Los Angeles River Instream Flow Criteria: Technical Study

Technical Advisory Committee Meeting (Webinar) #5

May 12, 2020

Meeting Objectives:

- Review conceptual models for willow and SA sucker
- Receive feedback on development of species response curves
- Review preliminary spp life history information for additional focal species

Meeting Time and Location:

May 12, 2020, 1:00 – 4:00 pm
WEBINAR ONLY
Webinar Recording: https://vimeo.com/418215248

Participant	Affiliation
AJ Keith	Stillwater
Ali Poste	
Andrea Dell'Apa	Council for Watershed Health
Andy Collison	ESA Consultants
Anthony Hicke	ULARA Watermaster
Anthony Nercessian	LA DWP
Charlie Yu	LA Watershed Protection Division
Chris Medak	USFWS
Dan Schultz	SWRCB - Division of Water Rights
Dean Wang	Long Beach Water Department
Derek Booth	Stillwater
Dian Tanuwidjaja	Long Beach Water
Doug Chambliss	
Doug McPherson	USBR
Edward Belden	LA Mayor- LA River Works
Flor Burrola	LA Bureau of Sanitation
Ginachi Amah	LARWQB
Hassan Rad	LA City
Heather Rhee	Long Beach Water Department
Jane Tsong	WCA
Jenny Newman	LARWQB
John Randall	The Nature Conservancy
Johnathon Truong	
Katherine Pease	Heal the Bay

Project Team:	
Eric Stein	SCCWRP
Katie Irving	SCCWRP
Jenny Rogers	SCCWRP
Kris Taniguchi-Quan	SCCWRP
Liesl Tiefenthaler	SCCWRP
Annie Holt	SCCWRP
Jhen Cabasal	SCCWRP
Megan Mirkhanian	SCCWRP
Terri Hogue	Colorado School of Mines
Jordyn Wolfand	University of Portland
Reza Abdi	Colorado School of Mines
Victoria Hennon	Colorado School of Mines
Jonathan Bishop	SWRCB
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Tatyana Isupov	SWRCB
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Kelly Schmoker	CDFW
Manuel Aguilar	LA DWP
Mary Ngo	CDFW
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Matt Drenner	Stillwater
Melanie Tory	
M. Evans	
Michael Affeldt	LA City
Michael Lyons	MBC Aquatic Sciences
Miller Zou	
Milo ?	
Nathan Holste	USBR
Patrizia Hall	Long Beach Water
Rafael Villegas	LA DWP
Ralphy's iPhone	
Richard Tavolacci	LA City
Rosi Dagit	RCD Santa Monica Mountains
Sabrina Drill	UC Extension
Sam Ward	
Sarah Yarnell	UC Davis
Seth Carr	LA City
Shirley ?	
Stephen Opot	LA City
Steve Slack	
Steven Webb	LARWQB
Tricia Lee	SWRCB
Wendy Katagi	Stillwater
Yao K	

Agenda:

1. Introductions and meeting goals – 1:00-1:15
   a. Recap from last TAC meeting
2. Review conceptual models of spp response – 1:15 – 2:00
   a. Willow
   b. Santa Ana Sucker
3. Development of continuous response curves – 2:00 – 2:45
4. Preliminary review of new focal species – 2:45 – 3:45
   a. Freshwater marsh species
   b. Warm water/invasive species
5. Wrap-up, action items and next steps – 3:45 – 4:00

Key TAC Recommendations:

- Microhabitats:
    - Spatially interpolate between cross sections when modeling habitats for a reach
    - Attempt to add detail on cross sections with more complex habitats
- Santa Ana Sucker:
    - For the depth probability curve, do not rescale the y-axis to 0-1
    - Include a description of the validation process in the caveats and limitations for all species models
    - Model contextualization: proposed co-dependent variables approach but response from TAC was to stick to limiting factors approach

    - Develop an hypothesis of different parts of the hydrograph, what's important, and how the model results will translate to the species
    - Ensure data used in probability curve represents data observed in the field and that all available data sources are included. Check to see of recent USGS data (Brown and May) is included
- Typha spp:
    - Consider the uneven complexity in the various focal species models given that some species have more detailed data available and others do not

Action Items:

- Microhabitats:

