NORTH COAST STREAM FLOW COALITION
NCSFC
2945 ATLAS PEAK RD. NAPA, CA. 94558
707.255.7434 Fax. 707.259.1097
www.ourstreamsflow.org

Coalition Member Organizations
Community Clean Water Institute; Forest Unlimited; Friends of Del Norte; Friends of the Eel River; Friends of Green Valley Creek, Friends of the Gualala; Friends of the Navarro Watershed; Institute for Conservation Advocacy, Research and Education; Institute for Fisheries Resources; Klamath Forest Alliance; Living Rivers Council, Maacama Watershed Alliance; Pacific Coast Federation of Fishermen's Associations; Save Mark West Creek; Sonoma County Water Coalition; Sonoma Ecology Center; Willits Environmental Ctr; Willets/Outlet Creek Watershed Group

December 1, 2016

Felicia Marcos, Board Chair
Tom Howard, Executive Officer
Board Members
State Water Quality Control Board
Via Email

Subject: TEMPORARY PERMIT 21364 ISSUED TO THE SCOTT VALLEY IRRIGATION DISTRICT (SVID) FOR DIVERSION AND USE OF WATER FOR GROUNDWATER STORAGE: PROJECT EVALUATION, COMMENT ON THE PROJECT'S SUMMARY REPORT AND RECOMMENDATIONS FOR FUTURE PERMITS ISSUED PURSUANT TO THE BOARD'S PROGRAM TO PERMIT DIVERSION OF SURFACE WATER TO GROUNDWATER STORAGE

Chairperson Marcos, Executive Officer Howard and Board Members,

We write today to share with you our evaluation of the SVID's use of Temporary Permit 21364 which is one of the first two permits issued by the Board for diversion of seasonally high and flood flows to groundwater storage under temporary water right permits, a program created by the Board in January 2016. We also comment on the SVID and UC Extension's Summary Report on the Project and we make recommendations based on these evaluations for prudent actions we recommend the Board and its staff take as the program granting temporary permits to divert seasonally high and flood flows to groundwater storage goes forward.

Groundwater storage has tremendous potential for California; it is likely that some portion of seasonally high and flood flows can be safely diverted to storage. Storage in the ground has obvious advantages over surface storage, mainly little to no evaporation loss. However, diversion of seasonally high and flood flows to groundwater storage also has great potential to further damage stream ecosystems, including ecologically, culturally and economically important salmon and steelhead stocks and other at risk species Therefore, we believe the Board and staff should proceed with caution. In particular we believe permit application and evaluation requirements need adjustment to assure that seasonally high and flood flow diverted for groundwater storage are not needed in stream to protect and restore stream ecosystems and species at risk in those watersheds from which seasonally high and flood flows are diverted.

Stream science instructs that seasonally high flows and flood flows are needed in order to sustain and restore stream ecosystems and stream ecosystem benefits. Science also instructs that some portion of seasonally high and flood flows can safely be diverted for other purposes, including groundwater storage. The North Coast Stream Flow Coalition believes that scientifically robust flow criteria must be developed in order to properly determine when and how much of seasonally high and flood flows can be diverted from a stream for any purpose. Ideally, flow objectives should have been adopted for a stream by a Regional Water Board or the State Water Board before water to which there are no established water rights is approved for diversion to groundwater storage, whether by temporary permit or any other means.

Our Coalition members are concerned because, in the first year of the groundwater storage program, the SWRCB granted two temporary permits to divert seasonally high and/or flood flows in two watersheds for which no flow criteria have been developed and no flow objectives adopted. In one case (Yolo) the right was granted based on a simple assertion that flood flows are not needed instream. In the other case (Scott) the applicant did not divert in excess of the Forest Service primary right to instream flows in Scott River for fish. However, only the first priority Forest Service right was used; Forest Service surplus and periodic flood flow rights were ignored. Furthermore, the Scott instream right is based on science from the 1960s and 70s; no scientifically current flow criteria for the Scott River has been completed or published and no flow objectives have been adopted by the North Coast Water Board for Scott River.

For these reasons we believe the two first year grants set unfortunate initial precedents and expectations which we hope the SWRCB will not follow or reinforce in future years.

