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Inyo County Planning Commission
c/o Inyo County Planning Department
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Dear Commissioners,

Comments re: Coso Hay Ranch EIR and CUP

Many good reasons have been brought to the attention of the Water Commission and your commission for denying the Conditional Use Permit (#2007-003) for the Coso Hay Ranch pumping project. Most of the comments raised have not been adequately addressed by County staff or the project proponents. Because of this, your commission needs to once again hear the important concerns that are being raised. In the remainder of this letter, I hope to help you understand that, because the best available data were not used thus insufficient information was disclosed in the EIR, a 10% reduction in flows to the Little Lake area could result in significant harm to the environment of Inyo County. Below are several examples and negative consequences of the County's failure to provide the documentation and analysis needed for a determination of biological significance.

Inadequate Species Documentation

I have not visited all sites with groundwater dependent vegetation in Rose Valley; however, I have explored Little Lake Ranch (LLR). I observed the lake, areas of wetland, riparian, and groundwater dependent vegetation, and brisk flows from Coso Spring. There are high-cover wet meadows dominated by native grass and other herbaceous species. I did not observe any standing saltcedar (*Tamarix ramosissima*), but like in Owens Valley, there were slash piles of sawed-off dead saltcedar plants in places. Many acres of plants and plant communities requiring shallow groundwater or surface water occur at LLR. In the few hours I was there, I saw many species of birds occupying the different habitats.

A comprehensive inventory of species in areas affected by a project is the cornerstone of CEQA. A thorough species list assists your commission and the public in determining if special status species, especially rare and endangered species, occur in the area. This EIR fails to present a comprehensive species list for potentially affected groundwater dependent and wetland habitats (for example, LLR and Portuguese Bench) in Rose Valley.

If the project is allowed to proceed and it's later discovered that there was incidental take of a listed species in an affected but un-surveyed location, the County would be an accomplice to the take. Ignorance, willful in this case, is not excused. It is possible that, for example, nesting habitat occurs at LLR for a listed avian species, and it is possible that a listed springsnail occupies one of the Rose Valley springs.

My expertise is plant ecology, and my concern is that a thorough search was not performed for listed plant species in any of the shallow groundwater areas in Rose Valley. *Sidalcea covillei* (Owens Valley checkerbloom) is one state-listed endangered plant that may occur in shallow water table areas of Rose Valley. The species was first discovered and collected in the late nineteenth century in "Haiwee Meadows" by Frederick V. Coville (US Fish and Wildlife Service 2000). Haiwee Meadows is now the site of Haiwee reservoirs, and the species is no longer observed there. However, it occurs in the Olancha and Cartago area, and, given the geomorphic and hydrologic setting of Haiwee at the head of Rose Valley, it is possible the species could still occur in Rose Valley. In the Eastern Sierra, where precipitation averages less than 6 inches per year, *S. covillei* requires groundwater to maintain a viable population. In Owens Valley areas that have been subjected to groundwater withdrawal due to pumping, we typically cannot find viable *S. covillei* populations. In the Five Bridges area north of Bishop, where hundreds of acres of groundwater dependent vegetation died as a result of pumping in the late 1980s, a small *S. covillei* population is struggling to survive. In unpumped Owens Valley sites, the species is persisting (US Fish and Wildlife Service 2000 and ICWD data on file). To not search for this species at the appropriate time of year, when it could occur within the radius of influence of this pumping project, is contrary to the intent of CEQA. Rediscovery of *S. covillei* in Rose Valley would not only corroborate Coville's historical discovery, it would also represent the southernmost extent of the current known geographical extents of this species; therefore a new southern population would be significant because it could house genetic material necessary for the species' long-term survival, especially given global climate change projections.

<u>Misrepresentation of Hydrologic Data</u>

It would be irresponsible to assign any statistical parameters (means and variance around means) using LLR water table data presented in this EIR. I couldn't find Bauer's (2002) actual, tabular data for the graph presented in the DEIR's Figure 3.2-3 anywhere in the EIR[1]. These important data are the basis for asserting that a 10% reduction in the amount of water flowing into Little Lake is within some range of baseline variation. In reading Bauer's graph, I see a total of seven data points, each taken during a different month, over the course of fifteen months. Bauer's first data point was from December 1996, and I plotted this as the diamond shape in month 12 in my Figure 1 (below). During 1997, Bauer graphed data for April, June, August, November, and December shown as the squares in my Figure 1. Bauer shows one 1998 data point, in March, shown as a triangle in Figure 1. Note that when all points are plotted within an annual context (as in my Figure 1), there are data for only six months of the year. Although two data points occur for December, one in 1996 and the other about 0.2' shallower in 1997,

[1] Also, I called the Planning Department (Feb. 26, 2009) to ask for assistance in pointing me to the data, but only the graph and interpretations of the graph by the preparers of the EIR could be found.

deriving means and standard deviations for December with only two points would be misleading. More water table data, probably at least six complete years' worth, would be needed to understand the long term water table patterns.