    - Look into multiple different outputs from HEC-RAS model and the ability to subdivide the cross sections in different ways – follow up with Andy and Nathan
- Santa Ana Sucker:
    - Follow up with Larry Brown regarding sucker data from Santa Ana River --> see if we can use the data and review the report [UPDATE: we have this data and already incorporated it into the curves, but we will revisit based on TAC feedback]
    - Circle back with TAC via email or phone: TAC to review curves and give a gut check that it matches what they know about life history needs
        - Follow up on additional data/reports we do not have (Rosi/Sabrina)
    - TAC to fill out co-dependent variables' spreadsheet and curves (2 weeks): decide if we should include co-dependencies in analysis given the defensibility of shifting curves based on available data/knowledge
- Groundwater:
    - Follow up with Rafael and Anthony regarding groundwater management and ability/desirability of including groundwater in the analysis
- Typha:
    - Complexity of Typha model: TAC to think about the benefits of using a more complex approach that includes quality of habitat in addition to just occurrence. Our default is to use the simpler approach unless the TAC expresses a strong feeling otherwise
- Additional focal species:
    - Wendy to send document on Bouquet Canyon Creek stickleback tech memo [update: already have this report, in metadata sheet as SMEA 1995]

Detailed Meeting Notes:

Introductions/meeting goals:
- Reminder: sent TAC materials in advance including agenda, ppt (minor changes to organization and wordsmithing, no new material added), summary tables + bibliography, metadata of reports/studies we found so far

Micro-habitats:
- Based on previous TAC recommendation: Instead of one average value for the entire cross section, we manually adjusted HEC-RAS to get outputs at 3 locations in a cross section (e.g. left, center, right)
    - Better representation of hydraulic conditions at different bed features (e.g. pools, sand bars, shallow riffles)
- Rosi Dagit: do you get different hydraulic measurements when you split the channel in that way? Are you removing the impacts of the concrete walls when doing this?
    - Kris Taniguchi-Quan: No, we should get a more accurate representation of the hydraulic conditions when you split the channel in this way compared to getting one average value across the entire cross section. The concrete channel walls will still have an impact on overall conditions.
- Nathan Holste: you can get more than 3 outputs from HEC-RAS at equal width intervals. Have you considered diving the chanel in more detail?
    - Kris Taniguchi-Quan: no, we split the channel at very specific points to capture the different bed features. We will follow up with you offline to get more information.
- Andy Collison: did you run into instabilities in HEC-RAS with the way that you split the channel? In your example, the main channel (sand bar) would have zero flow and the LOB/ROB would have flow during some lower flow events.
    - Jordy Wolfand: Daniel from Colorado School of Mines was the person who built and ran the HEC-RAS model and he did not run into instabilities. He generated a series of rating curves for the different sections, so that may be a reason why he didn't see any instabilities
    - Andy followed up offline: he double checked and did not see a problem with the way that we split up the channel with a dry middle section
- Nathan Holste:
    - ==Recommendation==: spatially interpolate between cross sections when modeling habitats for a reach
    - ==Action item==: Look into multiple different outputs from HEC-RAS model and the ability to subdivide the cross sections in different ways – follow up with Andy and Nathan

Habitat modeling approach and thresholds of response:
1. Compile habitat requirements for life history phases
2. Coalesce available data for each life stage and environmental variable
3. Create species' response curves: life stage ~ environmental variable
4. Apply management scenarios to response curves to estimate habitat suitability

