Los Angeles River Instream Flow Criteria Technical Study
Progress Report – November 4, 2020
Covering the Period Ending September 30, 2020

Project Overview

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 adequate flows for a variety of beneficial uses. Wastewater Treatment Plant dischargers seeking to reduce discharges associated with reducing flow in a stream for reuse 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. Key considerations of appropriate levels of environmental flows include demonstrating that the reduced discharge will not unreasonably affect fish and wildlife, or other public trust resources.

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 regarding 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.

Major Accomplishments in the Past Quarter

Activity 1: Stakeholder and Technical Advisory Group Coordination

The Stakeholder Workgroup (SWG) met on September 28th, 2020 (virtually) and received an update on the status of the project and progress toward completion of the technical studies. The focus of the discussion was on development of outreach materials (PowerPoint slides, fact sheets, etc.) to help keep local communities informed on the status of the project.

Working with the Council for Watershed Health, we convened a meeting of the recreational uses workgroup on October 28th, 2020 (virtually). This workgroup focused on refining flow needs for key recreational uses in the LA River. Through a series of breakout sessions, the workgroup refined the list of key flow-dependent uses for specific reaches of the river, including fishing, swimming/wading, kayaking, cleanups, and educational events. The workgroup recommended specific depth and flow needs for recreational uses in Sepulveda Basin, downtown LA section, Glendale Narrows, the Rio Hondo-LA River confluence, and Long Beach (lower river). These recommendations will be incorporated into development of final flow recommendations.

A combined meeting of the Technical Advisory Committee and the SWG has been scheduled for December 18th, 2020. This meeting will focus on a process for synthesizing flow recommendations

based on the needs of multiple species and for evaluating scenarios involving reduced wastewater discharge, reduced storm drain discharge and increased stormwater capture.

Activity 2: Non-aquatic Life Beneficial Use Assessments.

The final report on the recreational use survey was published in September 2019 and is available on the SCCWRP web site. Prior to its release, the draft report was reviewed by the stakeholder and technical workgroups.

The report found that the most popular uses along the Los Angeles River are walking (walking use were grouped with running, jogging, and dog walking activities), biking, and art/photography. Based on interviews with recreational experts, the activities that occur in channel require sustained, but relatively reduced flow. Experts thought that water quality was an important indicator for all recreational uses and indicated that the volume of water that now flows along the River helps to dilute contaminants. Though recreational experts could not identify a volume that would help in maintaining water quality, they thought there needed to be enough water volume so that smell, excessive algal growth, and bio-accumulating contaminants would not cause nuisance or harm to people or wildlife. Basic flow requirements for kayaking in Reach 3 were also identified. The results of the recreational use assessment were released in July 2019.

A follow up workshop was held with the recreational uses' workgroup in October 2020. During this meeting, preliminary flows necessary to support focal species were presented. The workgroup helped refine these preliminary recommendations to account for recreational uses. In general, flows recommended by this workgroup were compatible with flows necessary to support focal species. Kayaking needs were generally in the 1-3-foot range, while fishing can occur at slightly deeper depths. Most flow-dependent recreational needs occur in the Glendale Narrows, Sepulveda Basin and lower LA River (Reach 1) sections.

Activity 3: Aquatic Life Beneficial Use Assessments

Assessment of aquatic life use needs is based on coupling a hydrology and hydraulics model with species-occurrence models to predict the flow conditions necessary to support key species of interest (i.e. focal species).

We have created a coupled hydrologic (unsteady state EPA SWMM) and hydraulic model (steady state HEC-RAS) of the system. The model provides hourly data (both discharge and other hydraulic variables) from water year 2011 to 2017. The time frame was selected due to the availability of high-quality continuous data and WRP information. Although this period was slighter drier than "typical", the project's Technical Advisory Committee felt it provided a slightly conservative, but appropriate baseline for comparison of future scenarios. More specifically, we have completed the following:

- **Hydrology model:** A runoff model of the basin using spatially interpreted precipitation data was created with EPA SWMM. A low flow (dry weather) hydrologic model was incorporated into the runoff model based on observed wastewater discharge, groundwater upwelling, dam releases, and dry-weather urban runoff (e.g., irrigation return flows). Calibration of flows in the hydrologic model is complete. An autocalibration algorithm was utilized to select optimal parameters at 7 gage stations.

- **Hydraulic model:** The hydraulic model (HEC-RAS) has been created, and calibrated and validated at five gage locations. Rating curves were developed to relate discharge to stage, velocity, shear and stream power at key model output nodes. The hydraulic model was expanded to include Sepulveda basin. Cross-sectional field data collected in June was used to validate select soft bottom reaches in Sepulveda Basin and Glendale Narrows.

- **Water temperature model:** We simulated the baseline river temperature variations using the mechanistic river temperature model on Los Angeles River and its two major tributaries, Rio Hondo and Compton Creek. We simulated river temperature on 5 control points on the Los Angeles River's main stem from immediately downstream of the Sepulveda Dam to the Compton Creek and Los Angeles River confluence. We also simulated river water temperature on the tributaries with one control point for each of them. The considered interval for all the simulations was 100 m meaning that we generated simulated river temperature data in every 100 m for the desired reaches. The modeled baseline temperature estimates on control points were used to calculate the three ecologically meaningful temperature metrics including Maximum Weekly Maximum Temperature (MaxWMT), Maximum Weekly Average Temperature (MaxWAT), and Minimum Weekly Minimum Temperature (MinWMT).