Because of the obvious benefits to irrigation interests from diverting seasonally high and flood flows to groundwater storage, it is reasonable to expect that irrigation and water districts proposing such projects will tend to overestimate potential benefits and underestimate potential negative impacts to stream ecosystems and at risk species. For that reason, we recommend that the board enhance application, monitoring and reporting requirements for this new program. We believe that better focused application, monitoring and reporting requirements will assure that the projects permitted by the Board do not become contentious sources of additional conflict and that the Board's new program is successful, that is, achieves its potential benefits while avoiding further damaging stream ecosystems and at risk species.

Analysis of the Summary Report and the UCD Model

Based on our analysis of the Scott River Irrigation District's Project we believe that the District's claim in the Summary Report that the Project "*can be considered a successful implementation of artificial recharge on agricultural land for groundwater storage and streamflow enhancement...*" is not supported by the actual results as presented in the body of the Summary Report. In particular we believe the UCD model is too simplistic and its parameters are too untested and unverified for it to serve as anything more than a general guide. Because it is too simplistic and untested, we do not believe the UC Extension modeled benefits to streamflow enhancement could be realized in the real world without considerable damage to stream ecosystems and salmonids, including state and federal ESA listed Coho salmon. The implied claim in the Summary Report that larger and greater diversion of seasonally high flows to groundwater storage will enhance late summer and fall flows in Scott River without significant damage to stream ecosystems and at risk species has not been demonstrated. Finally, unless and until groundwater extraction is effectively regulated, any water put into the ground

in hopes of enhancing late summer and fall river flows will be subject to appropriation by groundwater irrigation interests before that water can reach the river or enhance late summer and fall flows. The water may be used to lengthen the irrigation season or on fields not previously irrigated.

On page 9 the Summary Report states:

"With exception to the Bryan-Morris ranch, where the groundwater surface elevation response could be monitored directly on site, it was not possible to quantify the rise in groundwater surface elevation related to groundwater recharge vs. natural recharge from precipitation."

In other words, in a year when precipitation was only slightly above the long term average, only one monitoring well demonstrated that winter irrigation enhanced natural groundwater levels resulting from precipitation, that is, enhanced the ability of groundwater to augment streamflow. In 8 of the 9 monitoring sites and 7 of 8 wells monitored, diversion of surface flows to groundwater storage did not raise the groundwater elevation and therefore did not enhance discharge from groundwater to the Scott River.

The Summary Report states on page 24:

"The results suggest an order of magnitude increase in recharge would be necessary to impact late-summer streamflow. The previous managed aquifer recharge simulations also indicated that maximum gains in streamflow were not recognized until after several consecutive years of treatment."

Perhaps the adjudication's instream flow requirements could be met even with an "order of magnitude" increase in winter/early spring irrigation. But this statement is a far cry from the claim in the Executive Summary. More concerning is the fact that no effort was made to determine if the amount of water the model indicates would need to be diverted to winter-spring irrigation in order to impact late summer flows was actually available without violating the Forest Service instream rights to flows in Scott River, including the right to periodic flushing flows and surplus rights.

Of even more concern is what is revealed by the Report's Figure 32. Actual streamflow at the USGS gage (where the instream right is measured) was significantly reduced during February and March, the period of time diversion pursuant to the temporary permit took place. Both modeling and actual gage measurements indicate that the small diversion to groundwater made this past year reduced flows in the Scott River at the gage by 7.5 cfs. How much would winter-spring irrigation "orders of magnitude" larger over the course of "several consecutive years" have reduced streamflow at the gage? The Report could have modeled that but did not.

Of greater concern still is the failure of SVID and UCD to monitor impacts to Scott River flows and to out-migrating salmon **at and below the point of diversion**, that is, at and below Young's Dam where the SVID diversion from Scott River takes place. The diversion to winter irrigation and thence to groundwater took place from February through April 1st. What flows remained in the stream during those times immediately below the point of diversion and were those flows sufficient to keep salmon nests under water and to not impede the downstream migration of salmonids which begins during the time the diversions were made?

