Los Angeles River Instream Flow Criteria: Technical Study

Scope of Work and Budget

September 13, 2018

Background

The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (collectively Water Boards) have invested heavily in promoting water reuse and recycling. However, reuse leads to potential reduction in stream flow, and the Water Boards are responsible for establishing flows for a variety of beneficial uses. Wastewater Treatment Plant dischargers seeking to reduce discharges associated with reducing flow in a stream for reuse (or any other purpose) must file a wastewater change petition and obtain approval under Water Code Section 1211 (1211 petition) from the State Water Board prior to reducing discharges. A key provision of the 1211 petition is to demonstrate that the reduced discharge will not unreasonably affect fish and wildlife, or other public trust resources.

Resolving the potential conflict between increased reuse and maintaining sufficient instream flows is challenging for two reasons. The first is technical, as the tools and processes for determining flow requirements that protect various beneficial uses are still in early stages of development. The State Water Board is currently funding development of the California Environmental Flows Framework (CEFF), a two-tier approach for setting environmental flow criteria. Tier 1 involves defining ecologically protective flow ranges based on reference hydrology for nine general stream classes in the state. The Tier 2 approach, which is just starting, provides a framework to develop specific flow criteria for different seasons necessary to protect specific species, habitats, or beneficial uses. Developing the Tier 2 framework includes a series of proposed case studies across the state demonstrating how watershed-specific analyses can be used to define flow targets for specific beneficial uses.

The second reason is procedural, as there is no established protocol for determining allocation of flow requirements when there are multiple dischargers or water users on a single water body. That circumstance has already materialized in the Los Angeles River (LA River), where the City of Burbank's 1211 petition for flow reduction associated with reuse was protested by another city, which asked the State Water Board to forestall that decision until a comprehensive environmental analysis could be completed to determine how much water should remain in the Los Angeles River. Although the most recent challenges have been addressed, the procedural concerns for equitable allocation of permission to reduce discharges for reuse remains.

A series of scoping meetings involving the State and Regional Water Boards, City and County agencies and land conservancies were held to develop an approach to help address the technical and procedural challenges associated with defining environmental flow targets for the LA River. This scope of work represents the outcome of those meetings and provides a science -informed approach for assessing flow needs and evaluating future 1211 petitions and other proposals for water capture, diversion and/or reuse.

Project Goal

The Los Angeles River Flow Study has two overarching goals. The first is to develop technical tools that quantify the relationship between various alternative flow regimes (which may include seasonal or annual needs for flow, such as presence and depth of pools, temperature, or flow timing, duration, frequency, or magnitude) and the extent to which beneficial uses are achieved. The second is to engage multiple affected parties in application of these tools to inform and solicit input about appropriate flow needs in the Los Angeles River. The ultimate outcome of this project is to provide technically sound recommendations and alternatives to the Water Boards for consideration and implementation of flow objectives.

Scope and Tasks

The following provides the scope of work and tasks that will be completed or led by SCCWRP. Note: Community Outreach is an essential actvitiy that is not included in this draft scope of work and budget, but will need to be incorporated into the project.

The process to achieving the project goals involves six activities. Underneath these activities are provided more detailed technical tasks.

Activity 1: Stakeholder and Technical Advisory Group Coordination.

Development of both the technical approach and implementation strategy should be informed by a robust stakeholder coordination process. The project will be coordinated through two advisory workgroups; a technical advisory group will be regularly consulted to help guide the analytical approach, and a stakeholder advisory group will provide input on decisions regarding the beneficial uses analyzed, the biological communities focused on, and implementation approaches considered. A series of meetings or workshops will be held with key stakeholders to solicit their input and participation in the overall process and in defining desired outcomes. Stakeholders may include other regulatory agencies, discharger agencies, other public or private entities, or non-governmental organizations. State and regional water board staff will oversee the stakeholder process. Under this task, the technical team will provide summary materials on the project process and products that can support the stakeholder process and will participate in the stakeholder workgroup meetings to help answer technical questions and respond to suggestions.

SCCWRP (technical team) will lead the technical workgroup. This will include providing materials for review and facilitating discussion among the technical workgroup that will serve to provide technical review of analytical approaches and draft products.

Products: Agendas, presentation materials, and meeting summaries for the technical and stakeholder advisory workgroups.

Activity 2: Non-aquatic Life Beneficial Use Assessments.

The LA River supports a suite of non-aquatic life beneficial uses, such as recreation, fishing and kayaking. Existing information will be compiled on these uses and the hydrological needs necessary for their support.

