gradient, sinuousity, human influence in the riparian zone, riparian vegetation, instream habitat complexity, rapid habitat assessments, and photo documentation. Data will be delivered digitally as an Excel spreadsheet, using pre-specified data formats (templates) for taxonomy and physical habitat data found on the CEDEN website http://www.ceden.org/ceden_datatemplates.shtml.

Equipment

Required equipment for invertebrate collection includes 8 ramped pitfall tramps (plus spares), a canvas bag with beating stick, sampling jars with preservative, forceps, dish detergent and propylene glycol. Bryophyte equipment includes flags, paper envelopes, a 10x or 20x hand lens, a spray bottle, and a timer. Habitat equipment includes an autolevel or clinometer, a metric ruler, a trowel, range finder, GPS receiver, and a digital camera with date and time stamps.

Methods

Full details of the sampling method are described in Robinson et al (2018). Briefly, reaches are divided up into 8 equidistant transects (20 m apart). Seven inter-transects are established halfway between each transect. Streambed substrate, cobble embeddedness, canopy cover, human influence in the riparian zone, riparian vegetation, instream habitat complexity, rapid habitat assessments, and photo documentation is assessed at each transect and/or intertransect, as specified in Robinson et al (2018). Gradient and sinuosity are measured across the entire reach, as specified in Robinson et al (2018).

All equipment must be calibrated and operated according to manufacturer's specifications, including water chemistry probes, flow meters, and global positioning systems.

All equipment must be cleaned of biotic material prior to deployment. All gear must be cleaned to prevent the spread of invasive species. Sampling gear (waders, nets, and other gear that can tolerate treatment) should be scrubbed with a stiff-bristled brush or high-pressure water, inspected for residue or clinging organisms, and then treated with a physical or chemical treatment. Physical treatments include freezing (below 26°F for at least 24 hours), hot water (above 120°F for 5 minutes), or drying (gear should be completely dry for a minimum of 48 hours). Chemical treatments include soaking gear for 5 minutes in benzethonium chloride (1,840 mg/L), Commercial Solutions Formula 409 Cleaner Degreaser Disinfectant (50% dilution), or copper sulfate (252 mg/L copper ion). Physical and chemical treatments are in addition to (not a substitute for) scrubbing. Sampling gear that cannot withstand physical and chemical treatment (e.g., pH probes) shall be rinsed and visually inspected to ensure that no material is transferred between sites. Hosea and Finlayson (2005) provide details on chemical treatments, and information about which treatment is best for which types of gear. Sites with known major infestations of invasive species (such as the New Zealand mud snail) shall be sampled using dedicated waders and nets.

Quality Assurance/Quality Control

Quality control shall be achieved through proper maintenance and calibration of all equipment, as per manufacturers' specifications, and through training. Field crews shall participate in training and intercalibration activities on collecting physical habitat data sponsored by the State Water Quality Control Program (or similar field training opportunities). In addition, field crews may be audited in the field by SCCWRP staff.

It is expected that completeness will exceed 95% of physical habitat variables. If sediment samples are collected, replicate measures of sediment chemistry variables (i.e., pyrethroid concentrations, grain size, total organic carbon) shall be measured at a subset of 10% of sites. Replicate measurements shall be within 10% or repeated.

2.2.4 Streamflow duration assessment

Product

The purpose of this element is to collect indicators of streamflow duration following the EPA-approved protocols (Zimmerman and Olson 2021). This is to support the assessment of streamflow duration following protocols for the Arid West and Western Mountains (Mazor et al. 2021a, 2021b).

Stream temperature, intermittency, and conductance (STIC) loggers shall be deployed at each site following EPA protocol (Fritz 2021; https://sccwrp-my.sharepoint.com/:b:/g/personal/raphaelm_sccwrp_org/EQtGE2lcZhJBr6lOichsDpIBbZXVxDjYlUskETuaeDAF0Q?e=DtwDhi).

Deliverables include invertebrates samples preserved in 70% ethanol (if collected) or dry (for bryophytes), field data sheets, and data in a pre-specified electronic format (e.g., Arc GIS database.

Equipment

Required equipment for macroinvertebrate collection include a d-frame net, a trowel, a survey level or clinometer, measuring tape, and appropriate field guides for plant and animal identification. A metric ruler, range finder, GPS receiver, a digital camera with date and time stamps are also recommended.

Methods

Full details of the sampling method are described in Zimmerman and Olson (2021). Briefly, a suite of biological, geomorphological, and hydrological indicators is measured at each site. Biological measures include aquatic invertebrates (with identification to Family at the streamside or within 24 hours of sampling, unless lab identification is employed), riparian plants (with sufficient taxonomic resolution to determine wetland indicator status), algae cover, fish, amphibians, and iron-oxidizing fungi or bacteria (qualitatitve assessments). Geomorphic indicators include bank width, slope (quantitative assessments), riffle structure, bed and bank continuity, substrate sorting, and entrenchment ratios (qualitative assessments). Hydrologic indicators include presence of baseflow, seeps and springs, reach with surface or subsurface flow, presence of hydric soils, and presence of woody jams. Data will be delivered in digital formats specified by SCCWRP (e.g., through a Survey123 application).

All equipment must be calibrated and operated according to manufacturer's specifications, including water chemistry probes, flow meters, and global positioning systems.

All equipment must be cleaned of biotic material prior to deployment. All gear must be cleaned to prevent the spread of invasive species. Sampling gear (waders, nets, and other gear that can tolerate treatment) should be scrubbed with a stiff-bristled brush or high-pressure water, inspected for residue or clinging organisms, and then treated with a physical or chemical treatment. Physical treatments include freezing (below 26°F for at least 24 hours), hot water (above 120°F for 5 minutes), or drying (gear should be completely dry for a minimum of 48 hours). Chemical treatments include soaking gear

for 5 minutes in benzethonium chloride (1,840 mg/L), Commercial Solutions Formula 409 Cleaner Degreaser Disinfectant (50% dilution), or copper sulfate (252 mg/L copper ion). Physical and chemical treatments are in addition to (not a substitute for) scrubbing. Sampling gear that cannot withstand physical and chemical treatment (e.g., pH probes) shall be rinsed and visually inspected to ensure that no material is transferred between sites. Hosea and Finlayson (2005) provide details on chemical treatments, and information about which treatment is best for which types of gear. Sites with known major infestations of invasive species (such as the New Zealand mud snail) shall be sampled using dedicated waders and nets.

Quality Assurance/Quality Control

Quality control shall be achieved through proper maintenance and calibration of all equipment, as per manufacturers' specifications, and through training. Field crews shall participate in training and intercalibration activities on collecting physical habitat data sponsored by the State Water Quality Control Program (or similar field training opportunities). In addition, field crews may be audited in the field by SCCWRP staff.

It is expected that completeness will exceed 95% of physical habitat variables. If sediment samples are collected, replicate measures of sediment chemistry variables (i.e., pyrethroid concentrations, grain size, total organic carbon) shall be measured at a subset of 10% of sites. Replicate measurements shall be within 10% or repeated.

2.3 Chemistry Laboratory Analysis

2.3.1 Nutrient Chemistry Laboratory Analysis

Product

The purpose of this element is to analyze samples of stormwater, marine water, or sediment for nutrient related constituents. The final products will be computer files in the pre-defined formats similar to those described in the previous Regional Monitoring Information Management Plan http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf) including field orders and analyte codes and submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/). All data are due within 45 days of sample delivery.

Equipment

Nutrients must be analyzed by nutrient-specific methods described below.