According to the Summary Report's Table 2, under this permit between February 2nd and April 1st SVID diverted at a rate as high as 27.7 cfs and as low 0.5 cfs. What was the impact of such variable diversion rates on habitat and salmon nests located below the point of diversion? Were salmon nests dewatered as a highly variable amount of water was diverted? It appears that those impacts were not monitored.

In the Scott River watershed salmon fry emerge from gravels and begin their migration to the ocean during the period when SVID was diverting water from the Scott River. Were flows below the Young's Dam diversion sufficient for salmon and steelhead to migrate past that point? Why was the Department of Fish & Wildlife not enlisted to monitor the impact of the Project on salmonid migration and salmonid habitat below the Young's Dam diversion?

The SVID's temporary permit application's "Underground Storage Supplement" states on page 4 that the SVID will monitor Scott River flows during implementation of the Project at "River Mile 46 and River Mile 35" in addition to at the USGS Scott River gage (River Mile 21). However, only flows at the USGS gage are reported in the Summary Report. Why is that? Did the monitoring of flows at RN 46 and 35 occur? If not, why not; if so, why were those flows not reported in the Summary Report?

Flow in the reach below the diversion is critical information that should have been reported. The fact that the information was not reported raises serious questions which should be answered before the SWRCB considers additional projects of this nature in the Scott River Basin. Because flow and habitat monitoring in Scott River below the point of diversion was not done (or was not reported) one cannot rule out the possibility that implementation of the Project resulted in "take" of State and Federal ESA listed Coho salmon and other impacts to at risk salmonids.

Furthermore, because monitoring in Scott River below the SVID diversion was not implemented, we have no idea what impacts to Coho and other salmonids would likely occur below the diversion if winter-spring irrigation was increased by "orders of magnitude." Will SVID and UCD now request even larger diversions outside the irrigation season when they have not taken the time to investigate the impacts on stream ecosystems and salmonids of this Project's diversions?

These questions and concerns strongly suggest that in the future SWRCB should require that applicants assess the likely impacts of surface diversion to groundwater on the steams ecosystem and to species of concern. It is arguable that the SVID should have obtained Coho take permits from the CDFW and NMFS for this Project. At minimum, SVID should have consulted with CDFW and NMFS to determine if a take permit was needed. If SVID makes a future proposal to divert "orders of magnitude" more water, as suggested in the summary report, they would certainly need to consult with CDFW and NMFS to determine whether a take permit is needed and to report the results of that consultation in their application.

The above discussion strongly suggests that those applying for temporary permits under this program should be required to consult with CDFW on likely impacts to California ESA listed and candidate species and stream ecosystems and to report the results of that consultation in the application for a temporary permit. Projects which divert seasonally high flows to groundwater storage should also be required to monitor and report impacts to stream ecosystems in the stream reach immediately below points of diversion and to invite CDFW to collaborate in that monitoring.

We asked CDFW managers if they were aware of the SVID's Project and whether they had concerns. The response, which we can provide to the Board, states that DFW does have concerns but was not consulted by SVID, UCD or any other Project collaborators. In light of potential impacts of the diversion on fish and fish habitat, the failure of Project proponents and cooperators to involve CDFW is a concern we hope the Board will share.

As noted on Summary Report page 24, "a (modeled) diversion of 42 cfs for three months (total of

~7500 acre-ft) showed streamflow gains on the order of about 2.5 cfs in the late summer season." However, that simulation used the unrealistic assumption that "all diverted water was recharged to the aquifer" and therefore was available to enhance streamflow. Simulations which unrealistically assumed 100% efficiency, that is, that 100% of the water diverted to groundwater will be available to enhance streamflow, have been presented to the Scott River Basin community and have raised expectations that enhanced irrigation will effectively create more streamflow.

In contrast, for the modeling of this years' groundwater recharge activities 50% recharge efficiency was assumed. The assumption of 50% recharge efficiency recognizes that a certain amount of managed aquifer recharge will not be available to enhance streamflow. Losses include evapotranspiration but mainly groundwater extraction for irrigation.