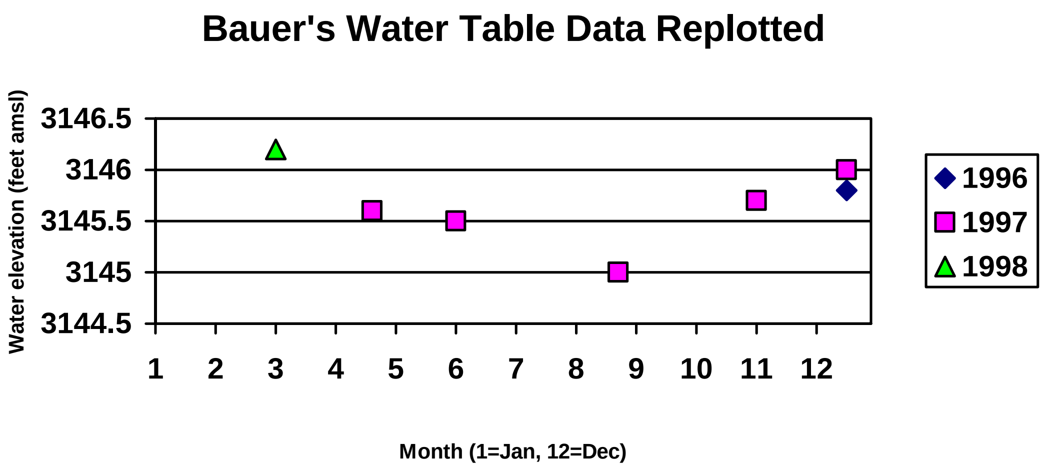

Figure 1. Water table elevation data from Bauer in Figure 3.2-3 of the Coso Hay Ranch EIR, here replotted to show seasonal water table elevation in the different months, regardless of year.

Not surprisingly, however, Bauer's albeit short-term data show the typical seasonal water table change pattern beneath groundwater dependent vegetation. This seasonal fluctuation is well-known to scientists and managers at the Inyo County Water Department (ICWD) and Los Angeles Department of Water and Power (LADWP), and it was first documented nearly a century ago by USGS engineer C. H. Lee in his 1912 study of southern Owens Valley (Lee 1912). Despite these facts, the concept – and *importance* -- of natural seasonal water table fluctuation beneath groundwater dependent vegetation was not mentioned in the Coso Hay Ranch EIR: Why not?

To quantify only an annual mean water table is a gross simplification of dynamic, interacting ecosystem processes, and such simplistic representation of these processes in this EIR is irresponsible and misleading to many readers. Eamus and Froend (2006) studied approaches to managing groundwater dependent ecosystems. They urge managers to "quantify" the relationship between the health of the ecosystem and groundwater depth. They further point out that determining ecological water requirements for groundwater dependent ecosystems involves identification of those aspects of the current water regime important for "maintaining key ecosystem features and processes." This involves understanding what really matters to the ecosystem, such as the timing and duration of water availability. They say the timing and quantity of water availability must be understood both spatially and temporally. In this EIR, such information was not provided.

In Owens Valley, ICWD and LADWP have identified the quantity and timing necessary for ecologic functioning: the water table high stand near the beginning of spring. ICWD and LADWP use water table depths on ~ April 1 to assess water table conditions, project summer vegetation conditions, and compare the effects of pumping or runoff from one year to the next. The annual water table high stand in early spring, at the beginning of the plant growing season, provides the most relevant insight into real changes in groundwater levels, and it is virtually the only water table information used for management. What the water table does in Owens Valley during July, for example, is generally regarded as irrelevant to ICWD and LADWP hydrologists. LADWP typically only collects data at most Owens Valley groundwater monitoring wells on ~ April 1 and ~ October 1, the latter being Owens Valley low water table time; however the intra-annual measurements are not averaged or used to calculate any relevant statistics about inter-annual water table fluctuations. In my >20 years experience, I have not seen October data used in any analytic capacity. Unfortunately, the way Bauer's data are presented and discussed in this EIR, the reader in misled into thinking the seasonal decline is evidence that the ecosystem can withstand prolonged declines of even greater water table depths. Not true! If Owens Valley water tables in April under a groundwater dependent plant community approximate groundwater levels the previous fall, we anticipate adverse consequences for the site. Owens Valley groundwater dependent ecosystems experience measurable plant losses and other adverse changes when water tables fail to fully recover.