SA sucker: Probability Curves

- Previous recommendation from TAC: Explore use of continuous functions (i.e. response curves) vs. binned thresholds (i.e. suitable or unsuitable bins) for habitat modeling
    - Presented approach to developing continuous curves from histogram
    - Challenging because:
        - Lack of systematic survey data (observations)
        - No absence data (abundance/presence only)
        - Variety of data types (categorical/continuous)
- Chris Medak: Haglund et al studies in the Santa Ana River - They collected habitat availability for comparison with habitat use. Where fish is located relative to data. So you can see where they are not.
    - Katie Irving: Although there were absences, the surveys were not systematic enough to use them statistically. The abundance data from these surveys are included
- AJ Keith: Larry Brown, Jason May, and others have collected SA sucker data from Santa Ana River
    - Chris Medak: Their data is not published yet, not sure if its been released.
    - Eric Stein: Larry Brown would be a good resource to see if he can share the data with us if we do not already have it [UPDATE: we have this data and already incorporated it into the curves, but we will revisit based on TAC feedback]
- Rosi Dagit: because the depth-probability curve only goes up to 0.4 probability, does this limit predictive values significantly?
    - Katie Irving: we plan to use the curve to explore relative effects (less likely or more likely under different scenarios).
    - Nathan Holste: A lot of habitat studies have scaled suitability curves to 0-1, you could take curve and scale it up to 0-1
        - Katie: we previously separated probabilities into quantiles to transform y-axis to 0-1 but it's important that the curve is used in the right way. Don't want to give a false impression that if you are at a certain depth, then there's 100% chance that you will find a fish
        - Eric: after discussing this point internally, the way that we presented it (0-0.4) is more transparent. How will different scenarios effect likelihood of supporting diff species.
        - **Question to TAC:** Does TAC feel like we should rescale the curve to 0-1?
            - Rosi Dagit: thinks it is better to represent it as 0-0.4 (more transparent)
            - Sabrina Drill: likes the 0-0.4 approach so there is no room for misinterpretation
            - John Randall: likes the 0-0.4 approach, but is it realistic that probabilities will go down with greater depth?
                - Eric Stein: Based on the shape of the histogram. Outlier values pull the curve down with greater depth. We don't have enough knowledge of the data to know if it's anomalous or real. We felt it was better to retain the entire dataset than remove it altogether.
        - <mark>TAC Recommendation:</mark> do not rescale the 0-0.4 probability curve
            - **Question to TAC:** Based on your knowledge of Santa Ana Sucker, does this follow what you would expect?
                - Chris Medak: adult habitat use was really skewed to upper availability to depth of the river. So there was little habitat available at the depth that the fish occurred. I would expect more fish to be in the deepest parts - adults are always in the deepest parts when scuba diving in the Santa Ana River
                - AJ Keith: I'm looking at Larry Brown et al.'s data from Santa Ana River and it shows exactly the same thing that Chris mentioned.

> > Availability of habitat in terms of depth were skewed to shallow end, but they're using the deepest parts. The data shows proportion of habitat binned in 10 cm depth categories, availability vs. use
> > - Eric Stein: if we added Larry's data, it could change the shape of the curve. If datasets were not used, we can see if these curves are predictive
> - **Action Item:** Follow up with Larry Brown regarding sucker data from Santa Ana River --> see if we can use the data and review the report [UPDATE: we have this data and already incorporated it into the curves, but we will revisit based on TAC feedback]
- Edward Belden: How will the time of year/seasonality of a species life stages be incorporated into the models?
  - Katie Irving: when we apply the hydraulic data to the curves, we will get timeseries that represents hydraulic conditions in different seasons.
  - Eric Stein: yes, and we will be looking at different seasons depending on the different life stages. We are modeling each life stage separately.
  - Sabrina Drill: will you be looking at different curves based on seasonality?
    - Katie Irving: Yes, fry and juvenile stages will be looking at different times (and potentially different curves) and each lifestages are different models.
    - Sabrina Drill: do you have the survey from entrix (grey literature)?
      - **Action Item:** will follow up on additional studies/literature to be incorporated
- Rosi Dagit: So is this model framework going to be applied to each species?
  - Katie Irving: Yes, when the data allows us to do this. Where we can, this will be our proposed approach. If we do not have enough data, we propose alternative approaches in the next slides
- Rosi Dagit: how are you planning on validating the models?
  - Eric Stein: due to the data limitations, we had to use all of the available data to build the curves. However, we are planning on applying the curves to different but comparable systems where there is presence-absence data to do validation
  - **Recommendation:** include a description of the validation process in the caveats and limitations
- Rosi Dagit: Does Kerwin Russel have additional data that might be helpful?
- Sabrina Drill: Do you have Camm Swifts data?
  - Chris Medak: Camm swift was involved with Haglund and Baskin's studies on the Santa Ana. He did not look specifically at habitat use
- **Action Item:** Circle back with TAC via email or phone: TAC to review curves and give a gut check that it matches what they know about life history needs
  - Follow up on additional data/reports we do not have (Rosi/Sabrina)

SA sucker: Life stage/variable with limited data
- **Question to TAC:** do we know if depth is more important than substrate?
  - Chris Medak: velocity is most important for fry: silt is due to the conditions of low velocity
- Chris Medak: From USGS data: Adult and juvenile Santa Ana sucker were found commonly at depths between 1 and 2 feet (35 and 60 centimeters) and mean water column velocities ranging from 3.3 to 4.6 feet per second (1 to 1.4 meter per second). Larvae in tributaries to the Santa Ana River were observed along the edge of the stream in proximity to emergent vegetation, in depths from 1 to 4 inches where the flow was negligible and the bottom was silty (Haglund et al. 2002)

- Sabrina Drill: If you don't have enough data for fry, what are the next steps?
  - Katie: we would apply the yes/no thresholds instead of developing a curve