Methods

Maximum acceptable method detection limits (MDLs) for nutrients are given by media in Table 2. Nitrate + nitrite will be analyzed using the cadmium reduction method (SM 4500-NO3 F), nitrite will be analyzed using the colorimetric method (SM 4500-NO2 B), ammonium will be analyzed using distillation and the automated phenate method (SM 4500-NH3 G), and soluble reactive phosphorus will be analyzed using the automated

ascorbic acid reduction method (SM 4500-P F). Total nitrogen and total phosphorus can be collected into HDPE bottles and stored frozen. For TN/TP (USGS I-4650-03) and TDN/TDP (USGS I-2650-03), persulfate will be used to digest unfiltered and filtered water samples to convert the nitrogen from all N compartments into nitrate and the phosphorus from all P compartments into orthophosphate for the simultaneous determination of TN and TP. The resulting digests will be analyzed by automated colorimetry for nitrate-N and orthophosphate. Dissolved organic carbon will be determined for filtered sample water via the combustion infrared method (SM 5310-B) using a Total Organic Carbon Analyzer. Total suspended solids must be filtered within 24 hours of collection on pre-weighed GF/F filters. Total suspended solids filters can then be dried in an oven at 80 deg C until dry and stored upright in a desiccator until analysis. Total suspended solids will be analyzed using the gravimetric technique (SM 2540-D). Holding times must not exceed 28 days.

Quality Assurance/Quality Control

An intercalibration exercise among participating labs will be conducted in which certified or standard reference materials and environmental will be distributed and analyzed. Participation in group meetings regarding intercalibration and quality control issues is required by all participating labs.

2.3.2 Laboratory Analysis for Carbonate Chemistry

Product

The purpose of this element is to analyze samples of marine or estuarine water for carbonate chemistry related constituents. The final products will be computer files in the pre-defined formats similar to those described in the previous Regional Monitoring Information Management Plan for chemical constituents http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf) including field orders and analyte codes and submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/). All data are due within 45 days of sample delivery.

Equipment

Carbonate chemistry must be analyzed using equipment described in the protocols outlined in the Guide to Best Practices for Ocean CO2 Measurements (https://www.ncei.noaa.gov/access/ocean-carbon-acidification-data-system/oceans/Handbook_2007.html). Total alkalinity using open or closed cell titration system (SOP 3a or 3B), pH a UV/Vis spectrophotometer (SOP 6b) and dissolved inorganic carbon (DIC) using a coulometer (SOP 2).

Methods

Methods for carbonate chemistry analysis are detailed in The Guide to Best Practices for Ocean CO2 Measurements (Dickson et al. 2007), protocols detailed in SOP 3a or 3b for total alkalinity, SOP 6b for pH and SOP 2 for DIC. Contract laboratories must pass intercalibration and routinely analyze certified reference materials for carbonate chemistry (available for purchase from the Dickson Laboratory at Scripps Institution of

Oceanography) as a part of standard laboratory practices. Total alkalinity measurements must be within within ± 50 µmol/kg of the reported value, pH within ± 0.05 pH units of the reported value, and DIC within ± 30 µmol/kg of the reported value. Three replicate pH measurements should be made on each bottle sample and the average pH of the measurements must have a standard deviation within ± 0.03 pH units and be within. The average total alkalinity must have a standard deviation within ± 30 µmol/kg and the average DIC must have a standard deviation within ± 20 µmol/kg.

Quality Assurance/Quality Control

An intercalibration exercise among participating labs will be conducted in which certified or standard reference materials and environmental will be distributed and analyzed. Participation in group meetings regarding intercalibration and quality control issues is required by all participating labs.

2.3.3 Trace Metal Chemistry Laboratory Analysis

Product

The purpose of this element is to analyze samples of stormwater, marine water or sediment for trace metal constituents (Table 3). The final products will be computer files in the prescribed format similar to those described in previous Regional Survey http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf) including field orders and analyte codes and submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/). All data are due within 45 days of sample delivery.

Equipment

Atomic absorption spectrometer (AA) inductively coupled plasma atomic emission spectrometer (ICP-AES), and inductively coupled plasma mass spectrometer (ICP-MS) must be utilized for trace metals analyses.

Methods

For trace metal analytes, sediment and water samples will be digested using a strong acid method (chloric acid/nitric acid) and analyzed by graphite furnace AAS, ICP-MS and/or cold vapor atomic fluorescence spectroscopy (CVAFS) described in methods approved or recommended by EPA. Prior to analysis of any field samples, the laboratory should establish five-point or greater calibration ranges for all the target analytes. The lowest point of each calibration curve must be equal to the maximum acceptable method detection limits (MDLs) for all the trace metals (Table 3). Initial MDLs for target analytes must be obtained and should not be higher than the maximum acceptable MDLs. Sediment data are to be reported as dry weight. Alternative methods for marine water are acceptable, including trace metal extractions to remove interferences.

Quality Assurance/Quality Control

An intercalibration exercise among participating labs will be conducted in which certified or standard reference materials (e.g., CRM-10-050 (Lot #L516) from Resource

Technology Corporation) will be analyzed. Participation in group meetings regarding intercalibration and quality control issues is required by all participating labs.

2.3.4 Trace Organic Chemistry Laboratory Analysis

Product

The goal of this work element is to measure trace organic chemicals collected from stormwater or sediments samples. Samples are to be analyzed for 41 PCB congeners (Table 4), 7 DDT and 5 chlordane compounds (Table 5), 24 polycyclic aromatic hydrocarbon (PAH) compounds (Table 6), 11 pyrethroid and fipronil pesticides (Table 7), 13 polybrominated diphenyl ether (PBDE) congeners (Table 8), TOC/TN, and moisture content. The final products will be computer files in the prescribed format similar to those described in previous Regional Surveys (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf) including field orders and analyte codes and submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/). All data are due within 45 days of sample delivery.

Equipment

A gas chromatography/electron-capture detector (GC/ECD), gas chromatography/mass spectrometer (GC/MS), liquid chromatography tandem mass spectrometer (LC-MS/MS) and/or elemental analyzer (for TOC/TN) as appropriate shall be utilized for analysis of the majority of organic analytes.

Methods

Sediment samples shall be extracted and purified prior to instrumental analyses using EPA-approved methods or equivalents. Surrogate standards should be spiked into the samples (including quality control samples) prior to extraction. Internal calibration is preferred as the quantitation method and internal standards are added to the samples before injection. PCBs, DDTs and chlordane will be measured using a GC/ECD and a capillary column. Confirmation of peak identification is required and should be done using a GC/MS and capillary column under the identical chromatographic conditions to those used for the GC/ECD instrument. Selected Ion Monitoring (SIM) mode is preferred in order to achieve comparable detection sensitivity as with GC/ECD. PCBs should be measured on a congener-specific basis, as opposed to the Aroclor pattern-matched approach. To achieve reasonable chromatographic resolution, the total run time for PCB analysis should not be less than 60 minutes. Chlordane will be measured as cis- and trans-chlordanes, trans-nonachlor, heptachlor, heptachlor epoxide and oxychlordane.

PAHs will be measured using a GC/MS and a capillary column. Chromatographic conditions should be so chosen that benzo[b]fluoranthene and benzo[k]fluoranthene can be partially resolved. Mass spectrometry full scan should be used in acquiring data to allow confirmation of positive peak identification by matching sample spectra with reference spectra. Pyrethroid analytes may be quantified by GC-ECD after confirmation of their presence by GC-MS.

Prior to analysis of any field samples, the laboratory should establish five-point calibration ranges, at minimum, for all the target analytes. The lowest point of each calibration curve must be equal to the report level (Tables 3-8). The MDL for each target analyte must be obtained and should not be higher than the reporting level. Data are to be reported as dry weight. The PCB and PAH compounds are prepared in custom-made mixtures and can be purchased from AccuStandard, Inc.

