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NATURAL RESOURCE ASSESSMENT AND RESTORATION SERVICES

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Ojai Valley Sanitary District Effluent Reuse Feasibility Analysis

Steelhead trout habitat assessment comments for final report

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Background

The Ventura River drains a watershed of approximately 228 square miles and flows south from the confluence of Matilija Creek and the North Fork Matilija Creek to the Pacific Ocean just west of the city of Ventura. The river historically hosted large runs of adult steelhead and continues to support both anadromous steelhead and coastal rainbow trout in headwater streams. Stoecker Ecological was contracted by Nautilus Environmental to assist with a feasibly analysis of proposed effluent re-use by the Ojai Valley Sanitary District (OVSD) and to perform a one-day survey of the project area and provide comments and a limited steelhead trout assessment for inclusion into the final report. The OVSD treatment plant discharge point on the lower Ventura River occurs approximately 5 miles upstream from the ocean and discharges approximately 2 million gallons per day. The project area stream reach occurs in federally listed critical habitat for endangered steelhead trout. This brief report is intended to provide a summary of steelhead use in the Ventura River, field survey observations, a discussion of anticipated project impacts, and specific comments on the draft report prepared by Nautilus Environmental, which I am contributing to now for the first time.

Steelhead Discussion

The Ventura River historically hosted large annual runs of steelhead and continues to support both adult steelhead runs downstream of impassable migration barriers and native, sustainable populations of coastal rainbow trout (*O. mykiss*) in headwater streams. These above-barrier populations likely have a significant contribution to the anadromous steelhead run as they can migrate downstream into the lower river, estuary, and likely ocean. A 1946 DFG correspondence included an estimated adult steelhead run size of 4,000 to 5,000 fish on the Ventura River (DFG 1946). This estimate follows extensive development of the Ventura River watershed and over a century of active cattle grazing. It is likely that historic run size was larger prior to Spanish settlement of the watershed, but also highly variable in annual size due to natural environmental factors. In 1947 DFG staff noted, "An estimated 250-300 adult steelhead were found to be present in scattered pools throughout the (lower) 5 miles (of the Ventura River)" (DFG 1947). Staff proposed that during a dry year about two miles of the lower Ventura River was suitable for spawning that could support a run of about 1,000 individuals. These statement indicate

that adult steelhead may have used, and may continue to use, the lower river and project area for more that just a migration corridor.

Personal observations of adult steelhead in Santa Barbara and Ventura County watersheds indicates that the lower reaches of river systems are highly utilized and important, especially the estuaries and lagoons, as oversummering habitat for outmigrating adults and juveniles (smolts) that attempt to migrate to the ocean but are prevented by low flows. It is my experience in southern California that lower river and creek habitat typically considered a sub-optimal migration corridor can have an extremely important "refugia" component when both adult and juvenile outmigrants are trapped during low flow conditions typical of our regions flashy and highly diverted stream systems. In addition, estuary and lagoon habitat provides some of the most productive and important habitat in a given watershed both for steelhead rearing and acclimation between saline and freshwater habitat.

The current remaining steelhead population in the Ventura River is highly dependant on adequate habitat downstream of existing anthropogenic migration barriers, migration along the lower river, and estuary habitat for rearing and migratory acclimation between fresh and saltwater.

Field Survey

On July 11, 2007 a limited field survey of the project area was conducted by Matt Stoecker from the estuary sandbar at the ocean upstream to 300 feet upstream of the OVSD discharge source. A secondary lagoon was observed approximately 400 feet north of the main Ventura River estuary and may be fed by OVSD discharge flows. The main estuary was observed to provide extensive aquatic habitat and measured 1090 feet wide across the irregular shaped sandbar separating in from the ocean and extended upstream past the Highway 101 bridge. Surface water temperature in the estuary was measured at 64F at 8:00 am and air temperature measured 66F.While the sandbar was preventing migratory access for fish between the ocean and estuary during the morning of the survey, a significant wetted sand-bottom channel (see VentEstMouth.jpg photo) was observed across the sandbar showing signs of very recent connectivity between the river and ocean, likely during the previous nights high tide event. It appears that even during the summer there is connectivity between the ocean and river during high tide and potentially high wave events. It is also likely that the OVSD discharge contributes significantly to the estuary surface elevation and increased ocean connectivity. The estuary had depths of greater than 15 feet near the railroad bridge and submerged debris and bridge pilings provide substantial shelter for fish species. Arroyo chub were observed in relatively high numbers in the estuary and lower river. Numerous unidentified fingerling fish were also observed in the estuary and upstream.