The within-year seasonal variation observed at functioning Owens Valley sites and also observed in Bauer's data indicates that the ecosystem near the LLR north dock well was alive and functioning in 1997. Similar to Owens Valley, note that Bauer's data show shallowest groundwater levels from December through March (see DEIR Figure 3.2-3 or my Figure 1). During these months in Rose Valley, groundwater dependent and wetland plants are typically dormant, and temperatures, especially nighttime temperatures, often fall below freezing. Water-loving plants typically cannot endure freezing, for obvious reasons. However, once temperatures begin to rise in the spring (probably early- to mid- March in Rose Valley at the elevation of Little Lake), plants break bud and begin developing green leaves and shoots. Water is required for this growth, and water is required for transpiration. Transpiration is loss of water out of the plant that occurs when plants open their stomata to absorb carbon dioxide. Transpiration also serves to evaporatively cool the plant so it doesn't burn in the sun. So, the onset of plant growth, the maintenance of that growth, and the ability of the plants to flower and set seed during the year, are processes requiring water, and the availability of water at the first of spring is indicative of the degree to which the ecosystem will thrive. To supply the plants, groundwater is absorbed by roots at rates high enough to result in a measurable decline in the water table. In Owens Valley groundwater-dependent meadow, large amounts of water are transpired each spring and summer. However, when plants begin to senesce in early fall, transpiration diminishes, and water tables begin to rise. In unpumped Eastern Sierra groundwater dependent ecosystems, water continuously recharges from below. The basic concept is simple to explain hydrologically and ecologically: In summer the discharge rate (via transpiration) exceeds the recharge rate (via regional runoff and flows from higher elevations), but in winter, lack of discharge (no transpiration) allows groundwater (aquifer) recharge.

It is important to understand this simple pattern because only then can the effects of pumping or other anthropogenic manipulations that alter normal hydrology, and thus plant physiology, be interpreted. Pumping imposes an altered hydrologic discharge and/or it can intercept natural below-ground recharge. Regardless, pumping thus competes with the vegetation for water resources. The water that the vegetation has become adapted to using year after year is suddenly intercepted and no longer fully available under what would otherwise be "normal" hydroclimatic conditions. A plant affected by competition for water displays signs of stress (e.g. Manning and Barbour 1988), and stress can be manifested as anything from diminished physiological processes to plant death. Within a plant community affected by artificial groundwater lowering, the least drought tolerant species, such as the shallowest rooted glycophytic herbaceous plants (e.g. *Sidalcea covillei* or *Anemopsis californica*) are typically the first to succumb, while more drought-hardy species, such as deeper-rooted, halophytic saltgrass (*Distichlis spicata*) may endure for years longer. As Elmore et al (2006) and Manning (2007) showed, however, as water table is lowered by pumping, total live plant abundance (plant cover) on a site decreases correspondingly. That is, as less-drought-tolerant species die back, the spaces are not fully filled by more-drought-hardy species.

A decline in plant cover and change in species abundance due to groundwater withdrawal from groundwater-dependent ecosystems may result in severe consequences, depending on the organism(s) involved or the prevailing ecosystem processes. Lower plant cover can lead to increased soil erosion, due to wind or water, leading to loss of nutrients, minerals, and structure necessary for seed germination of plants occurring on and thus adapted to previous conditions on the site. Non-native opportunistic "weed" species, better adapted to hard, nutrient-poor soils may gain a foothold. Animals, including mammals, reptiles, birds, and invertebrates (e.g. insects and spiders), who may have required certain plant species or a certain vegetation structure, may no longer find suitable food or living space and be locally extirpated (Forman 1995, Collinge and Palmer 2002), and these losses can be compounded if the displaced animal is an important food source for another animal. Soil is typically alive with a myriad of microorganisms, including bacteria, algae, and fungi, which provide numerous valuable ecosystems services, such as breakdown of organic matter, nitrogen fixation, carbon storage, and recycling of nutrients, but these below-ground systems are disrupted when water is lowered and becomes more limiting to all the life forms previously sharing the site.