As indicted by the Summary Report's odd number figures 7 through 23 there were sharp declines in groundwater elevation at monitoring wells beginning between mid March and early April. Those declines indicate cones of depression associated with groundwater extraction for irrigation. In other words, some of the water diverted to groundwater storage was subsequently taken for irrigation via groundwater extraction.

Raising the groundwater elevation makes extraction of groundwater for irrigation less expensive. That may motivate landowners to extract more water either to begin irrigation earlier in the year or to spread extracted water to new fields.

The Summary Report does not provide a basis for using 50% efficiency. Lacking any factual scientific basis for the assumed 50% efficiency figure, it remains possible that a greater or lesser percentage of any water diverted to groundwater storage via late winter-early spring irrigation would not be available to enhance streamflow. **Unless and until groundwater extraction is adequately regulated there is no way to guarantee that water diverted to groundwater storage during late winter and early spring will actually remain in the ground long enough to enhance Scott River flows in late summer.** Without effective groundwater regulation water diverted to groundwater storage could be taken via extraction to extend the irrigation season or to irrigate fields not previously irrigated with groundwater.

It is a cause for concern that this SVID Project to extend the irrigation season in the name of groundwater recharge and flow enhancement has apparently taken place before UCD has a sound basis for its "efficiency" percentage, that is, before there is a solid understanding of how much of any managed groundwater recharge will likely be available to augment river flows. Getting a handle on that efficiency percentage, based on monitoring and measurement, is essential and should be required before additional projects to divert surface water from Scott River or its tributaries to groundwater storage are approved by the Board. Because large amounts of groundwater are extracted for irrigation in the Scott River Valley each year, it is feasible to determine the efficiency of flow enhancement via groundwater recharge without another project which removes more water from Scott River during the salmon emergence and migration season by extending the Scott Valley Adjudication Decree's irrigation season.

We are also concerned because neither the SVID nor the UCD, nor any of the other cooperators, monitored any of the springs which are the method by which groundwater discharges to Scott River. What was the impact of the Project's late winter-early spring irrigation on those springs? How did the Project affect gaining and loosing reaches of Scott River? We will never know the answers to these questions because no baseline was established and no monitoring was conducted. When actual physical

indicators of impacts are available should not those impacts be monitored rather than relying on modeling and, in particular, modeling for which key parameters have not been experientially verified or tested?

In summary, examination of the Project Report and UCD's previously published related work indicates that late-winter and early spring irrigation has unknown but almost certainly limited potential to positively impact Scott River streamflow. Any significant increases in late summer streamflow would occur before the Chinook salmon migration season, that is, before October, would require much larger decreases in late winter and spring river flows during the period of salmon emergence and downstream migration, and could both dewater salmon nests, impede downstream migration and “take” ESA and California ESA listed Coho Salmon. Furthermore, as stated by UCD, to impact streamflow significantly, large diversions would need to take place for several successive years. That could conflict with the Forest Service adjudicated rights, including surplus rights and the right to periodic high flushing flows.

In addition, the greatest flow enhancement, if any is achieved, would occur in early summer when flows are almost always adequate to maintain stream ecosystems and salmonid habitat. Most importantly, most and perhaps all augmentation of groundwater levels via late winter and early spring irrigation could be taken for irrigation via unregulated groundwater extraction, including by some or all of the very people who would also benefit from enhanced yields resulting from late winter-early spring irrigation. This is a very different perspective from that alleged in the Executive Summary of the Project's Summary Report.

In the above discussion of Project impacts and concerns we have suggested changes in application and monitoring requirement for the SWRCB's Groundwater Recharge/Storage Program. These are:

1. SWRCB should require that applicants assess and applications report the likely impacts of surface diversion to groundwater on steam ecosystems and to species of concern. If California ESA listed or candidate species are present, applicants should be required to demonstrate that they have consulted with CDFW and that the agency either does not have concerns or that CDFW concerns have been addressed.
2. Projects which divert seasonally high flows to groundwater storage should be required to monitor and report impacts to stream ecosystems in the stream reach immediately below points of diversion and to invite CDFW and other interested parties, including federal tribes, to collaborate in that monitoring.
3. Unless and until groundwater extraction is adequately regulated, there is no way to guarantee that water diverted to groundwater storage will not be taken by unregulated groundwater extraction. Therefore, projects proposing to divert surface flows to groundwater in order to enhance streamflow should be required to discuss why that water will not be taken by unregulated groundwater extraction before it has an opportunity to discharge to a stream and thereby enhance that stream’s flow.
4. The SWRCB should require that, where feasible, actual measurements to determine project impacts are monitored and reported rather than modeling impacts. Where modeling is used to estimate impacts, applicants should be required to include a statement from the principle model developer on the robustness, uncertainty and sensitivity of the model used to estimate impacts.