Quality Assurance/Quality Control

QA/QC requirements will be similar to those prescribed in the QA Plan from previous regional surveys (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityQAPlan.pdf). An intercalibration exercise will be conducted in which certified or standard reference materials and environmental samples will be analyzed for PCB congeners, DDTs, chlordanes, and PAHs. The winning bidder must be comparable to those of other participating agencies in the Regional Survey. Participation in group meetings regarding intercalibration is required for all participating labs.

2.3.5. Microplastics Laboratory Analysis

Product

The purpose of this element is to measure microplastics. Initial measurements on which we are requesting bids will be for drinking water samples using the methods recently adopted by the State Water Resources Control Board for extraction and measurement of microplastic particles by either Raman Spectroscopy or Infrared Spectroscopy (IR). The contract may also be extended to include extraction of plastics from marine waters, tissue, or sediments samples, with the processing of the extracted samples being identical to the method used for drinking water. Sample collection is not within the scope of this element. Additional consideration may be given to laboratories with experience in these matrices, but for the purposes of this RFP, bidders are asked to only include costs for the drinking water methodology. The final products will be computer files in the prescribed format similar to those described in previous Regional Surveys (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf) including field orders and analyte codes and submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/).

Equipment

Equipment requirements are detailed in the State Water Board Standard Operating Procedures for extraction and measurement of microplastics in drinking water by either Raman or IR Spectroscopy. IR spectroscopy can include, but is not limited to, Fourier Transform IR (FTIR), Laser Direct Infrared (LDIR) Imaging, Optical- Photothermal IR (O-PTIR), and other techniques capable of measuring microplastic particles as small as 50 µm. At a minimum, this includes a laboratory suitable for processing environmental samples for microplastics analysis (i.e., with HEPA air filtration and appropriate protocols to minimize and quantify potential particulate contamination), and suitable IR and/or Raman instrumentation. Bidders should notice in their response whether they plan to

use their own in-house instrumentation or utilize external facilities (e.g., SCCWRP's spectroscopic instrumentation) for analysis.

Methods

The required method is detailed in the State Water Board Standard Operating Procedures for extraction and measurement of microplastics in drinking water. This method extracts microplastic particles from drinking water samples, and other water samples with low levels of suspended particulate matter and organic material, using sieving and vacuum filtration. Each sample is split into size fractions with separation at 500 µm, 212 µm and 20 µm (to maintain consistency between Raman and IR methods), and particles are collected onto filters or into glass containers prior to microscopic and spectroscopic analysis. Processed samples are viewed using stereomicroscopy and microplastic particles are identified. For the identification of material type, a representative subsample of particles is selected and prepared for IR or Raman spectroscopy by presentation either on a filter surface or on a glass slide. Bidders can assume 30 subsampled particles per sample. Each subsampled particle is measured and photographed to make a permanent record of the sample, then chemically identified individually using IR or Raman spectroscopy. The instrument is calibrated and run through performance checks prior to use, and spectra are matched using relevant spectral reference libraries. The proportion of particles confirmed to be microplastics via spectroscopy is applied to total counts from microscopy to provide an estimate of microplastic particles per liter. If the cost per sample varies by the total number of samples, bidders may submit separate bids based on number of samples.

Quality Assurance/Quality Control

QA/QC requirements will be similar to those prescribed in the QA Plan from previous regional surveys, such as the Bight Program Sediment Quality Plan (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityQAPlan.pdf). Further analyte-specific QA/QC may be found in the State Water Board Standard Operating Procedures for microplastics in drinking water. The preferred laboratory will have participated in an intercalibration exercise in which they have been able to demonstrate proficiency. Extra consideration will be given to laboratories that have been accredited for this method by the State of California's Environmental Laboratory Accreditation Program.

2.4 Biological Laboratory Analysis

2.4.1 Ocean and embayment infaunal samples

Product

Sample analysis for benthic infaunal samples includes the following tasks: (1) transfer of the sample from formalin to alcohol; (2) sorting the sample to remove all organisms from the debris; and (3) identification and enumeration of all organisms in the sample. In addition, prequalification of the laboratory in a taxonomic intercalibration exercise and participation in a series of workshops on taxonomy, culminating in a synoptic review of the project data by all participants, is required.

The final product will be a data file showing the number of individuals in each taxon at each station as well as supporting documentation and data for QA/QC. Contractor will retain data sheets for 5 years.

The data should also be provided in computer files in formats pre-specified formats similar to those used in previous Regional Surveys http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf) including field orders and analyte codes and submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/). All data are due within 160 days of sample delivery.

Methods

Benthic samples must be washed and transferred to a 70% solution of ethanol after a minimum of 72 hours or a maximum of two weeks after collection. It is recommended that the alcohol be buffered with marble chips. Formalin from the sample should be decanted through a 0.5 mm or finer mesh.

Sorting will include completion of a Sorting Record form provided to the contractor. Samples must be sorted under a stereo microscope. All individual organisms except foraminiferans and planktonic organisms should be removed from the sample and sorted into taxa lots (e.g., Annelida, Mollusca). Fragments of organisms should also be removed. Each taxon lot should be internally labeled with the sample number. Labels should be written in pencil or indelible ink on 100% rag-paper, poly-paper or other paper suitable for wet labels.

The laboratory may use its own bench sheets for identification. However, in addition to columns for the taxon name and the number of individuals, two additional columns must be included: (1) Voucher and (2) Exclude. The voucher column will be used to note the removal of specimens for the voucher collection (See below). The exclude column is used to note when a taxon should be excluded from the data for counts of number of species. Instructions will be provided for filling out these columns.

Taxonomic identifications, including nomenclature and orthography, will be based on the most recent edition of the Southern California Association of Marine Invertebrate Taxonomists (SCAMIT ed. 13, as of December 2022), as well as keys and other materials produced for the survey. The objective will be to accurately identify all organisms to the

lowest possible taxonomic category, most often species, and to provide an accurate count of the organisms in each taxon.

Following identification and enumeration, all specimens are to be retained in taxa lots within the sample. Minimally, the material must be segregated and internally labeled into the following 17 lots:

Annelid lots:

Oligochaeta
Spionidae
Cirratulidae
Other Polychaetes (by order)

Echinoderm lots:

Ophiuroidea
Misc. Echinodermata

Arthropod lots:

Ostracoda
Amphipoda
Decapoda
Misc Arthropoda

Misc. Phyla lots:

Cnidaria
Nematoda
Nemertea
Other Phyla (a collective lot)

Molluscan lots:

Bivalvia
Gastropoda
Misc. Mollusca

The laboratory will be responsible for maintaining thorough and complete records through all stages of sample analysis and QC procedures.

Quality Assurance/Quality Control

The contractor must create a voucher collection of all taxa identified to species in the survey. Only glass containers are to be used for the storage of voucher material unless specimens are inappropriate for wet storage.
Quality control for sorting will require resorting a minimum of 10% of each sample must be resorted by an experienced sorter other than the original sorter. If the data quality objective of 95% removal efficiency is not met, the entire sample must be resorted.

Quality control for taxonomic identification and enumeration will involve re-identification of 10% of samples processed by each laboratory according the procedures described in Bight 18 Benthic Infauna Laboratory Manual (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityBenthicLabManual.pdf). The contract lab will have a number of samples equal to a minimum of 10% of the number of samples processed re-identified by an independent taxonomist. After the results of the re-identification have been submitted, the taxonomists will meet to resolve discrepancies between the laboratories. Taxonomic accuracy, count accuracy, and taxonomic precision, calculated as detailed in the Bight 18 Benthic Infauna Laboratory Manual

(http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityBenthicLabManual.pdf). Data found to be below 90% accuracy and precision of all three QA standards must be reidentifed to resolve errors found in the re-identification process.