<u>The 10% Reduction in Water Recharge</u>

The EIR talks about the 10% decline in water table at the LLR dock well due to pumping at the Coso Hay Ranch, but never illustrates it. A graphical representation of the project's anticipated 10% reduction in water levels is presented as the line in my Figure 2, below. Note that when the existing data and the anticipated changes are critically analyzed, we see: (1) water table *will* drop below the documented levels, and (2) the water table will be *in a deficit, for at least 150 years after the pumping amount is "mitigated"* according to the existing hydrologic monitoring and mitigation plan (HMMP).

The 10% reduction in water inflows means that, for any given month, we can expect the water table to be 0.3 ft below the levels measured by Bauer (or any newly-established baseline). There are two very important points to make: (1) During the depths of the pumping impact near the beginning of the Coso project, first-of-spring water levels will be, on average, up to 0.3 ft below baseline levels; and (2) Late summer groundwater levels will fall below *any* previously measured levels, thus below the so-called "observed variation." Because Rose Valley is similar to Owens Valley, it follows that ecosystems will be forced to adjust to reduced water inflows over the long-term.

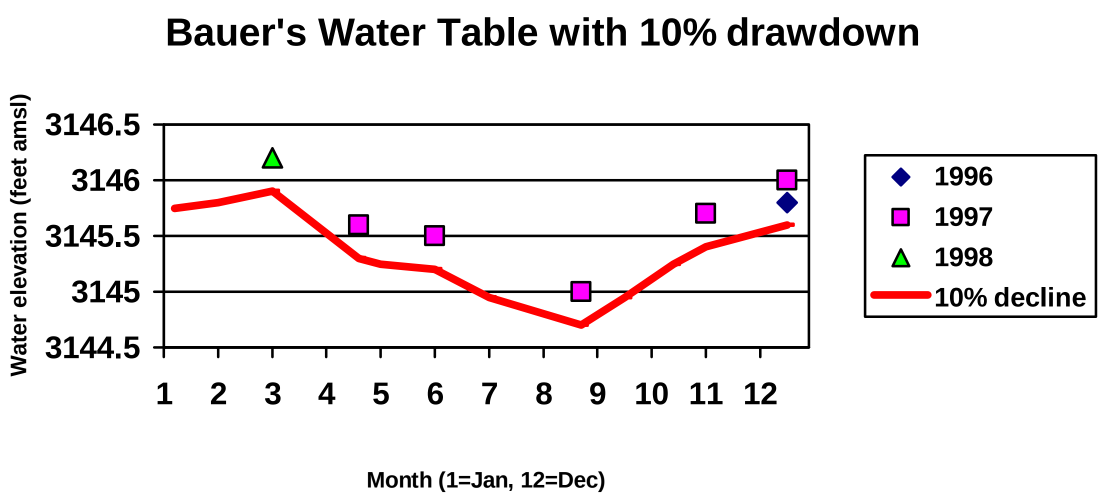

Figure 2. Same data from EIR as plotted in Figure 1, above, but a line is added showing a 0.3' lower water table elevation for each month.

The 10% reduction in water inflows as measured at the Little Lake dock will correspond with changes of much greater magnitude, spatially and temporally, for other environmental components. According to Bauer's data (EIR Figure 3.2-3), "little to no" outflow occurred from the south end of Little Lake when the water table dropped below about 3145.5 ft MSL and the lake's water level dropped below about 3142.2 ft MSL. In 1997, this condition occurred from mid June through about mid October, a period of about 4 months (EIR Figure 3.2-3). With a 10% decline in water input to the lake, however, water table levels are projected to drop below 3145.5 and lake levels below 3142.2 in April and not recover until November, a period of about 7 months (as shown here in Figure 2, the middle horizontal line on the graph is 3145.5 ft). Under Bauer's conditions, little to no outflow occurred 33% of the year, but with the project's 0.3 ft of water table drawdown, diminished outflows will occur about 60% of the year. A 10% decline in water recharge caused by the project can thus result in -- not a 10% time increase for diminished lake outflows -- but greater than a 25% increase such that outflows are affected for more than half the year. Downstream uses of this water would be greatly compromised, or LLR may opt to lower the lake level even further to supply the downstream uses. Serious risks to plants, wetlands, and wildlife, would result from either scenario.