Task 2A: Characterize non-aquatic life uses. The goal of this task is to identify the prevalence of non-aquatic life uses, such as recreation and fishing, in various reaches of the LA

River. A preliminary set of current and potential uses will be developed by the project team and vetted through the stakeholder advisory workgroup. The goal of this task is not to "define the beneficial uses" but to summarize activities that occur (or could occur in the future) associated with each use, in each reach of the river. The uses will be related to specific indicators to determine the basis for potential flow criteria.

Product: Map of specific non-aquatic life uses and associated indicators by reach of the LA River

Task 2B: Determine flow-use relationships for priority beneficial uses. A conceptual assessment approach will be developed for each beneficial use that allows changes in flow to be related to changes in use that exceed specific levels designated important from a management perspective. Focused group surveys will be conducted with knowledgable stakeholder groups to help determine hydrologic needs associated with each use. The ultimate flow-use relationships will be based on the stakeholder input, expert judgement, and/or empirical relationships.

Product: Draft and final technical memo summarizing non-aquatic life beneficial uses, flow-use relationships and the associated flow targets necessary for their support.

Activity 3: Aquatic Life Beneficial Use Assessments.

This activity will involve applying the Tier 2 California Environmental Flows Framework for the Los Angeles River. The State's Tier 2 framework includes the following basic steps, which will need to be evaluated and possibly adapted for their application to the Los Angeles River:

- Characterize aquatic life uses
- Assess hydrologic baseline conditions
- Identify priority ecological endpoints of management concern
- Determine flow-ecology relationships for priority ecological endpoints
- Determine appropriate hydrologic and ecologic tools for analysis

Task 3A: Assess hydrologic baseline conditions. The Los Angeles River has been the subject of past and ongoing hydrologic studies by entities including Colorado School of Mines/UCLA, City of Los Angeles, Cities of Glendale and Burbank, and the Army Corps of Engineers. In addition, there are a range of past reports an analysis ranging from the 1962 Final Report of Referee for the Upper Los Angeles River Area to the recent Enhanced Watershed Management Plan (EWMP). This task will compile and review results from existing hydrologic studies to determine existing conditions relative to ecologically relevant hydrologic metrics. Data gaps associated with differences in the objectives of past studies relative to the goals of this study will be identified to guide subsequent hydrologic analysis.

Product: Summary of baseline hydrology and identification of data gaps

Task 3B: Identify priority ecological endpoints of management concern. The CEFF uses benthic invertebrates and fish as the primary ecological endpoints, largely because of the large amount of data on these organisms. However, other groups, such as amphibians, birds, or riparian habitat may be important for the determination of flow criteria for the Los Angeles River. This task will identify key ecological endpoints and their locations in the river, and prioritize them based on stakeholder interest, relevance to the goals of the study, and

availability of data and analytical tools. Hydrologic needs of each species or habitat will compiled to support future analysis of flow-ecology relationships.

Product: Ranked list of priority ecological endpoints and summary of available data on species distributions and flow-ecology relationships

Task 3C: Determine flow-ecology relationships and targets for stream and riparian endpoints. This task will focus on developing (or refining) the conceptual flow-ecology models and targets for riparian ecological endpoints . This task will provide targets for organisms for which the basic flow-ecology relationships have already been (or are currently being) developed as part of an ongoing project on the LA River; specifically, benthic invertebrates and focal vertebrate species identified as part of the ongoing Regional Water Board project investigating climate change induced flow changes on instream vertebrate communities (3 fish, 2 birds, 1 reptile, 1 amphibian). The conceptual models outline the key flow characteristics, seasonality, and desired variability necessary to support the priority ecological endpoints. Flow targets build from flow-ecology relationships by identifying thresholds of response that that can serve as quantitative management criteria They form the foundation for quantitative analysis of flow needs and provide an important platform for discussion among the stakeholders of where analysis should be focused.

Product: Flow-ecology models and preliminary flow targets for each reach of the LA River, based on benthic invertebrate and focal vertebrate communities.

Task 3D: Determine flow-ecology relationships and targets for non-riverine ecological endpoints. This task will expand the analysis of flow-ecology relationships to include additional habitats and species, specifically those associated with emergent marsh habitats and tidal flats located near the mouth of the river. Similar to Task 3C, this task will develop the conceptual relationships between hydrologic properties and probability of occurance for marsh and estuarine species. These relationships will be used with hydrologic analysis to produce putative flow-ecology targets for these additional ecological endpoints.

Product: Flow-ecology models and preliminary flow targets for emergent marsh and estuarine habitats and species of the LA River.

Activity 4: Apply Environmental Flows Framework to quantify effects of flow modification on the Los Angeles River and evaluate management scenarios.