We previously compiled all readily available data from surveys and species/habitat databases. Based on input from the TAC, we have refined the following focal habitats, and associated keystone species:

- Cold water habitat – these habitats may not currently occur, but could potentially occur in the future
- Cold water migration habitat – this habitat overlays the entire study area, with an emphasis on the mainstem from the estuary to the confluence with Arroyo Seco.
- Wading shorebird habitat
- Freshwater marsh habitat
- Riparian habitat
- Warm water habitat – as a surrogate of non-native species habitats

We have mapped the habitat locations, compiled data on species that occur in each habitat and identified endmember species that represent the range of tolerances for each habitat. These have been reviewed by our TAC and stakeholders. Project team members have visually surveyed the river to better understand habitat distributions and quantitatively survey bed topography, particularly in soft bottom reaches of Sepulveda Basin and Glendale Narrows. We have designed a conceptual modelling approach that relies on developing response curves (or in some cases thresholds) that can be used to help determine when a species is less likely to occur because a specific life history need cannot be fulfilled. Each species is separated into life stage and the model is built depending on the life stage response to its associated habitat conditions (i.e. substrate, depth, velocity & temperature, or related variables). The probability of occurrence is evaluated for individual life stage.

Over the past quarter, we completed the baseline conditions report summarizing the methods, results, and products from Task 3. Major findings of the baseline conditions report suggest:

- Flow conditions are at least partially suitable to support freshwater marsh habitat, as indicated by *Typha*, which is consistent with field observations. This is not surprising given that marsh habitat is generally an early successional habitat when water (and substrate) are present and velocities are sufficiently low. Furthermore, these habitats rapidly recover following disturbance from high flows or mechanical clearing.

- Flows can generally support riparian habitat along the LA River, as indicated by the high suitability for willow seedlings. However, current modeling suggests that the River generally cannot support adult willows. This is likely due to either an artificially low stream power criteria in the model, which can be revisited, or to seasonal scouring winter flows, or a combination of two.

- The lower LA River is characterized by flows that have a high probability to support wading shorebirds based on suitable flows for Cladophora. Although flows that can support Cladophora are present throughout the study area, for this study, we are specifically interested in Cladophora as an indicator of the ability to support foraging shorebirds in the tidal portions of the river.

- Although temperatures are too warm to support coldwater fish species, such as the Santa Ana Sucker, the river currently has flows that are at least partially suitable for coldwater fish. This suggest that if temperature and substrate condition were to be improved, flows would be appropriate for these species.

- Conditions are generally not conducive to steelhead migration except in the lowest reaches of the river, suggesting that both flow and habitat/substrate modification would be necessary to support migration.

The report was reviewed by the TAC and is the process of being finalized based on their input.

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

Based on discussions with the TAC, we have developed an approach for evaluating management scenarios using sensitivity curves. This approach provides flexibility in terms of management options that can be considered and allows for defining ranges of acceptable flow metrics. We have started with a series of model runs to develop sensitivity curves and are working on creating heat maps of the certain combinations of management actions that meet criteria. We have completed preliminary scenario runs for water reuse with initial hydrologic/hydraulic model outputs, based on a general percent of reuse scenarios. The preliminary results demonstrate how the final data may be displayed through interactive and online plots and will be refined over time in coordination with the TAC and stakeholder groups. During the next quarter, we will expand the sensitivity curves approach to include ranges of future conditions that may also be affected by stormwater capture.

Currently, we are also working on the approach to apply species habitat suitability to the management scenarios by relating the hydraulic variables to the WRP discharge. We aim to produce flow

recommendations that consider spatiotemporal aspects of each species life history relative to ranges of potential future changes in WRP discharge.

Activities 5 And 6: Adaptive Monitoring and Management Plan and Summary Project Report.

No progress has been made yet on Activities 5 and 6, which involve developing a monitoring program and drafting the final project report.

Activity 7: Assess Water Quality Effects of Flow Modifications on the LA River.

We have finished compiling a water quality database containing metals, suspended solids, conductivity, and nutrients data dating back to 2005 from a variety of different sources, including Mass Emissions Stations, MS4 discharge data, CEDEN, and the Los Angeles River Watershed Monitoring Program. WRP effluent data was obtained from Discharge Monitoring Reports. A water quality module has been added to the calibrated hydrologic SWMM model. Percent land use and event mean concentrations, which are inputs for the model, have been obtained from Southern California Association of Governments and SCCWRP respectively. Compton Creek tributary has been successfully calibrated and segments along the mainstem are in the process of calibration.

We have also begun to identify specific restoration strategies involving riparian vegetation shading effect and substrate enhancement. We have modeled temperature effects of these potential scenarios and shown that together, they have the potential to reduce temperatures to ranges that could support cold-water species. We are currently studying the thermal impacts of the restoration scenarios suggested by the USBR on Los Angeles River during the migration season. The considered scenarios include depth and manning's roughness increase and adjusting the top width on low flow channel. This modeling will be expanded to include effects of hydrologic changes on restoration actions.