2.4.2 Freshwater benthic macroinvertebrate samples

Product

Samples of benthic macroinvertebrates will be sorted and identified to Standard Taxonomic Level II, as determined by the SAFIT Standard Taxonomic Effort (Richards and Rogers 2007). Level II corresponds to species-level identification for most groups of organisms (with Chironomidae to genus). All samples will be sorted to completion, or until at least 600 specimens have been identified.

The final product will be data showing the numbers of individuals in each taxon in each sample, as well as supporting documentation and data for QA/QC. Where appropriate, taxonomic information will be accompanied by life stage (i.e., larva, pupa, or adult), functional feeding group, and tolerance value. Data for 500-count must be provided.

The data must be provided in computer files in SCCWRP specified formats, which are similar to those from previous regional watershed surveys (https://smc.sccwrp.org/). All data are due within 120 days of sample delivery.

Methods

Benthic samples must be washed and transferred to a 70% solution of ethanol after a minimum of 72 hours or a maximum of two weeks after collection. Sorting will include completion of a Sorting Record form provided to the contractor. All individual organisms should be removed from the sample and sorted into taxa lots (e.g., Ephemeroptera, Mollusca). Fragments of organisms, and incomplete organisms lacking identifiable headparts should also be removed. Each taxon lot should be internally labeled with the sample number. Labels should be written in pencil or indelible ink on 100% rag-paper, poly-paper or other paper suitable for wet labels.

The laboratory may use its own bench sheets for identification. However, in addition to columns for the taxon name and the number of individuals, two additional columns must be included: (1) Voucher, (2) Exclude and (3) Slide. The voucher column will be used to note the removal of specimens for the voucher collection (See below). The exclude

column is used to note when a specimen should be excluded from the data for counts of number of species. The slide column indicates when a specimen was slide-mounted for identification. Instructions will be provided for filling out these columns.

Taxonomic identifications, including nomenclature and orthography, will be based on the most recent Standard Taxonomic Effort of the Southwestern Association of Freshwater Invertebrate Taxonomists. The objective will be to accurately identify all organisms to STE Level II (unless otherwise specified), and to provide an accurate count of the organisms in each taxon.

Following identification and enumeration, all specimens are to be retained in taxa lots within the sample. individual vials, with each vial corresponding to a single taxonomic identification within a sample.

The laboratory will be responsible for maintaining thorough and complete records through all stages of sample analysis and QC procedures. All specimens will be retained by the contractor for 3 years. Voucher specimens shall be curated for 7 years.

Quality Assurance/Quality Control

Prequalification of the laboratory in a taxonomic intercalibration exercise and participation in the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT) is required.

Since taxonomic consistency is of particular importance, the taxonomists will be required to participate in meetings and workshops to discuss taxonomic issues. It is expected that taxonomic workshops will be made available through SAFIT and/or SCCWRP.

Before benthic organisms are identified, the contractor must show that the taxonomists who will process samples can meet the Measurement Quality Objectives for sample identification and enumeration by participating in a pre-qualification exercise. The contractor will submit a list of taxonomists who will be processing samples along with the taxonomic groups for which each person will be responsible. A taxonomist must be a member of SAFIT.

The contractor must create a voucher collection of all taxa identified in the survey. Only glass containers or permanently mounted slides are to be used for the storage of voucher material.

Quality control for sorting will require resorting a minimum of 10% of each sample must be resorted by an experienced sorter other than the original sorter. If the MQO of 95% removal efficiency is not met, the entire sample must be resorted.

Quality control for taxonomic identification and enumeration will involve re-identification of 10% of samples processed by each laboratory. The contract lab will re-identify a number of samples equal to 10% of the number of samples processed.

Quality control for taxonomic identification involve re-identification of affected specimens. If the QA taxonomist identifies a systemic problem (e.g., one taxon is consistently mis-identified), the identifications of all affected specimens in a project batch must be corrected. If the errors identified by the QA taxonomist do not appear to

be systemic (e.g., taxa are haphazardly or randomly misidentified) OR if the identifications lead to a failure of MQOs (i.e., taxon ID error rate < 10% of taxa and < 10% of individuals in each sample), the entire project batch must be reviewed, and another 10% of samples must be resubmitted for external QA. Discrepancies will be resolved through consultation with taxonomists outside Contractor's laboratory.

2.4.3 Submerged aquatic vegetation laboratory analyses

Product

The purpose of this element is to process material collected from sublittoral and littoral submerged aquatic vegetation (SAV)/seagrass beds. Most commonly, this work will be focused on different species of eelgrasses (*Zostera* spp) in embayments and shallow coastal waters.

Sample analysis of SAV will include measurements of epiphytic algae biomass, count of leaves per shoot, count of shoots sample, leaf area, above ground plant biomass, and below ground plant biomass. The final product will be a data file containing each measurement for each sample (typically 5 per site). Contractor will retain a copy of the data for a minimum of 5 years. Data will be submitted through SCCWRP's data portal. All data are due within 160 days of sample delivery.

Methods

Upon receipt of samples from field crews, above ground samples can be placed in refrigerated conditions (~4C) for up to 12hrs and below ground samples can be stored in freezer conditions (-20C). Measurements of shoots per sample, leaves per shoot, and epiphytic biomass should be done as soon as possible from the above ground sample material. After which, above ground samples can be stored in freezer (-20C) conditions.

Methods for each measure should broadly follow those detailed in McCune et al. 2020 (http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/1136_SeagrassAssessmentFramework.pdf). In brief, the required measures are:

Count of shoots – Data should be recorded as shoots sample^{-1} for each sample. The number of shoots in a sample are counted. Loose leaves broken off from their stem/node should not be counted, though intact, single-leaf shoots should be counted.

Count of leave per shoot- Data should recorded as the mean number of leaves shoot^{-1} for each sample. Leaves should be counted by their basal, stem ends. Broken, apical ends of leaves should not be counted.

Shoot length – Data should be recorded as the average per sample of mean, maximum, and minimum length of the leaves in each of the shoots. The length of each intact leaf in a shoot should be recorded to the closest mm. The mean, maximum, and minimum length for each shoot should then be used to calculate the sample averages of shoot means, shoot maximums, and shoot minimums.

Epiphytic algae biomass – Data should be recorded as dry mass (mg) and ash-free dry mass (mg) for each sample. After recording the count of shoots, leaves per shoot, and

shoot length, individual leaves can be gently removed from their shoot. Material should be scraped from both sides of each leaf using the edge of glass microscope slide, or similar clean, straight edge. Scraped material from all blades should be pooled for drying and subsequent weighing. Pooled material should be inspected for animal material (e.g., sponges, bryozoans, crustaceans), which should be removed prior to drying. Epiphytic material should be dried at 60C for 24hours. Material should then be cooled in a desiccation chamber where it can be stored prior to measuring dry mass. Dry mass should be recorded to the closest 0.01 mg. After weighing, samples should be placed in a combustion oven at 500C for 6 hrs. Cooled samples can be stored in a desiccation chamber prior to measuring ashed mass. Subtract ashed mass from dry mass to obtain ash free dry mass and reported to the nearest 0.01mg.

Leaf area – Leaf area can be calculated from leaves either prior to storage in a freezer or afterwards. Data should be recorded as the average per sample in cm^2. Leaf area can be measured with a leaf area meter (e.g., Licor LI-3100) or flatbed scanner and photo interpretation software (e.g., Image J). The longest intact leaf from each shoot should be scanned for area of one side. The average of all measured leaves should be reported.

Aboveground biomass – Data should be recorded as dry mass (mg) and ash-free dry mass (mg) for each sample. All leaves (whole, broken, or loose in the sample bag) in the sample should be dried at 60C for 24-48hrs. Material should then be cooled in a desiccation chamber where it can be stored prior to measuring dry mass. Dry mass should be recorded to the closest 0.01 mg. After weighing, samples should be placed in a combustion oven at 500C for 8 hrs. Cooled samples can be stored in a desiccation chamber prior to measuring ashed mass. Subtract ashed mass from dry mass to obtain ash free dry mass and reported to the nearest 0.01mg.