As we were composing this letter, the North Coast Stream Flow Coalition reached out to Doctor Harter, overall lead on the groundwater modeling, and Doctor Danhkle, lead author of the Project Report, with our concerns about the model, the report and the expectations that the report and presentation of the model have raised among Scott River Basin irrigators. We sought answers to our questions and

comments on our interpretations. Attached to this letter is a document stating the concerns we shared with Dr. Danhkle, Dr. Harter and the other authors, cooperators and contributors. Some, but not all, of those concerns are summarized above.

We request that the SWRCB convene a meeting of interested parties to further explore what the actual impacts of the SVID groundwater storage project were and what those impacts tell us about the potential for diverting seasonally high and flood flows to groundwater storage. We believe such a meeting would be of substantial use to the SWRCB staff as they work toward programs that make use of the portion of seasonally high and flood flows which can safely be diverted from streams for groundwater storage. For those with interests in the Scott River, its water and its fish, such a meeting could serve to get us all on the same page and that, we believe, would serve all interests as we prepare for Scott River Basin groundwater planning and future challenges and opportunities for water management in the Scott River Basin going forward.

Sincerely,

Signed via Email
Felice Pace
for the North Coast Stream Flow Coalition.

November 20, 2016 email message from Felice Pace to UCD lead investigator, Thomas Harter, UCD SVID Project Summary Report author Helen E. Dahlke and their student Gus Tolley concerning the UCD Scott Valley Groundwater and Stream Depletion Model and the Summary Report for SWRCB Application T032564 and Temporary Permit 21364

Dear Dr. Harter, Dr. Dahlke and Gus Tolley,

Below is a summary of my concerns about the Scott Valley Model as a predictive tool for use in water management and about the SVID Project and the Summary Report for Temporary Water Right Permit 21364. I would be very happy to learn that some or all of these concerns are unfounded and I invite communication to that end. I am drafting a letter to the SWRCB that expresses these concerns. In that letter I suggest a meeting among SWRCB staff, UCD, SVID, the North Coast Stream Flow Coalition whom I represent and interested parties, including the Karuk and QVIR Tribes, to hash out and better understand the Project's impacts and the Summary Report's assertions and conclusions. However, if some of these concerns can be cleared up before the letter is sent I would consider that a good thing.

Before too long everyone receiving this, or the interests they represent, will be involved in groundwater planning pursuant to SGMA. The USD Groundwater model will almost certainly be used during that process. I believe it is in everyones interest to better understand the models capabilities and its limitations and to work to make sure the model does not become a political tool used by one interest to advance its agenda. I hope the UCD folks involved are also interested in making sure that a model which bears the university's name is not used as a partisan political tool. Those are my objectives here. SGMA requires and assures that all interests must be significantly involved in that planning process; if the USD model is going to be useful in that process it must not be used as a tool to advance partisan

agendas.

While my concerns are mainly related to UCD's work, publications and involvement, as a courtesy I have cc'ed Jim Morris who is a co-author of the Summary Report and an SVID member and those listed on the Summary Report's title page as having contributed to the report, that is: Preston Harris, Erich Yokel, Gary Black and Steve Orloff.