Lowering lake levels in this shallow lake during the warmest months of the year could adversely affect shallow-water and lakeside habitat dependent on that water. Unfortunately, bathymetric data are not presented for Little Lake, so we have no way to estimate the change in lake surface area resulting from a change in lake level elevation. Regardless, smaller lake size cannot reasonably be assumed to result in increases in available habitat (in fact, what it can be assumed to do in our area is generate dust). Also, should managers decide to release water from the lake to ameliorate downstream conditions, even a short-term release of water from the lake that exceeds normal practice could result in protracted recovery of lake levels because the Coso pumping project would interfere with recharge for a long, long time. For a nearby example, diversions of Mono Lake inflows that occurred over several years are projected to take many years to return to desired levels. Such hysteresis is seen in predicted groundwater recovery rates as well, as presented in Figure 3.2 of the EIR's HMMP. Obviously, the reduction in lake inflows will adversely affect the Little Lake environment and the ability of its caretakers to manage it for generations to come, if not permanently.

Ecological Significance Not Disclosed

Ecologists acknowledge that, due to increased demand for freshwater for urban, agricultural, and other human uses, native groundwater dependent ecosystems are at risk worldwide (Postel 2000, Jackson et al 2001). In the case of this EIR, clean, fresh groundwater will be exported for the purposes of geothermal power generation. There is a large body of scientific literature available for assisting in projecting the ecological consequences of Coso's proposed water transfer. Unfortunately, relevant information was not reviewed or presented.

Failure to consult during this EIR preparation process with a professional ecologist knowledgeable about Eastern Sierra groundwater dependent habitats and their response to water limitation is inexcusable, especially considering that Inyo County Water Department employed a person with this expertise[2]. Despite the fact that ICWD hydrologists and other staff spent many hours working on the EIR and related matters (and, as a result, were reimbursed by COC to the tune of thousands of dollars[3]), ICWD's ecologist was actively excluded from the process. Inyo County failed to review then present relevant information contained in numerous technical reports, newsletter articles, and journal articles that Inyo County staff had produced regarding the relationship between groundwater dependent vegetation and water table depth.

The Coso Hay Ranch DEIR does acknowledge the relationship between diminished vegetation cover and water tables that have been lowered due to pumping. The authors appear to accept that declining water levels leads to loss of vegetation cover despite referencing only three gray-literature reports which present very little vegetation data (and ICWD staff is well aware that LADWP's report presents an incorrect

[2] I, Sally Manning, author of this letter, was ICWD plant ecologist, with over 23 years experience working in Owens Valley ecosystems.

[3] This is an estimate. I've requested an accounting of ICWD staff time and Greg James' time and the reimbursement rates, but as of this date, I haven't received the information.

interpretation of the data that are presented). Regardless, the EIR reveals a very real threat pumping poses to groundwater dependent and riparian ecosystems. Therefore it isn't clear why a more detailed investigation of water-dependent resources was not performed and why the authors of the EIR state that long-term diminished water deliveries to LLR equal to 10% or less, as opposed to any other amount, will not result in significant and adverse changes in vegetation and habitat in Rose Valley.

Had the EIR preparers adequately researched the topic, they would have found, at minimum, the following examples of the negative consequences to groundwater dependent vegetation that occur when pumping is allowed to lower water tables. It's important to note in the Owens Valley examples presented below that the water table level used for analysis was always the closest-to-April 1 high water table stand, *not* an average annual depth to groundwater.

Manning (2005) presented a case study of two meadows that in 1988 were nearly identical in terms of groundwater depth and vegetation cover and composition. By 2004, however, groundwater pumping had taken its toll on the meadow closer to the heavy pumping. In that meadow, pumping had lowered the water table below the reach of plant roots. The data revealed that live vegetation had decreased significantly in abundance when it no longer had access to the water table, and what remained of the vegetation was no longer using groundwater to any measurable extent. By 2004, this meadow closer to the pumps was subsisting on the meager amounts of precipitation that typically fall in Owens Valley to meet the water needs of the remaining vegetation. This change from groundwater dependence to precipitation dependence is a clear change from the Inyo-LA Water Agreement's Type C meadow to a Type A non groundwater dependent condition, and it happened after of period of about 15 years of lowered water table. The Coso Hay Ranch pumping project anticipates, at best, at least 150 years of reduced water table. In any areas of Rose Valley where vegetation roots lose contact with the water table for as little as even 15 years as a result of this project, there will undoubtedly be vegetation type conversion.