Conceptual Model/Contextualization:
- Previous TAC Suggestion: develop overall coneptual model that contextualizes the study reaches and physical habitats that may be supported at each reach - which species and limiting factors are important in what areas?
  - Identified co-dependencies of variables that can increase or limit sucker tolerances but need TAC input on the direction and magnitude of curve shift

- Sent out co-dependent variable spreadsheet for SA sucker

  - <mark>**Action Item:**</mark> TAC to fill out co-dependent variables' spreadsheet and curves (2 weeks): decide if we should include co-dependencies in analysis given the defensibility of shifting curves based on available data/knowledge

  - Rosi Dagit: This is really hard to do without looking at the curves you developed to see how well it matches observations and expert info
- Sabrina Drill: are in-stream depth and depth of water coming in different?
  - Eric Stein: in the hydrology model, we account for any potential groundwater contribution and how management and underlying geology may impact flow. Harder to account for potential cooling from groundwater in temperature model. What we can say is if water were cooler by 3 degrees, we think it would effect ecology in this way.
- Chris Medak: without the inclusion of co-dependent variables, if one factor (i.e., depth) predicts low probability of occurrence then does that dictate whether the species can be there? What happens if we don't have co-dependent variables? Certainly there are co-dependent variables, but we don't know how much information there is to defend those co-dependencies
  - Eric Stein: think about it and we can go either way. We will take guidance from the TAC. If group thinks co-dependencies are important for this analysis, we are happy to do it. If the group feels like we will come out with an outcome that's hard to defend, then we will work with the curves that we have and use the limiting factors approach. TAC think about it and we will circle back in a week or two
  - AJ Keith: The data I have seen don't provide good support for a defensible stance on co-dependent variables. That would leave best professional judgment, for which I'd defer to Sabrina, Christine M., and others who have observed SA sucker in the field.
- Rafael Villegas: raised concerns on upwelling during break. There are 2 elements to it: water rights element (state CA supreme court decision to limit water leaving the groundwater basin) and water contamination. Assuming that upwelling continues, we could get a benefit in temperature but could get contaminants from aerospace industries: how do you balance that? Don't even try to factor in increased upwelling, since there may be unintended consequences. Increased upwelling may lead to the introduction of PCE, TCE, 1-4 Dioxane and Hexavalent Chromium into the LA River. Existing Operable Units are there to remediate the Basin and keep the contamination plume from escaping the SF Basin.
    - Manuel Aguilar in regards to the water rights element: The San Fernando Basin is a managed Basin under the purview of the Court System. Prescribing how the Basin is pumped would impact Los Angeles' Pueblo Water Right and, Glendale and Burbank's right to pump their import return credit

- Anthony Hicke: There really is no way to determine how many and which wells to shut down to obtain some desired upwelling flow rate.
    - Eric Stein: Resolution from the last TAC meeting was to retain gw contribution in model for now, that gives us flexibility to look at scenario analysis in different ways.
    - ==Action Item:== Follow up with Rafael and Anthony regarding groundwater management and ability/desirability of including groundwater in the analysis

Black Willow (Salix Gooddingii)
- Reviewed black willow conceptual model and data (topic of last TAC meeting) and presented model application (i.e., taking depth timeseries and predicting % seedling mortality by month) and thresholds
- Kelly Schmoker: I thought for germination, they need continuous water for between 1-2 years? They are surface water dependent I can find the reference somewhere
    - Jenny Rogers: thanks for that feedback, we will incorporate that into the model. TAC, please provide us with additional details/data from continuous curves or data to enhance thresholds, and we will incorporate that into the model.
- Sabrina Drill: Does intraspecific competition affect it? In other words does willow germinate better on open sand post flood? Cheryl Swift at Whittier College should know. This is referring to the flood scouring, could relate to the adults.
    - Eric Stein: this is when timing may be important
- Types of questions we will pose to the TAC for feedback: Do we want to apply this curve hourly or apply it to depth daily or seasonally? As we apply these curves we will want expert feedback on these types of nuisances
    - Eric Stein: Reminder to TAC: what are the elements of the hydrograph that would be most likely be affected by reduced wastewater discharge and stormwater capture? We will target analysis on how those elements of the hydrograph affect the willow.
    - Jenny Rogers: unlike sucker where we want successful spawning/recruitment every year, for the black willow, may be good to have successful germination every few years
- Question to TAC: Do you think sandbar willow is different enough to differentiate between the black willow? We originally wanted species for wetter and drier ends of the spectrum, but what we found as we were looking at different stages of blackwillow is that there are needs that hit the end of the spectrum. Is there utility in keeping sandbar willow or should we better invest that time elsewhere?
- Kelly Schmoker: Goodding's willow is an initial to early seral species. It has very low shade tolerance but high flood tolerance [14,20]. It does not sprout beneath its own canopy. Gooding willow seedlings compete poorly with grasses [27].
    - Jenny Rogers: for every life stage, we will model some outcome of suitability but we're not considering the structure of vegetation in the channel. We see your point that we will miss this aspect if there is a large tree blocking sunlight. We can look at it more holistically: do any years supports germination, as opposed to analyzing each cross section individually -> this could help deal with randomness of where large trees create shading, for example.
- Nathan Holste:
    - ==Suggestion:== develop an hypothesis of different parts of the hydrograph, what's important, and how the model results will translate to the species