Concern 1: The Summary Report does not acknowledge significant limitations of the predictive model and the fact that calibration of parameters has been limited. Below are a few of the limitations of the model which indicate that caution should be exercised when using it to predict the results of water management actions. These are taken from Foglia et al.....:

- The soil water budget approach includes the managed components of the surface water system (diversions) and of the groundwater system (extraction), as well as groundwater recharge from managed and unmanaged land-uses. (but no subtraction for unmanaged vegetation)
- The water budget model applied only within the valley area as defined by the Land Use Map in Foglia, et al. There is a significant amount of diversion to irrigation, as well as some amount of groundwater withdrawal, in areas upslope of the Valley Area, most significantly in the East Fork that are not accounted for. There is no attempt to acknowledge this limitation or to estimate the magnitude of influences outside the model area on streamflow.
- The model does not account for annual direct recharge from the stream system to groundwater that is subsequently discharged back to the stream. Both, actual recharge from and groundwater discharge to the stream are likely larger.
- "The complex interaction of the groundwater system with streams and tributaries are not accounted for here. This includes hyporheic zone exchanges due to streambed topography and groundwater-surface water exchanges due to the larger scale streambed and water table variability" [e.g.,Wondzell et al., 2009; Boano et al., 2010].

Concern 2: The Summary Report refers to "previously modeled managed aquifer recharge scenarios assuming a diversion of 42 cfs for three months (total of ~7500 acre-ft)" and states those scenarios "showed streamflow gains on the order of about 2.5 cfs in the late summer season" which would "correspond to approximately 8-25% increase in late-summer streamflow depending on the year." The report then clarifies that "these simulations assumed that all diverted water was recharged to the aquifer." There is no citation given for the "previously modeled" simulation. Can you provide the citation?

I would like to know if that or similar simulations which do not adjust for "recharge efficiency" have been presented to agricultural interests and others in the Scott Valley. If so, it is very likely that expectations have been raised that can not be fulfilled. My concern from the outset with proposals to divert more surface flows to irrigation and subsequent groundwater storage is that the water will be "taken" via groundwater extraction before it has an opportunity to discharge into the River. This concern is based on the actual water history of the Scott River Basin rather than modeling. And it is exactly what we see indicated by the SVID Project's Summary Report odd numbered figures 7 though 23, 26 and 27.

Concern 3: The previous mentioned aquifer recharge simulations, unadjusted for "efficiency", which is, for the most part, really a euphemism for groundwater extraction, also indicated that maximum gains in streamflow were not recognized until after several consecutive years of surface flow diversion to groundwater storage. The second SVID Project model run mentioned in the Summary Report, the one

adjusted for groundwater extraction, used 50% as the portion of recharge taken by subsequent groundwater extraction. What is the basis for using 50%? Doesn't Figure 3 from Foglia et al suggest a different adjustment figure?

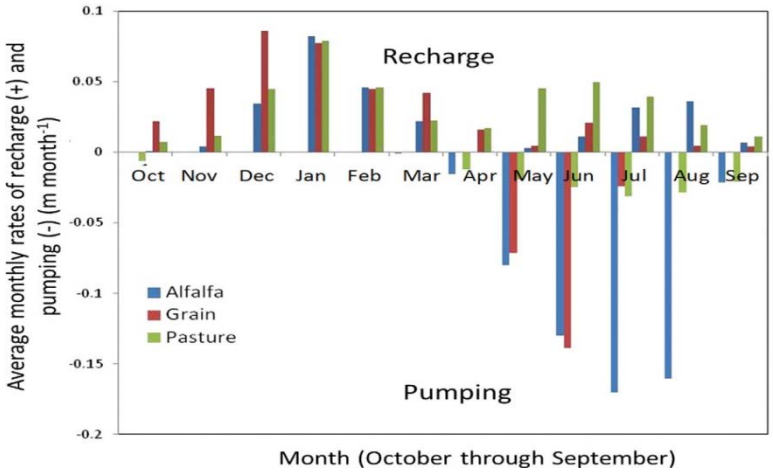


Figure 3. Simulated monthly rates of recharge and pumping (m month A1) for each of the three main landuses as calculated with the water budget model.

Concern 4: My analysis, so far, of the SVID Project's results as presented in the Summary Report and in light of Foglia, et al suggest a conclusion quite different than the conclusion Doctor Dahlke reaches in the Executive Summary of the Project's Summary Report. I believe this experiment in groundwater recharge indicates that the potential for late-winter-early-spring irrigation to significantly impact late summer and fall flows in Scott River is limited and would likely require very large amounts of water applied over many years. It is not clear that amount of water could be removed in successive years without significant negative impacts to streamflow, particularly spring and early summer streamflows which are essential to salmonid outmigration. It is concerning that neither this caution not the models limitations and need for calibration are acknowledged or noted in the Summary Report.