For this activity, we will apply the CEFF framework to assess the effects of wastewater reuse and other flow management actions on aquatic and non-aquatic life uses in the Los Angeles River. Scenarios that will be analyzed will be developed in coordination with the project's technical advisory and stakeholder committees.

Task 4A: Determine appropriate hydrologic tools and update modeling for analysis. For this task, we will enhance the existing hydrologic model for the LA River watershed to accommodate the goals of this project. Colorado School of Mines (CSM) has an established hydrologic/stormwater model for the LA River watershed that was previously implemented for the LA Sustainable Water Project. The model will be discretized to improve spatial resolution, expanded to include a reach hydraulic model, and refined with new data and information to provide baseline daily flows for all applicable reaches of the LA River. These baseline flows will be used in subsequent tasks to assess potential effects of flow modification.

Product: Hydrologic and hydraulic models for use in scenario analysis for the Los Angeles River

Task 4B: Analyze tolerances of river to flow modifications. Hydrologic models will be used iteratively to evaluate how sensitive different aquatic life and non-aquatic life endpoints are to flow alteration. The resulting tolerances will be used to define a range of flow conditions that should be considered "protective" for each ecological endpoint (i.e. how far can flow deviate from the defined reference targets before ecological impacts occur). These ranges will be used to support development of preliminary flow criteria.

Product: Flow tolerance ranges of riparian habitat, benthic invertebrates and focal vertebrate species

Task 4C: Analyze wastewater reuse scenarios. The effect of changes in discharge and flow in the LA River associated with proposed wastewater reuse scenarios will be evaluated to determine the potential effects on the priority beneficial uses. Changes in flow associated with reduced discharge will be modeled to determine the effect on beneficial use indicators. The results will be used to produce a map of potential effect" by river reach and beneficial use.

Product: Map of potential effects on beneficial use associated with proposed wastewater reuse scenarios.

Task 4D: Evaluate stormwater capture scenarios. This task would involve modeling the effects of various stormwater management scenarios on ecological endpoints and assessing potential effects on proposed flow criteria. Stormwater capture may occur in tributaries, storm drain conveyance systems, or on the mainstem river (e.g. through use of rubber dams) and can include capturing elements of both dry season and (some) wet season runoff. Stormwater capture scenarios will be developed with the local municipalities and appropriate stakeholder groups and may also include the effects of Low Impact Development (LID) or conservation practices that reduce runoff to the river.

Product: Map of potential beneficial use effects associated with proposed stormwater capture in combination with wastewater reuse scenarios

Task 4E: Evaluate groundwater interactions. This task would expand the watershed model to include groundwater-surface water interactions. Groundwater discharge is a significant component of the hydrology in specific reaches of the LA River (e.g. Glendale Narrows). This task would allow for more direct consideration of the relative influence of changes in recharge or discharge, wastewater reuse or stormwater capture on groundwater discharge and subsequent environmental flows.

Product: Map of potential beneficial use effects associated with groundwater interactions in combination with wastewater reuse scenarios

Task 4F: Evaluate habitat modifications to offset flow reduction impacts. This task would explore options for mitigating flow impacts by creating improved physical habitat. The results could provide a mechanism for enhancing biological conditions (as well as non-aquatic life uses) in the stream as an offset to modified flow regimes. The task would provide a means of balancing costs for physical habitat alterations against the value of the water that could be recovered. Habitat restoration scenarios would be developed in coordination with stakeholder groups and in consultation of existing restoration/revitalization plans.

Product: List of potential habitat restoration projects; Map of potential beneficial use associated with habitat restoration

Task 4G: Evaluate effects of flow alteration on tidal portions of the river. This task would evaluate the effects of flow alteration on the tidal portion of the LA River. The lowest reaches of the river are subject to bidirectional flow that produces habitat similar to tidal mudflats. This habitat is known to support a diverse assemblage of wading shorebirds. This task would develop a hydrologic model able to simulate bidirectional flow that, along with the flow-ecology relationships for wading shorebirds, would be used to assess the effect of wastewater and stormwater management on estuarine habitat.

Product: Map of potential beneficial use effects on the tidal portion of the LA River associated with the various scenarios evaluated.

Task 4H: Establish recommended flow criteria with stakeholder group. The results from previous tasks will be used to develop recommended flow criteria for each reach of the LA River. Criteria may also vary by season or type of year. This task will be done in conjunction with project partners and will focus on integrating across all beneficial uses vs. being driven by desired conditions for each individual ecological endpoint.

Product: Technical memo/report summarizing the assessment process and providing recommended flow criteria by reach of the LA River (and season).

Activity 5: Adaptive monitoring and management during implementation.