Belowground biomass - Data should be recorded as dry mass (mg) and ash-free dry mass (mg) for each sample. The below ground sample should be thawed, and any sediment should be gently washed away. All roots and rhizomes (whole, broken, or loose in the sample bag) in the sample should be dried at 60C for 24-48hrs. Material should then be cooled in a desiccation chamber where it can be stored prior to measuring dry mass. Dry mass should be recorded to the closest 0.01 mg. After weighing, samples should be placed in a combustion oven at 500C for 8 hrs. Cooled samples can be stored in a desiccation chamber prior to measuring ashed mass. Subtract ashed mass from dry mass to obtain ash free dry mass and reported to the nearest 0.01mg.

Quality Assurance/Quality Control

Electronic copies of all data will be submitted to the SCCWRP data portal using the data forms provided. Data will undergo standard quality checking during upload. Data will be checked to ensure usage of proper units and spellings. It is incumbent upon the data submitter to ensure all data types were successfully accepted through the data portal.

2.5 Toxicity Testing

2.5.1 Sediment toxicity tests

Product

Bulk sediment samples will be tested for survival of *Eohaustorius estuarius* after 10 days exposure, and for sublethal effects using a 2-day development test on embryos of the mussel *Mytilus galloprovincialis* exposed at the sediment-water interface. The final products will be a computer file of amphipod survival and mussel effects with associated test water quality in the prescribed format similar to that used in previous Regional Surveys (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf) including field orders and analyte codes. All data are due within 45 days of sample delivery and should be submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/). In addition, a hardcopy report must be delivered that provides test endpoint summary statistics and a statement of quality assurance including descriptions of QA/QC deviations, if any. Pricing for sediment toxicity tests are separated by species.

Methods

The amphipod survival test will be conducted according to US EPA (1994) guidelines. This test consists of a 10-day exposure of *Eohaustorius estuarius* to sediment under static conditions. Amphipods are placed in glass chambers containing seawater and a 2 cm layer of test sediment. The number of surviving amphipods is measured at the end of the test and used to calculate the percentage survival. Five laboratory replicates will be conducted for each test. All sediment samples must be dry sieved through a 1.0 mm-mesh stainless steel screen prior to testing in order to remove predatory and large macrofauna.

All amphipod test organisms must be verified through consultation with a taxonomist, if necessary. Individuals selected for testing should be visually inspected to confirm that they are the proper size and in good condition (i.e., no external damage). Holding time for amphipods prior to testing should be 10 days or less.

A reference toxicant test must be run with every batch of test samples in order to document amphipod relative sensitivity and test precision. This test will consist of a 96-hour exposure to five different concentrations of ammonia dissolved in seawater. Ammonia concentrations will be selected to provide an estimate of the LC50 and will be verified by analysis of each concentration. Reference toxicant test results that fall outside of control chart limits (2 std dev of mean) will trigger a review of test procedures and a possible retest of the corresponding sediment samples.

Water quality of the overlying water and pore water will be measured for each sample type at the beginning of the exposure. Overlying water quality will also be measured at the end of exposure. Temperature will be measured continuously in the exposure room. Instruments will be calibrated daily. Deviations in water quality will be noted on the data files and a synopsis given in the hardcopy summary report.

Each test batch must include a negative control using "home sediment". This toxicity test procedure is considered unacceptable if amphipod survival in home sediment is less than 90%, or if survival in any control replicate is less than 80%. Reference toxicant results should be within two standard deviations of the mean response specific to the laboratory. Water quality parameters (salinity, temperature, pH, and ammonia) should also be within the tolerance range of the test organism, as specified in EPA (1994) guidance.

Embryos of the mussel *Mytilus galloprovincialis* exposed at the sediment-water interface will be used to test for sublethal effects. Details of the exposure system can be found in Anderson et al. (1996) and methods for the preparation and handling of the mussel embryos are in USEPA (1995). Additional details of the exposure system may be revised by the Regional Survey Toxicology Committee to facilitate the use of a composite sample, rather than a core, in the test. All sediment samples must be dry sieved through a 1.0 mm-mesh stainless steel screen prior to testing in order to remove large macrofauna. Fertilized mussel eggs shall be prepared as described in the EPA manual (USEPA 1995).

A 2-day water only reference toxicant test using ammonia must be performed simultaneously with each set of field samples tested. Each laboratory must establish a control chart consisting of at least three tests and no more than the 20 most recent. The EC50 for each test performed should fall within two standard deviations of the mean of the previous tests on the control chart. All test batches must include a negative control consisting of sediment from a common source (specified by the Regional Survey Toxicology Committee) and all components of the exposure system.

Water quality parameters (dissolved oxygen, pH, salinity and ammonia) should be made prior to test initiation on Day 0 and at test termination. Temperature should be monitored continuously. Daily observations should be made on each replicate with special attention to aeration, sediment condition and the presence of any invertebrates in the test sample.

The mean control percent normal-alive for each test batch must be 80% or greater. In addition, water quality parameters must be within acceptable limits.

Quality Assurance/Quality Control

QA/QC protocols will follow those of previous Regional Surveys (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityQAPlan.pdf). The selected contractor must be able to demonstrate proficiency of toxicity testing on whole sediments with *Eohaustorius* and with *Mytilus*. Prior to the analysis of samples, the test laboratory must document at least three prior tests for each species in which test acceptability was attained. In addition, the laboratory should have conducted at least three prior reference toxicant tests for each species so that a control chart can be constructed.

The selected contractor must participate in Regional Monitoring coordination meetings, one post survey data exchange meeting, and successfully complete both an amphipod survival test and mussel sublethal test interlaboratory comparison exercise, which will be conducted prior to sample testing. This exercise will include the analysis of field-

collected sediments and a reference toxicant test. Successful completion of this exercise by a laboratory will be evaluated using two criteria: 1) attainment of test acceptability criteria, and 2) agreement of results between laboratories.

2.5.2 Freshwater water column toxicity tests

Product

Freshwater samples will be tested for toxicity using the 7-day *Ceriodaphnia dubia* survival and reproduction test. The final product will be a computer file of the test results and associated test water quality specified by SCCWRP, including field order and analyte codes. In addition, a hardcopy report must be delivered that provides test endpoint summary statistics and a statement of quality assurance including descriptions of QA/QC deviations, if any. All data are due within 45 days of sample delivery and should be submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/).

Methods

The 7-d *Ceriodaphnia dubia* growth and reproduction test will be conducted according to EPA Method 1002.0 (USEPA 2002). Each sample will be tested at 100% concentration (no dilution) under static renewal conditions. Ten replicates are tested for each sample. A concurrent reference toxicant (e.g., copper) and a control consisting of laboratory dilution water is included in each test batch. The test endpoints are percent survival and number of offspring. Test solutions will be renewed daily and the organisms fed each day

Species identification should be verified through consultation with a taxonomist, if necessary. Individuals selected for testing should be visually inspected to confirm that they are the proper size and in good condition (i.e., no external damage). The tests will be conducted on the 100% sample concentration only. Dilutions of the samples will not be tested.

A reference toxicant test must be run with every batch of test samples in order to document relative test sensitivity and test precision. This test will consist of a concurrent exposure to five different concentrations of the toxicant dissolved in laboratory dilution water. Toxicant concentrations will be selected to provide an estimate of the median effect concentration and will be verified by chemical analysis of a midrange test concentration. Reference toxicant test results that fall outside of control chart limits (2 sd of mean) will trigger a review of test procedures and a possible retest of the corresponding samples.