Concern 5: In addition, and after taking another look at Foglia, et al, I am concerned that the model may simply be too simple to, at this point, be used to guide water management. It seems to me that a lot more testing using actual data on impacts and subsequent model adjustment are needed before the model can serve as anything but a gross approximation of the results of management changes. The 50% figure cited above is a case in point. I am also concerned that significant areas of diversion, irrigation and recharge that impact streamflow are not within the geographical purview of the model. Here I think especially about the East Fork but also the South Fork and other tributaries.

Concern 6: I worry that the cumulative impact of model simplifications, model and simulation assumptions and the exclusion of significant lands and water uses that impact streamflow renders the model highly sensitive, that is, the results could be right on the money (reality) or they could be far off base (fantasy). In this regard I wonder if the model has been subjected to Sensitivity Analysis or (especially) Uncertainty Analysis. Here's what Wikipedia says about Uncertainty Analysis:

Uncertainty analysis *investigates the uncertainty of variables that are used in decision-making problems in which observations and models represent the knowledge base. In other words, uncertainty analysis aims to make a technical contribution to decision-making through the quantification of uncertainties in the relevant variables.....*

A calibrated parameter does not necessarily represent reality, as reality is much more complex. Any prediction has its own complexities of reality that cannot be represented uniquely in the calibrated model; therefore, there is a potential error. Such error must be accounted for when making management decisions on the basis of model outcomes.

Don't the parameters used in the Scott Valley model require additional calibration before the model can reliably be used to guide water management in Scott Valley and shouldn't UCD get a better idea of the models sensitivity and uncertainty before recommending it as a guide to water management? If so, shouldn't that have been acknowledged in the Summary Report and that reports Executive Summary?

Concern 7: No attempt was apparently made to measure and report Scott River flow below the Project's diversion point at Young's dam. It would have been instructive to know what percentage of the flow was removed each day the Project diverted water. More importantly no one was asked or enlisted to look at the impacts of February through March Project withdrawals on habitat (including possible salmon nests) and salmonid out migration below the point of diversion at Young's Dam. Those impacts could have been assessed by CDFW, the Karuk Tribe's fisheries biologists, or a consulting biologist. Those biologists could have also shed light on the likely impact of withdrawals at Young's Dam which would be "orders of magnitude larger" and which would be sustained for several consecutive years, i.e. the characteristics of a project that, according to the model, could significantly impact late summer Scott River flows. The failure to do any of those things or even to acknowledge them as issues that need to be examined in any future experiments is concerning.