Ongoing monitoring will be a key element of any implementation program. A robust monitoring strategy will provide data that can be used to validate model predictions, inform adaptive management strategies, and improve models for future applications or scenario assessments. We will work with the stakeholders and Water Board to develop monitoring recommendations that will provide a way to evaluate the actual effect of altered flow on instream biological communities and other non-aquatic life related beneficial uses. Monitoring data can be used to inform adaptiveimplementation management strategies and to improve models for future applications.

Product: Proposed monitoring strategy

Activity 6: Summary of Results/Reporting.

The products of all project tasks will be compiled into an overall project report that summarizes the process used, technical approach and key findings of the project. Recommendations for implementation and future investigations will also be provided. A draft report will be produced for review by the technical workgroup and the stakeholder workgroup. Comment received from these two groups will be addressed to the extent possible before the report is finalized.

Product: Draft and final project report

Project Budget and Schedule

A budget for the technical elements of this scope of work is provided in Table 1. The costs are based on implementation through a partnership of the Southern California Coastal Water Research Project Authority (SCCWRP) and the Colorado School of Mines (hydrological modeling). The project costs also assume that the Los Angeles Regional Water Board will be responsible for coordinating stakeholder involvement in the project.

In addition to the technical elements included in this scope, the State Water Resources Control Board and the Los Angeles Regional Water Quality Control Board have already committed $1.4 million and $300,000, respectively to support this through existing contracts focused on developing tools for assessment environmental flow requirements. The State and Regional Water Boards will also provide ongoing staff resources to support the project, as described previously in this scope of work. This funding is supporting foundational science products that are directly usable for this project. Costs for any future CEQA analysis that may be necessary are not included in the current budget.

Table 1: Overall Project Budget

Activity/ Task	Cost
Activity 1 - Stakeholder coordination	**$61, 600**
Activity 2 - Non-aquatic Life Use Assessment	**$40,000**
2A - Characterize non-aquatic life uses	$7,500
2B - Determine flow use relationships	$32,500
Activity 3 - Aquatic Life Beneficial Use Assessment	**$215,000**
3A - Assess hydrologic baseline condition	$20,000
3B - Identify priority ecological endpoints	$20,000
3C - Determine flow ecology relationships for stream endpoints	$20,000
3D - Determine flow ecology relationships for marsh and estuary endpoints	$155,000
Activity 4 - Apply Environmental Flows and Evaluate Scenarios	**$772,000**
4A - Update hydrologic modeling	$262,650
4B - Analyze tolerances to flow modifications	
4C - Analyze wastewater reuse scenarios	
4D - Evaluate stormwater management scenarios	$72,100
4E - Evaluate groundwater interaction scenarios	$66,950
4F - Evaluate habitat restoration effects	$70,000
4G - Evaluate flow alteration effects on tidal portion of LA River	$267,800
4H - Establish recommended flow criteria	$32,500
Activity 5 - Monitoring and Adaptive Mangement Plan	**$50,000**
Activity 6 - Summary of results/reporting	**$25,000**

TOTAL	$1,163,600

The project schedule is shown in Table 2 and assumes a start date of October 1, 2018. Delays in the start date would translate to a shift in the overall project schedule.

Table 2: Project Schedule

Activity / Sub-Tasks	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4
Activity 1 - Stakeholder coordination	X	X	X	X	X	X	X	X	X
Activity 2 - Non-aquatic Life Use Assessment									
2A Characterize non-aquatic life uses	X	X							
2B Determine flow use relationships		X	X						
Activity 3 - Aquatic Life Beneficial Use Assessment									
3A Asses hydrologic baseline condition	X	X	X						
3B Identify priority ecological endpoints	X	X							
3C Determine flow ecology relationships for stream endpoints		X	X						
3D Determine flow ecology relationships for marsh/estuary endpoints		X	X	X					
Activitiy 4 - Apply Environmental Flows and Evaluate Scenarios									
4A Update hydrologic modeling		X	X	X	X				
4B Analyze tolerances to flow modifications				X	X	X	X	X	
4C Analyze wastewater reuse scenarios			X	X	X				
4D Evaluate stormwater management scenarios					X	X	X	X	
4E Evaluate groundwater interaction scenarios				X	X	X	X		
4F Evaluate habitat restoration effects					X	X	X	X	
4G Evaluate flow alteration effects on tidal portion of LA River		X	X	X	X	X	X	X	
4H Establish recommended flow criteria							X	X	X
Activity 5 - Monitoring and Adaptive Mangement Plan								X	X
Activity 6 - Summary of results/reporting									X

Point of Contact:

Eric Stein, Principal Scientist, Southern California Coastal Water Research Project (SCCWRP)

715-755-3233, erics@sccwrp.org