Water quality of each sample will be measured throughout the exposure. Dissolved oxygen, conductivity, pH, and temperature of the test samples will be measured each day on both the water that has been in contact with the animals for 24 hrs and the water being used for renewal. Alkalinity, hardness, and total ammonia shall be measured on the test samples at the beginning of the experiment. Deviations in water quality will be noted on the data files and a synopsis given in the hardcopy summary report.

This toxicity test procedure is considered unacceptable if test acceptability criteria described in the method reference are not met. Reference toxicant results should also be within two standard deviations of the mean response specific to the laboratory. Water quality parameters (salinity, temperature, pH, and ammonia) should also be within the tolerance range of the test organism, as specified in the method reference.

Quality Assurance/Quality Control

The selected contractor must be able to demonstrate proficiency of toxicity testing with the species. Prior to testing, the laboratory must document at least three prior tests in which test acceptability was attained. In addition, the laboratory should have conducted at least three prior reference toxicant tests so that a control chart can be constructed.

The selected contractor must participate in at least one regional survey coordination meeting, one post survey data exchange meeting, and successfully complete an interlaboratory comparison exercise using the selected test method. The interlaboratory comparison exercise will be conducted prior to sample testing. This exercise will include the analysis of field-collected samples and a reference toxicant test. Successful completion of this exercise by a laboratory will be evaluated using two criteria: 1) attainment of test acceptability criteria, and 2) agreement of results between laboratories.

2.6 Bacteriological Analyses

Product

The goal of this work element is to measure public health indicator bacteria collected from fresh and marine surface waters. Samples are to be analyzed for total coliform, fecal coliform, enterococcus and *E. Coli*. The final product will be computer files in the pre-defined formats similar to previous Regional Monitoring Information Management Plan (http://ftp.sccwrp.org/pub/download/BIGHT18/Bight18SedQualityIMPlan.pdf) including field orders and analyte codes. All data are due within 30 days of sample delivery and should be submitted through relevant project data portals (https://www.sccwrp.org/about/research-areas/data-portal/).

Equipment

Bacteria samples must be analyzed by indicator-specific methods described below.

Methods and Analytical Holding Time

Total coliform, fecal coliform or *E. coli*, and Enterococcus will be analyzed using standard methods, within a 6-hour holding time from sample collection (Table 9). Methods may include membrane filtration, most probable number, and/or Idexx.

Quality Assurance/Quality Control

An intercalibration exercise among participating labs will be conducted. Participation in group meetings regarding intercalibration and quality control issues is required by all participating labs.

Table 1. Target analytes for sampling.

Analyte Group	Constituent	Marine Water	Sediment	Tissue	Freshwater/ Stormwater
General	Grain Size		X		
	TSS	X			X
	TDS				X
	TOC/TN		X		
Nutrients	TOC		X		X
	DOC	X			X
	TN	X	X		X
	TDN	X			X
	NH4	X			X
	NO2+NO3	X			X
	SiO4	X			
	Urea	X			
	TP	X			X
	TDP	X			X
	PO4	X			X
Carbonate Chemistry	pH	X			X
	total alkalinity	X			X
	dissolved inorganic carbon	X			X
Metals	Al		X		X
	Cd	X	X		X
	Cr	X	X		X
	Cu	X	X		X
	Fe	X	X		
	Hg	X	X		X
	Ni	X	X		X
	Pb	X	X		X
	Se				X
	Ag	X	X		X
	Zn	X	X		X
Organics	DDTs	X	X	X	X
	PCBs	X	X	X	X
	PAHs		X	X	X
	Chlordanes	X	X	X	X
	Dieldrin	X	X	X	
	Pyrethroids		X		X

	PBDEs		X	X	
Microbiological	Total Coliform Fecal coliform E. coli Enterococcus	X X X X			X X X X
Microplastics	Plastic particles				X*

*Drinking water only

Table 2. Detection limits for laboratories analyzing nutrients.

Target	Freshwater	Marine/Estuarine Waters	Sediments (dry wt)
Chlorophyll-*a*	0.01 µg L^{-1}	0.01 µg L^{-1}	
NH4	0.01 mg L^{-1}	0.02 - 0.2 µM	
NO3 + NO2	0.02 mg L^{-1}	0.05 µM	
PO4	0.0075 mg L^{-1}	0.01 µM	
SiO4	0.05 - 0.1 µM	0.05 - 0.1 µM	
Total dissolved nitrogen	0.2 µM	0.2 µM	
Total dissolved phosphorus	0.01 µM	0.01 µM	
Total nitrogen	0.2 µM	0.2 µM	
Total phosphorus	0.016 mg L^{-1}	0.01 µM	0.01%
Total Suspended Solids	0.5 mg L^{-1}	0.01 µg L^{-1}	
Total Organic Carbon	0.05 µg L^{-1}	0.005 µg L^{-1}	0.1%
Total Organic Nitrogen	0.05 µg L^{-1}	0.005 µg L^{-1}	0.1%
pH	± 0.01 pH units	± 0.01 pH units	
Total alkalinity	± 10 µmol/kg	± 10 µmol/kg	
Dissolved inorganic carbon	± 10 µmol/kg	± 10 µmol/kg	

Table 3. List of metals and target detection limits.

Target Analyte	Stormwater (µg/L)	Marine Water (µg/L)	Sediment (ug/g dry wt)
Aluminum	1		-[a]
Antimony			10
Arsenic	0.1		1.6
Barium			[a]
Beryllium			0.2
Cadmium	0.1	1	0.09
Chromium	0.1		16
Copper	0.1	1	7.0
Iron	1		[a]
Lead	0.05	1	9.3
Mercury	0.005		0.03
Nickel	0.1	2	4.2
Selenium	0.1		1.0
Silver	0.1		0.2
Zinc	0.1	5	30

[a] Must report a value above the detection limit.

Table 4. List of target analytes and detection limits for PCBs congeners.

Congener	Stormwater (ng/L)	Sediment (ng/g dry wt)	Tissue (ng/g wet wt)
8		1	1
11		1	1
18	1	1	1
27		1	1
28	1	1	1
29		1	1
31		1	1
33		1	1
37	1	1	1
44	1	1	1
49	1	1	1
52	1	1	1
56		1	1
60		1	1
64		1	1
66	1	1	1
70	1	1	1
74	1	1	1
77	1	1	1
81	1	1	1
87	1	1	1
95		1	1
97		1	1
99	1	1	1
101	1	1	1
105	1	1	1

Congener	Stormwater (ng/L)	Sediment (ng/g dry wt)	Tissue (ng/g wet wt)
110	1	1	1
114	1	1	1
118	1	1	1
119	1	1	1
123	1	1	1
126	1	1	1
128	1	1	1
137		1	1
138	1	1	1
141		1	1
146		1	1
149	1	1	1
151	1	1	1
153	1	1	1
156	1	1	1
157	1	1	1
158	1	1	1
167	1	1	1
168	1	1	1
169	1	1	1
170	1	1	1
174		1	1
177	1	1	1
180	1	1	1
183	1	1	1
187	1	1	1
189	1	1	1

Congener	Stormwater (ng/L)	Sediment (ng/g dry wt)	Tissue (ng/g wet wt)
194	1	1	1
195	1	1	1
201	1	1	1
203		1	1
206	1	1	1
209		1	1

TABLE 5. Target analytes and reporting levels for chlorinated hydrocarbons.

Target	Sediment (ng/g dry wt)	Tissue (ng/g wet wt)
o,p'-DDT	0.5	1.0
p,p'-DDT	0.5	1.0
o,p'-DDD	0.5	1.0
p,p'-DDD	0.5	1.0
o,p'-DDE	0.5	1.0
p,p'-DDE	0.5	1.0
p,p'-DDMU	0.5	1.0
cis-chlordane	0.5	1.0
trans-chlordane	0.5	1.0
cis-nonachlor	0.5	1.0
trans-nonachlor	0.5	1.0
oxychlordane	0.5	1.0
Dieldrin	0.5	1.0

TABLE 6. Reporting limits for PAH analytes.