Elmore et al (2006) found that vegetation abundance in Owens Valley alkali meadow "was highly responsive" to groundwater depth. They analyzed a multi-year record of vegetation abundance (cover) in Owens Valley alkali meadow and applied statistics to determine the meadow response to inter-annual changes in water table and changes in precipitation. They showed that vegetation cover declines most rapidly at the initiation of groundwater pumping when the water table is starting to drop beneath that vegetation. Other researchers have noted this phenomenon, leading them to hypothesize that vegetation is best adapted to the hydrologic conditions under which it established (e.g. Shafroth et al 2002). In the case of LLR, the vegetation did not become established during a period of heavy pumping and subsequent export of that water from the hydrologic basin; therefore, rapid declines in cover are expected with relatively small pumping-induced water table drawdowns.

Manning (2007) analyzed Owens Valley alkali meadow vegetation in 46 small plots associated with individual test wells such that changes in water table depth could be reliably linked to changes in nearby vegetation. This investigation thus expanded on the research of Elmore et al (2006), adding plots and updating data for additional years (through 2006). For the 46 plots in this analysis where the water table fluctuated in plant root zones, a distinct correlation between change in depth to water table and change in vegetation cover was documented. In all 46 cases, when the water table declined, so did the vegetation abundance. The mathematical -- and logically expected -- outcome of lowered water table is lower vegetation cover. Similar results for other systems in the western United States have been documented by other researchers (e.g. Stromberg et al 1996, Shafroth et al 2000, Scott et al 2000, Steed et al 2002, Rood et al 2003, Stromberg et al 2005, Cooper et al 2006).

Manning's (2006a) Owens Valley Monitor article presented data showing that groundwater pumping accelerates the conversion of native grass-dominated meadow to shrub-dominated scrub. The article was a summary of an in-depth analysis performed by Manning (2006b). Results showed that, after of period of about 5 to 20 years of lowered water table, some Owens Valley meadow parcels had changed from Type C groundwater dependent meadow to Type B or Type A shrub-dominated conditions. Additional pumped areas had not yet clearly crossed the meadow/scrub threshold, but were projected to do so within the next 5 to 20 years. Other researchers have documented shrub encroachment at the decadal scale in meadows experiencing water table drawdown (e.g. Cooper et al 2006).

When I visited LLR, I observed a high degree of species stratification over short distances due to topographic microrelief in areas of groundwater dependent vegetation. This pattern is a feature common to wetlands and meadows worldwide. Over a microelevational gradient ascending < about 15 cm (0.5 ft), plant species clearly changed from *Anemopsis californica*-dominated to *Juncus* -dominated to *Distichlis spicata*-dominated. This suggests that a change in water table elevation of 0.3 ft could effect a major change in plant life form and species composition, if, in fact, the plants survive the abrupt, pumping-induced change in water table. Stromberg et al (1996) noted species changes, including species die-off, at this range of change in water table. Other organisms dependent on these LLR plant species would also need to change or die. At the upper end of the change, where water tables would be deepest, groundwater dependent plants will cease to dominate, and there would be a high probability that invasion by non-native species would occur in any area where water tables were affected by the proposed project (Stromberg et al 2007). Because the wetlands and other vegetation were not mapped, and no maps of terrestrial microrelief were presented in this EIR, it is impossible to estimate the areal extents of these ecosystem changes. Will there be a wide area that will lose contact with the water table? Could certain species be eliminated from LLR when the water table is lowered?

All of these examples, in addition to the three reports cited in the Coso Hay Ranch EIR, demonstrate that more information is needed and more analysis needs to be performed on how hydrologic alterations will affect vegetation and habitat at LLR and in other groundwater dependent areas of Rose Valley. Only then can full disclosure be made of currently existing and potential future conditions, and only then can the information be evaluated with regard to environmental significance. The Conditional Use Permit should not be issued, and the project should not be initiated, without first performing these important CEQA tasks.

Conclusions

The EIR is inadequate because:

- Comprehensive plant and animal species inventories are lacking for the wet areas throughout Rose Valley.
- Data presented in the EIR fail to demonstrate that a reduction in water deliveries to LLR of 10% (and a corresponding lowering of the water table at the north end of Little Lake by 0.3 ft) is a condition previously experienced by the LLR area.
- Allowing the 10% flow reduction effectively places LLR in a long-term, if not permanent, hydrologic deficit. There is every reason to believe, based on relevant studies of similar systems (some reviewed above in this letter), that the water deficit will result in significant environmental damage.
- The project should only be allowed if *no reduction* in flows to springs, wetlands, and riparian and groundwater dependent vegetation is allowed. The HMMP allows reductions, and, as presented, cannot easily be modified to incorporate this criterion.

Thank you for considering my comments.

Sincerely,

Sara J. “Sally” Manning, Ph.D.

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