Under the Main Street Bridge, large non-native carp were observed in the river and upstream to the OVSD discharge source (see VentCarpMainBridge.jpg photo). A 7-8 inch unidentified fish was observed briefly feeding on the surface upstream of the Main Street Bridge. The size and surface feeding behavior were indicative of a trout as this

length is typically longer than Arroyo chub and surface feeding is most typical of trout in this region and watershed. Crayfish were also observed in high numbers throughout the project area. Four southwest pound turtles were observed at a large 5-foot deep pool (see VentPoolSWPT.jpg photo) approximately one mile downstream of the OVSD discharge source and numerous Pacific tree frogs were observed throughout the project area within the river and adjacent streamside vegetation (see VentPacTreeFrog.jpg photo). A kingfisher was observed hunting fish in the project area.

Numerous shallow riffle reaches occurred throughout the project area. Several of these riffles would preclude adult steelhead migration during observed discharge flows due to insufficient depth while other riffles would allow limited juvenile migration. Although highly mobile from year to year several shallow riffles and cascades were observed that are on the brink of being too shallow for juvenile steelhead migration and would likely become impassable with significant reduction in discharge flow at OVSD and reduced water depth. An example riffle/cascade just upstream of the Main Street Bridge (see VentRiffle.jpg photo) was the first "critical riffle" observed upstream of the estuary. This partial wood debris and boulder jam produced a steep and shallow cascade chute on river right and shallow riffle on the river left side of the jam. The minimum depth within the maximum channel thread on the river right cascade measured 2 inches, while the minimum depth of the maximum channel thread across the river left riffle measured 3 inches. In addition, the river left riffle contained thick submerged vegetation that further impedes potential upstream fish migration. At the current discharge rate juvenile steelhead and other small native fish species should be able to migrate upstream over this riffle feature that is fairly typical throughout the project area.

A reduction in OVSD discharge and resulting reduced water depth at this and other similar critical riffle locations would reduce or eliminate fish migration at several riffle locations in the project area. These critical riffles are highly mobile and their locations and severity will change annually with typical winter flows, but in general any reduction in water depth would further limit fish migration within the lower river. Additional detailed assessment of the project area at various flow regimes would be needed to accurately assess critical riffles and various migration flows.

Anticipated Impacts of Discharge Reduction

Reduced surface flow due to water diversions and groundwater pumping as well as reduced discharges from treatment plants can negatively impact instream steelhead habitat conditions by reducing available habitat and altering the remaining habitat conditions.

The following habitat features are expected to be negatively impacted by the proposed 50% reduction of discharge from OVSD:

1) Reduced surface flow quantity.
2) Altered water quality.
3) Altered estuary salinity and reduced freshwater input.

4) Reduced stream depth and loss or reduction of fish passage at critical riffles.
5) Reduced surface flow area, overall habitat quantity, and shelter.
6) Reduced water velocity.
7) Reduced food supply with decreases in overall aquatic food production habitat.
8) Reduction or alteration of estuary size and function.
9) Reduction of connectivity between the estuary and ocean as estuary surface level elevation may be reduced.
10) Reduced water temperature (especially associated with reduced water depth).
11) Reduced window of opportunity for outmigrating adult and juvenile steelhead during spring and early summer stream flows and ocean connectivity.

Unknown Effects of Discharge Reduction

1) Impacts to riparian vegetation.
2) Impacts to native reptile and amphibian species habitat.
3) Impacts to the abundance and distribution of non-native fish and amphibian species.
4) Impacts to specific water quality parameters like (DO, temperature, nutrients, pH, pollutants, etc.)
5) Cumulative effects of proposed project in conjunction with other ongoing or planned water diversion and pumping projects on surface flows and estuary habitat.
6) Overall estuary ecosystem response.

Effects Discussion

The proposed project is expected to reduce the surface area and depth of the project area estuary, pool, riffle, and run habitat, thereby reducing available habitat quantity for steelhead and other aquatic and amphibious species. Habitat loss is expected with any reduction of discharge, but will be most pronounced with greater levels of discharge and during drier years and within the drier months of a given year. Reductions of water discharge are expected to have the greatest negative impact on habitat during the spring, summer, and fall of dry years and the summer and fall of average and wet years. All indications at this point, with the limited data available, appear to show negative impacts to project area habitat and steelhead, with few if any positive impacts identified from reduction of discharge.

Relationship to Other Watershed Projects

The cumulative impacts of these and other watershed projects could be further compounded with proposed reductions in discharge from OVSD into the lower Ventura River.