Target Analyte	Stormwater (µg/L)	Sediment (ng/g dry wt)
Naphthalene	0.05	20
2-Methylnaphthalene	0.1	20
1-Methylnaphthalene	0.1	20
Biphenyl	0.1	20
2,6-Dimethylnaphthalene	0.1	20
Acenaphthylene	0.05	20
Acenaphthene	0.05	20
1,6,7-Trimethylnaphthalene	0.1	20
Fluorene	0.1	20
Phenanthrene	0.1	20
Anthracene	0.1	20
1-Methylphenanthrene	0.1	20
Fluoranthene	0.1	20
Pyrene	0.05	20
Benzo[a]anthracene	0.05	20
Chrysene	0.1	20
Benzo[b]fluoranthene	0.1	20
Benzo[k]fluoranthene	0.1	20
Benzo[e]pyrene	0.1	20
Benzo[a]pyrene	0.1	20
Perylene	0.1	20
lndeno[1,2,3-cd]pyrene	0.1	150
Dibenzo[a,h]anthracene	0.1	150
Benzo[g,h,i]perylene	0.1	150

TABLE 7. Pyrethroid analytes and reporting levels.

Target Analyte	**Sediment (ng/g dry wt)**
Bifenthrin	0.5
Permethrin	0.5
Cypermethrin	0.5
Cyfluthrin	0.5
Deltamethrin	0.5
Esfenvalerate	0.5
Lambda-cyhalothrin	0.5
Fenpropathrin	0.5
Fipronil	0.5
Fipronil sulfide	0.5
Fipronyl desulfinyl	0.5
Fipronil sulfone	0.5

Table 8. Target analytes and reporting levels for PBDE congeners.

Congener	Sediment Reporting Limit (ng/g dry wt)	Tissue Reporting Limit (ng/g dry wt)
BDE-17	0.1	0.5
BDE-28	0.1	0.5
BDE-47	0.1	0.5
BDE-49	0.1	0.5
BDE-66	0.1	0.5
BDE-85	0.1	0.5
BDE-99	0.1	0.5
BDE-10	0.1	0.5
BDE-138	0.1	0.5
BDE-153	0.1	0.5
BDE-154	0.1	0.5
BDE-183	0.1	0.5
BDE-190	0.1	0.5
BDE-209	1.0	5.0

Table 9. List of bacteriological target analytes and target detection.

Parameter	Target Detection Limit
Enterococcus	1 colonies/100 mL
E. coli /Fecal coliform	2 MPN/100 mL
Total coliform	2 MPN/100 mL

Table 10. Microplastics target size detection limit and number of particles in subsamples for spectroscopy

Parameter	Size detection limit	Number of particles in subsamples
Microplastics	50 µm	30

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SECTION 3. SPECIAL REQUIREMENTS AND INSTRUCTIONS

Bidders will be required to comply with the following special requirements and instructions during the performance of services rendered under this project:

3.1 Insurance

Bidders shall, at their sole expense, maintain in effect at all times during the performance of services awarded under this Proposal Form, general liability insurance providing for bodily injury liability and property damage liability. The combined single limits of liability for bodily injury or property damage shall be One Million Dollars ($1,000,000) for each occurrence and One Million Dollars ($1,000,000) aggregate, with the policy naming Southern California Coastal Water Research Project Authority as Additional Insured. Further, workers compensation insurance shall be held and maintained as required by applicable laws of the State of California with a minimum amount and limit of One Million Dollars ($1,000,000) for each accident. Bidders shall also hold automobile liability insurance (bodily injury and property damage liability), including coverage for all owned, hired, and non-owned automobiles, with the combined single limit of liability of Two Hundred Fifty Thousand Dollars ($250,000) for any one accident or loss. Bidders shall provide SCCWRP with evidence that policies providing such coverage and limits are in full force and effect within ten (10) days of the award of any contracts by SCCWRP. Such certificates shall provide that not less than thirty (30) calendar days advance notice will be given to SCCWRP prior to cancellation, termination, or material alteration of said policies of insurance.

3.2 Field Sampling Elements of Work

1. Possession of a valid Coast Guard license by the Captain of each boat utilized for field sampling is mandatory.
2. Possession of a valid scientific collecting permit by the cruise chief of each boat utilized for field sampling is mandatory.
3. All bidders for field sampling activities will be responsible for verifying the locations and depths of all sampling stations, and all stations must be plotted on North American (NAD) 1983 Datum charts.
4. All boats must have the ability to store collected samples using a refrigerator, freezer, or dry ice.
5. All samples collected must be delivered to SCCWRP or a designated laboratory within one week of collection, dependent on analysis requirements.
6. All containers, labels, and fixatives for field collections will be provided by SCCWRP.

SECTION 4. BID EVALUATION PROCESS AND CRITERIA

Following the opening of bids, SCCWRP will evaluate and score the bids received. Each work element of each bid submitted will be evaluated separately using the following criteria and scoring system, with a maximum possible score of 100.

1. Price (40 points): The lowest bid price will receive the maximum score of 40 points, with higher bids receiving scores proportional to the lowest bid price. If separate prices are provided for different quantities, SCCWRP will evaluate the bid based on the quantity of service that is most likely to be awarded.
2. Qualifications and experience (40 points): Each bid will be rated on a scale of 0 to 40 points, based upon the bidder's demonstrated experience using the methodologies and equipment required for the work, relevant experience of the bidder's staff members, and contingency planning for equipment and personnel due to weather, equipment failure, or other emergencies.
3. Survey/intercalibration experience (20 points): The regional survey data will be compiled from multiple sources. Consistency in procedures and measurements among data providers is important to the survey's success. Each bid will be rated on a scale of 0 to 20 points on the bidder's demonstrated experience in achieving similarity to others in cooperative surveys and intercalibrations. Points will be awarded for any intercalibration exercise or integrated multi-organization cooperative program. Preference will be given to those bidders with demonstrated comparability to other organizations participating in the southern California regional survey.

The bidder receiving the highest total score for each work element will be awarded a contract to perform the work. SCCWRP retains the right to award separate contracts for each of the work elements specified within the Proposal Form. SCCWRP also reserves the right to offer multiple contracts for the field surveys if there is sufficient geographical cost differentiation in the bids.

SECTION 5. PROPOSAL SUBMISSION

5.1 Bids

Bidders may submit bids for any or all of the work elements as detailed in this Proposal Form. The amount and locations of sampling stations, as well as the amount of samples for laboratory analyses, have not yet been determined. Bidders are asked to provide pricing for each element within the Scope of Work; at the bidder's discretion, bidders may provide one price or specify price breaks at different possible levels of effort as determined by the bidders, indicating the appropriate price differences for possible levels of work (i.e. cost per sampling site or sample analysis for 10-25, 26-50, 51-100, or 100-250 sites/samples). For field activities, if bid prices will differ due to geographic factors (i.e. by region), depth factors (i.e. 3-200 m, 200-500 m, or 500–1000 m), or distance from shore, indicate separate pricing for each region or depth. The actual number of sampling sites and samples to be analyzed will be determined prior to the execution of contracts with the successful bidder(s). For work elements not being bid, please indicate NO BID on the first line of those sections.

Field Sampling: Ocean and Embayments

1. Collect water column samples in ocean or saline embayment waters between Point Conception and the Mexican border. Includes both CTD profiling and sampling at 3 discrete depths.