Cattail Marsh (*Typha* spp.) - in model development stage

- Progress update for Typha spp. model: literature review phase (development of species fact sheets and conceptual model) and model development phase (compiled subset of papers with data that report Typha condition and associated hydraulic variables and extracted data)
- Two approaches for model development:
  - Approach I: simple presence and absence analysis to model species occurrence from hydraulic variables (i.e., depth, velocity)
  - Approach II: complex approach beyond just presence/absence which uses other variables that can be a better indicator of habitat quality (i.e. shoot density, biomass, germination, etc.)
- Question to TAC: What does TAC think about approaches presented?
  - Eric Stein: from his perspective is simpler is always better, approach I is simpler and easier to put data together but you lose specificity. Is it worth adding complexity, if yes, then we would need to work through which variables and rankings.
  - Kelly Schmoker: second approach could be tied to seedling vigor, that seems like what the variables you mention correlate with. Need more time to think about which approach is preferred
  - Rosi Dagit: one thing that is uneven throughout the different species is the level of complexity. What is it that you're trying to get at? If looking for possible locations or probability of occurrence throughout the length of the river, take a step back and think about what you need to know about each species and then put it all together.
    - Eric Stein: the question we're trying to answer is how will proposed management actions (i.e., changes in wastewater discharge) affect beneficial uses (in this case aquatic life in the river) and how will conditions increase or decrease likelihood of these species to exist? Maybe they can exist but a management action could potentially affect the suitability of conditions so they are lower density or a change in habitat quality that would affect beneficial uses. There are tradeoffs with the data we have to work with and the level to put in. From a management perspective, do we gain a lot with the additional specificity?
  - John Randall: one qualm is that occurrence data is that 1 stem in 500 m2 is a yes, doesn't sound good to him. Threshold idea could come in. Some minimal density is the way to go. Make sure that it's not just a single stem but a patch.
    - Jenny Rogers: didn't come across any data of just a single stem, but very good suggestion
  - Eric Stein: we will only give extra complexity if TAC feels its worthwhile, get feedback on approach when we send the data out to TAC to review
  - ==Action Item:== Complexity of Typha model: TAC to think about the benefits of using a more complex approach that includes quality of habitat in addition to just occurrence. Our default is to use the simpler approach unless the TAC expresses a strong feeling otherwise

Updates on New Focal Species:
- Progress:
  - Literature review underway for:
    - Unarmored threespine stickleback (cold water habitat)
    - Mosquitofish (Warm water/invasive)
    - African clawed frog (Warm water/invasive)
    - Steelhead (Migration)
    - Duckweed (Marsh)
  - Literature review in early stages

- - Algae (Shorebird)
- Reminder: sent TAC summary tables with life history information compiled to date, but need help filling in the gaps. Also sent TAC literature review metadata tables that list data sources and information we have so far. What others would be useful for this project?
- Wendy Katagi: can send additional reference on stickleback technical memo in Bouquet Canyon Creek
- ==Action Item:== TAC to send additional literature/studies for additional species in literature review phase in 2 weeks

Key TAC Recommendations:

- Microhabitats:
    - Spatially interpolate between cross sections when modeling habitats for a reach
- Santa Ana Sucker:
    - For the depth probability curve, do not rescale the y-axis to 0-1
    - Include a description of the validation process in the caveats and limitations for all species models
    - Model contextualization: proposed limiting factors approach but response from TAC was to stick to limiting factors approach
    - Develop an hypothesis of different parts of the hydrograph, what's important, and how the model results will translate to the species
    - Ensure data used in probability curve represents data observed in the field and that all available data sources are included.
- Typha spp:
    - Consider the uneven complexity in the various focal species models given that some species have more detailed data available and others do not