Robles Diversion Dam-
The current agreement relating to bypass flows at the Robles Diversion Dam upstream of the project area are dependent on the existing OVSD discharge. Reduction in the OVSD

discharge rate would apparently render existing instream flows inadequate or at least would need to be considered with current agreements.

City of Ventura/Wells-
Proposed groundwater well operation modifications upstream of the OVSD may further reduce instream flows in the project area causing additional reduction of surface flow and habitat quantity.

Matilija Dam Removal-
The planned removal of Matilija Dam will greatly benefit steelhead as additional historic habitat upstream becomes available, but the project may have short-term impacts to the OVSD project area with the potential increased sediment load during and following removal. Dam removal may have short-term negative impacts to the lower Ventura River and current OVSD discharges may be increasingly beneficial to steelhead during removal and thereafter. Specifically, the estuary could experience a reduction in size as sediment deposition occurs with removal and as additional sediment input from upstream of the dam will be free to migrate downstream into the project area and estuary. Reducing discharge from OVSD prior to or during Matilija Dam removal could have severe negative impacts on surface flow quantity and duration and habitat size and quality as this project is carried out.

Downstream Surface Water Rights-
At least two downstream water rights are identified in the draft report by Nautilus Environmental. The operability of these water rights is not known, but future development could further reduce lower river flows.

Comments on the Draft Report Prepared by Nautilus Environmental

The following comments are specific to the draft feasibility report sent out to project stakeholders by Nautilus Environmental prior to my field survey and assessment input.

Insufficient Data-
The most important comment overall is that it is my opinion there is insufficient data to conduct an accurate analysis of the a) Ventura River's water budget, b) steelhead population use in the lower river and migratory patterns, and c) potential impacts of discharge reductions on the project area. The draft report also acknowledges the multitude of deficiencies in data and I think makes the case that more information is needed to conduct an accurate analysis of hydrologic and ecosystem function. Without this additional knowledge I can't see how the proposed project can be deemed feasible at this point.

The draft report states, "There are a number of existing and historic surface water and groundwater withdrawal from the Lower Ventura Basin, but the actual quantities of diversions and groundwater extractions are not known to the extent necessary to prepare an accurate water budget for the Lower Ventura River Basin." In addition the draft report states, "The type and operability of them (wells in the Lower Ventura River Basin

between Main Street and Foster Park) appeared uncertain." The draft report further states that two water rights for surface diversions are known in the project area, but that the "extent to which these water rights are being utilized was not determined." The report also acknowledges the "lack of data quantifying the surface water-groundwater interactions in the lower Ventura River." At this point there are too many unknowns about the rivers surface flow and groundwater as well as current and planned water diversion and groundwater withdrawal operations.

The report states that during a dry year "represented by the 25th percentile flows, treatment plant releases account for more than 99-percent of the river flow during the driest three months of the year (August to November)." This equates to roughly half of the surface flow being eliminated during the most critical time of year for steelhead rearing and associated negative habitat impacts listed above. One of the most significant omissions in the draft report is how this reduction would impact the estuary. I found almost no discussion of how the proposed discharge reduction is expected to impact the estuary, which I consider to be the lower river's most critical habitat for steelhead and crucial in terms of migration between the river and ocean. All indications are that a 50% reduction in flow would greatly reduce the size and quality of the estuary and the reduced surface elevation would likely reduce sandbar breaching opportunities and reduce migration between the river and ocean.

If existing water rights for surface diversions were being implemented in full the report estimates that "no flow would reach the mouth of the estuary approximately 25 –percent of the time" under proposed discharge reduction rate of 50% of the current discharge rate. Eliminating surface flow into the estuary during critical dry years would likely have a significant negative impact on steelhead habitat, migration, and the estuary ecosystem as a whole and could lead to lethal water quality conditions for steelhead in addition public health concerns. I can't imagine that allowing elimination of surface flow to the estuary is even close to acceptable for any of the resource agencies and alone would make the proposed reduction rate unfeasible.

2.4 Project Influence on Aquatic Habitats-
The first sentence states that, "under existing conditions, dry season flows in the lower Ventura River maintain a continuous zone of shallow, aquatic habitats in the reach downstream from the OVSD treatment plant to the estuary mouth." I would respectfully disagree with this statement and characterize the reach as having shallow run and riffle habitat with pools to over 5 feet in depth and one of the largest and deepest estuary habitats within the entire Southern California Steelhead ESU.