	Pt Conception to Point Dume	Point Dume to Dana Point	Dana Point to the US/Mexico International Border	Channel Islands
3-60 m depth	$_____	$_____	$_____	$_____
60-200 m depth	$_____	$_____	$_____	$_____

2. Collect sediment samples in ocean or embayment between Point Conception and the Mexican border.

	Pt Conception to Point Dume	Point Dume to Dana Point	Dana Point to the US/Mexico International Border	Channel Islands
Estuaries (Push core/ Petite Ponar)	$_____	$_____	$_____	NA
Estuaries (Van Veen or Box Core)	$_____	$_____	$_____	NA
3-200 m depth (Van Veen or Box Core)	$_____	$_____	$_____	$_____
200-500 m depth (Van Veen or Box Core)	$_____	$_____	$_____	$_____
500-1,000m depth (Van Veen or Box Core)	$_____	$_____	$_____	$_____

3. Conduct trawls in ocean waters between Point Conception and the Mexican border.

	Pt Conception to Point Dume	Point Dume to Dana Point	Dana Point to the US/Mexico International Border	Channel Islands
3-200 m depth	$_____	$_____	$_____	$_____
200-500 m depth	$_____	$_____	$_____	$_____

4. Conduct Bongo net tows in ocean waters between Point Conception and the Mexican border.

	Pt Conception to Point Dume	Point Dume to Dana Point	Dana Point to the US/Mexico International Border	Channel Islands
0-10 miles from shore	$_____	$_____	$_____	$_____
10-20 miles from shore	$_____	$_____	$_____	$_____

5. Conduct SAV assessment between Point Conception and the Mexican border.

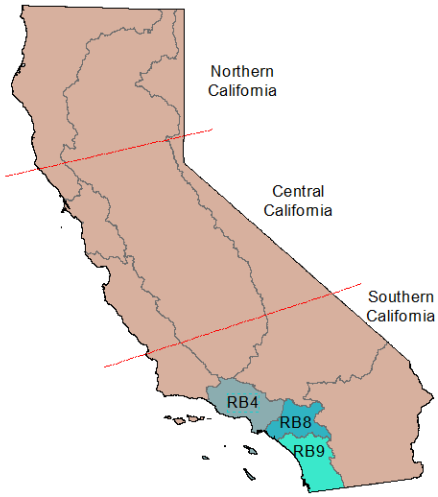
	Pt Conception to Point Dume	Point Dume to Dana Point	Dana Point to the US/Mexico International Border	Channel Islands
SAV Assessment	$_____	$_____	$_____	$_____

Field Sampling: Watersheds

6. Collect stormwater samples between Point Conception and the Mexican border.

	Urban	Non-Urban
Site Setup	$_____	$_____
Enclosed Space Premium	$_____	NA
Measurements and Sample Collection	$_____	$_____

7. Stream bioassessment



7a. Wadeable Stream Bioassessment

Number of samples	RB4	RB8	RB9	Other portions of Southern California	Central California	Northern California
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____

7b. Ephemeral Stream Bioassessment

Number of samples	RB4	RB8	RB9	Other portions of Southern California	Central California	Northern California
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____

8. Flow Stream Duration

Number of samples	RB4	RB8	RB9	Other portions of Southern California	Central California	Northern California
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____
_____	$_____	$_____	$_____	$_____	$_____	$_____

Laboratory: Chemistry

9. Laboratory analysis for nutrients.

Number of samples	Price per Sample		
	Stormwater	Marine water	Sediments
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

10. Laboratory analysis for bottle measurements of pH and total alkalinity of ocean water.

Number of samples	Price per Sample		
	pH	Total Alkalinity	Salinity
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

11. Laboratory analysis for general constituents.

Number of samples	Price per Sample		
	Stormwater	Marine water	Sediments
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

12. Laboratory analysis for trace metals.

Number of samples	Price per Sample		
	Stormwater	Marine water	Sediments
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

13. Laboratory analysis for Chlorinated Hydrocarbons and PCBs.

Number of samples	Price per Sample		
	Stormwater	Tissue	Sediments
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

14. Laboratory analysis for PAHs.

Number of samples	Price per Sample	
	Stormwater	Sediments
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____

15. Laboratory analysis for Pyrethroid pesticides.

Number of samples	Price per Sample Sediments	Price per Sample Stormwater
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____

16. Laboratory analysis for PBDEs.

Number of samples	Price per Sample	
	Sediment	Tissue
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____

17. Laboratory analysis for microplastics in drinking water.

Number of samples	Price per Sample
_____	$_____
_____	$_____
_____	$_____
_____	$_____

Laboratory: Biology

18. Analyze benthic infauna samples collected in:

18a) Ocean waters (3-500 m depth) between Point Conception and Mexican border, including the Channel Islands.

Number of samples	Price per Sample
_____	$_____
_____	$_____
_____	$_____
_____	$_____

18b) Saline estuarine waters between Point Conception and Mexican border.

Number of samples	Price per Sample
_____	$_____
_____	$_____
_____	$_____
_____	$_____

18c) Freshwater streams between Point Conception and Mexican border.

Number of samples	Price per Sample
_____	$_____
_____	$_____
_____	$_____
_____	$_____

Laboratory: Toxicity

19. Analyze sediment toxicity samples collected in ocean or estuarine waters.

Number of samples	Price per Sample	
	Eohaustorius	*Mytilus*
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____

20. Analyze water column toxicity samples collected in freshwater using *Ceriodaphnia dubia.*

Number of samples	Price per Sample
	Ceriodaphnia
_____	$_____
_____	$_____
_____	$_____
_____	$_____

Laboratory: Bacteriological

21. Laboratory analysis for Bacteria.

Number of samples	Price per Sample	
	Freshwater	Marine Water
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____

5.2 Additional Information to Accompany Proposal Form

The following additional information must accompany this Proposal Form as detailed below. This additional information must not exceed fifteen (15) single-sided pages, 12 point font, exclusive of resumes.

5.2.1 Statement of Qualifications

Bidders are required to submit a Statement of Qualifications detailing the following information pertinent to the elements of work being bid. The document should include the following:

a) a description of the firm;
b) a listing of environmental research and monitoring activities performed within the last five years;
c) a listing of equipment to be utilized to perform the work;
d) a listing of personnel that will perform the work (include resumes as an appendix);
e) a description of the bidder's participation in previous integrated multi-agency cooperative projects, including SCCWRP's 1994, 1998, 2003, 2008, 2013, or 2018 Regional Marine Surveys or Stormwater Monitoring Coalition Regional Watershed Surveys; and
f) a description of the bidder's participation in previous intercalibration exercises such as those sponsored by SCCWRP, Stormwater Monitoring Coalition and/or NOAA.
g) a description of the bidders contingency plan detailing methods to complete the work being bid under the time frames indicated in the event of vessel, personnel and/or equipment failure.

5.2.2 Certifications and Permits

Bidders are required to list all relevant certifications and permits necessary and/or desirable to perform the work being bid.

5.2.3. Certification Of Bidder

Name of corporation, partnership, or individual in whose behalf the bid is submitted:

Address: _____

City/State/Zip: _____

Phone: _____ FAX: _____ E-mail: _____

Tax Identification No.: _____

The full names and addresses of all persons and parties interested in the foregoing proposal as principals are as follows: (If bidder is a corporation or organization, give names of President, Secretary, and Treasurer; if bidder is a partnership, give the names of all partners.)

Name Title

I certify under penalty of perjury under the laws of the State of California that the foregoing representations are true and correct. Further, 1 certify that 1 have carefully examined the proposed work and the specifications as contained herein, and hereby propose to perform and complete all the work for this project as specified, in accordance with these specifications, and to furnish all materials and equipment necessary therefore to the satisfaction of SCCWRP, at the price(s) indicated within this document. In the event that this proposal is accepted by SCCWRP and the said work is awarded to the undersigned bidder, the said bidder agrees to sign and date, within seven (7) calendar days after it has been delivered or mailed to the bidder or its authorized agent, the Agreement for the performance of the work.

Signature of Bidder: _____

Title:_____ Date:_____