Table 2.1-
I am concerned that the representative reach used for analysis 1600 feet downstream of the OVSD (not clear where this was exactly) is not representative of much/most of the lowest portion of the project reach where the channel is less confined, gradient is lower, and water depths in general are shallower than they are closer to the discharge source upstream. The estimated reduction in flow of 30%-44% and velocities during dry and extremely dry years could adversely impact water quality parameters for salmonids

(temperature, DO, nutrient loading, submerged aquatic plant growth, etc). Reduced top width, maximum depth, and flow area would lead to significant reduction in designated critical habitat. In addition, the estimated 14%-18% reduction in mean water depth would reduce or prevent migration of juvenile steelhead and adults at multiple shallow riffle locations observed.

2.5-
With unknowns about the watershed's water budget and potential impacts on the lower Ventura River with proposed increases in water withdrawal at Foster Park it seems premature to be making surface flow estimations and recommendations for adequate discharge flows from OVSD. For these and other reasons mentioned I think there are still many unknowns and a lack of sufficient data about the rivers water budget and steelhead habitat and use to be able to make informed decisions about reducing flows at this time.

2.6-
I agree that tidal waters can extend to Highway 101. In addition to high flow events, it appears that extreme high tides (preceding my survey day) and potential large swell and surf can also allow connectivity between the estuary and ocean at its current surface elevation and with the existing water flow and discharge rate. My observations are contrary to those stated in this section of the draft report about the reduced mobility of the sandbar between the ocean and estuary caused by high cobble concentrations. While I did observe cobbles present, the vast majority of the sandbar was composed of sand and the channel I observed that had recent connectivity between the estuary and ocean was almost entirely sand and was well developed (See photo VentEstMouth). I was actually surprised to see recent connectivity between the estuary and ocean. My field notes state that this estuary, unlike many others along the south coast appears to have summer connectivity associated with high tides, potentially large wave events, and/or due to the rate of freshwater inflow from the OVSD discharge. Reductions in OVSD discharge could lead to reduced surface elevation and reduced sandbar breaching opportunities and ocean connectivity.

2.7-
The first sentence of this section I think accurately states the current knowledge of the lower Ventura River and again makes me think that we are far from being able to make accurate predictions about existing conditions and in turn recommendations for reduced discharge of any amount. The last sentence following the bullet points says it perfectly. "These questions (about unknown water quality issues) may need to be addressed in greater detail if there is further interest in implementing some level of effluent re-use."

Table 3.1-
Southwest Pond Turtle- I observed four during my field survey in project area.
Southern Steelhead- Change "likely" to "present".
Arroyo chub- I observed chub in the estuary and river during field survey.

Southern Steelhead Description-

Last Sentence- Add that the lagoon (estuary) could also provide important over-summering habitat for adult and outmigrating juvenile steelhead that could not reach the ocean prior to sandbar formation. The estuary also serves as an important acclimation zone for inmigrant and outmigrant steelhead between freshwater and saltwater environments.

3.5.3-
Add that the entire project area is federally listed "critical habitat" for steelhead.

3.7.2-
The second scenario accurately states that the proposed reduction in discharge would have a "negative effect on associated vegetation and wildlife habitat."

3.7.3-
While I can see numerous opportunities for project mitigation of stream habitat with projects like migration barrier removal, riparian habitat restoration, and other efforts I am concerned that any loss of the estuary habitat will be difficult or impossible to mitigate and would have a severe negative impact on steelhead habitat in the Ventura River.

Table 3.3-
Add the additional impact of "reduced migration" to all fish species boxes.

3.7.3-
The high density and large size of exotic carp in the lower river is a serious predation and competition problem for native fish species and efforts to eradicate these exotic fish should be recommended.

4.0 Summary of Feasibility Analysis-

First sentence-
There are many additional impacts such as habitat, migration alterations and others identified above and in the draft report. Maybe this statement is talking about "from a environmental health perspective"? This sentence is a confusing statement.

Second Paragraph-
Has there been discussion of reducing the same annual amount of OVSD discharge, but all during high flows with no discharge reduction during low flows and in conjunction with development of off stream water storage sites on Aera and agricultural property? This would eliminate the vast majority of the long list of negative issues associated with the existing proposal.

Last paragraph p.63-
As noted, the draft report's hydrological analysis was "simplistic" and "key variables were not quantified" and dealt with surface flows and discharge only. There are many pieces of the puzzle missing at this point and I personally believe that with the level of analysis presented there is insufficient data at this time to recommend for a specific

discharge reduction rate. On that note, looking at what we do know I think that a reduction of 50% is highly problematic for many reasons listed above and would be extremely difficult to get permits for, especially with the lack of data that exists. I think that resource agencies would have serious problems with the draft reports analysis, methodology, and recommendations as they stand.

First paragraph p. 64, first sentence-
I think the draft report and my comments indicate that impacts from the proposed project are hard to know with the existing data, but appear to be significant, not "minimal" as stated. The next sentence leaves out the importance of the estuary habitat for juvenile and adult steelhead. In fact, throughout the draft report there is very little about the estuary and I don't see anything about the estimated impacts to the resulting size and depth of the estuary with the proposed project or any analysis of expected sandbar breach and salinity alterations. I think these are extremely important issues to address and highly difficult ones to predict, especially with the insufficient amount of data and field surveying effort. On a related note, there is no discussion of steelhead population behavior in the river and a clear lack of data about steelhead use and occurrence in the project area, including migratory behavior through the reach and estuary use.

First paragraph p.64, fourth sentence-
I disagree with the statement that the reduced discharge "will not materially affect the depths over the broad shallow riffles that currently limit passage during low flows downstream of the discharge." The draft report's estimations point out the expected reduction in depth that is significant and will reduce or eliminate migration at critical riffles observed. I also think that the methodology used to make these estimates is problematic due to speculation about flows and withdrawals and applying a potentially uncharacteristic study reach (1600 feet downstream of the OVSD) to the entire lower river. What about impacts to sandbar breaching and estuary size and surface elevation?

Last paragraph-
I don't know the economics of the proposed reuse, but from my perspective there is clearly insufficient data to produce a detailed and accurate analysis of the lower Ventura River from a hydrological and ecological standpoint and with what is presented I can't see that from an environmental perspective the proposed 50% reduction of discharge is feasible purely from a permitting standpoint. There are too many unknowns and data gaps for me to say the project is feasible from an environmental perspective at this point. I would encourage looking into other alternatives such as water conservation measures, no reduction during low flows and potentially more reduction during high flows with off-stream storage, or increasing natural flows from further upstream to offset the reduction in discharge. I actually can't tell from the draft report where the proposed 50% discharge reduction number came from. It seems like this number was picked as the preferred reduction amount prior to assessing the limited data available. I would think that the percentage rate would have been a result of the analysis rather than what was analyzed.

Last sentence-

I am fascinated with, and confused by, the last sentence of the report that states "since the City now provides Aera and other local users with potable water that could be replaced with recycled water, there would be an opportunity to leave an equivalent amount of water in the river, resulting in no net change to flows." I would really like to see this statement expanded upon. Where and what are the sources of the City's potable water? Is some of this potable water coming from Casitas Reservoir or other sources upstream of the project area? What percentage is from what source? If there is a way to reduce surface diversions at Robles Diversion or groundwater diversions upstream of the project site and put more natural water back in the river while eliminating the OVSD discharge then this really needs to be looked into. I'm sure that using all of the OVSD discharge could be a viable project if there was a way to restore equivalent natural flows in the river from upstream diversion and withdrawal sources. I think this concept and a detailed alternatives analysis deserves serious investigation. If equivalent natural flows can be restored to the mainstem from existing upstream users, then using 50% or more of the OVSD discharge could become a viable and even ecologically beneficial project, especially if additional "live reaches" were revived upstream.

Summary

Due to the limited amount of hydrologic data available for the Ventura River I feel strongly that it is premature to make estimations about the potential effects of the proposed project, let alone recommendations for acceptable reductions in OVSD discharge. Similarly there is not enough data to accurately know the extent to which steelhead are using habitat in the project area and how reductions in discharge may impact this endangered species, the listed critical habitat, or the river and unique estuary ecosystem.

Additional Recommendations

Collaborate with watershed stakeholders and state and federal agencies to identify additional study needs and potential impacts of the proposed project. Additional research and analysis of existing documentation and detailed habitat and steelhead population occurrence and utilization should be conducted. Specific documentation relating to the history of the OVSD, permitting agreements, other watershed projects related to lower Ventura River stream flows, and extensive data occur in the Mark Capelli Steelhead Archives at the UCSB library and should be thoroughly investigated.

The high density and large size of non-native carp in the project area is a major concern for predation on native species including steelhead juveniles and eradication of non-native fish and their potential dependence of the OVSD discharge flows should be investigated.

Identify and implement potential opportunities to conserve local water resources and reduce the amount of groundwater pumping and surface diversion activity to promote natural instream surface flows in association with potential OVSD reuse.

Implement fish passage projects in the watershed that will improve steelhead access to upstream habitat at currently impassable migration barriers.

References

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