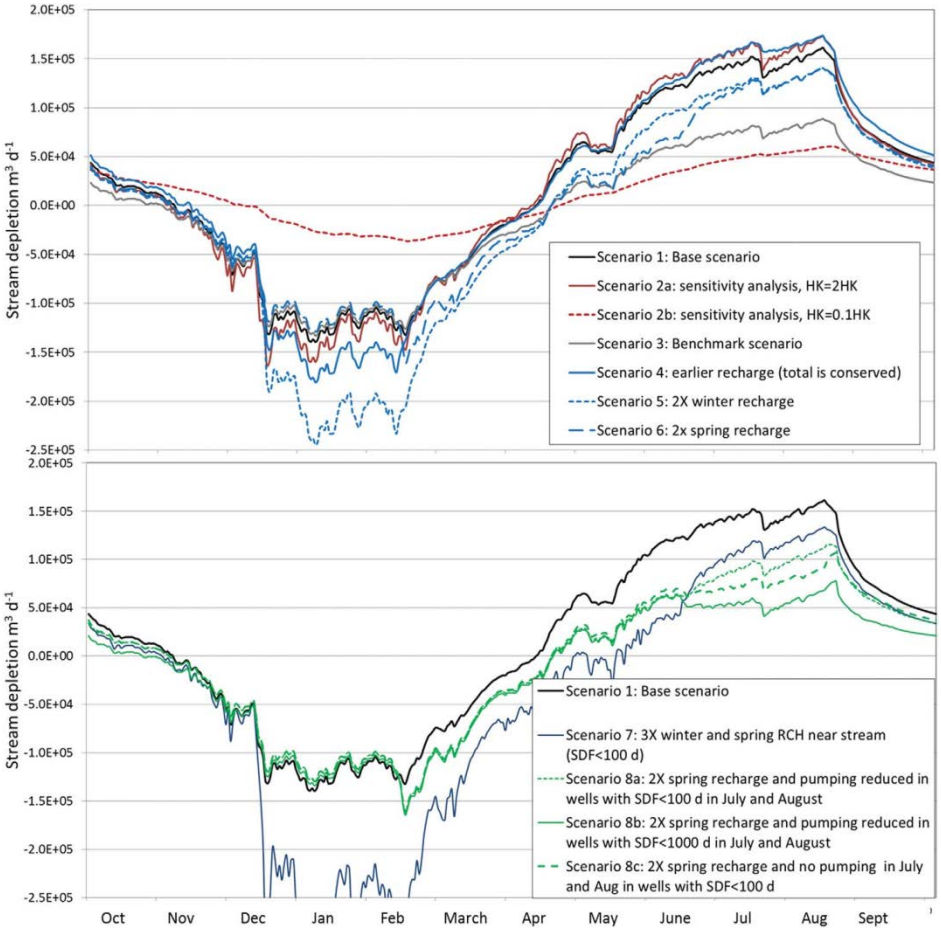
Concern 8: Unless and until groundwater extraction is effectively controlled and limited, any water diverted to raise groundwater elevations on the East Side of Scott Valley could legally be taken by any landowner wanting to extend the season of irrigation via groundwater extraction or to extend irrigation to additional fields that are not currently irrigated. By raising the water table, diversion of additional surface flows will make extending the season of irrigation or the area of irrigation significantly less expensive for landowners. In this way future SVID Projects of this nature that take place before groundwater extraction is effectively controlled and managed could result in increased groundwater extraction and decreased flows in Scott River.

Concern 9: As displayed in Foglia et al Figure 7 (reproduced below) if one only uses winter-spring increased irrigation to raise groundwater elevations one must deplete winter and spring flows orders of magnitude larger than the corresponding modest increase in late summer and fall flows. In other words, the bulk of the increased irrigation is taken by groundwater extraction and ET and never reaches Scott River. If, however, one couples winter-spring irrigation with ending pumping within 1,000 feet of Scott River in July and August one gets a much more significant reduction in late summer fall stream depletion. I interpret that as an indication that prohibiting pumping in July and August near the Scott River is much more effective at mitigating late summer and fall stream depletion as compared to extending the irrigation season into late winter and early spring.

It is unfortunate and a concern that Foglia et al did not include modeled scenarios that only ended pumping near the river and scenarios that ended pumping near the river in September and October and just in October. Future projects to "test" the model claiming as a purpose benefiting late summer and fall streamflow, should prioritize tests of the impact of eliminating groundwater pumping near Scott River, that is, they should include a test of the method the model says is most effective in reducing late summer/fall stream depletion.

UCD folks, please model the impact to stream depletion functions/streamflow of ending pumping within 1000 feet of Scott River for various time frames from August through October and share those scenarios with interested parties. And lets use Prop 50 or other funds to compensate groundwater extractors and test the impact to stream flow/stream depletion by ending extraction for irrigation within 1000 feet of the River based on those modeled scenarios. That would have a limited impact on annual agricultural yields and a likely significant impact on stream depletion.

Here's Figure 7 from Foglia, et al.:



To summarize, at heart I have four overarching concerns about the Summary Report, how the model has been and will be used, including in "education" as per the UCD's web page on the Project, and UCD's involvement in the Scott River Basin. These overarching concerns flow from my experiences living full time in the Valley from 1976 until 2002, part time until recently, and working on Scott River Basin water and natural resource issues since the early 1980s. That experience has included efforts to work with and also conflicts with the Valley's farmers, ranchers, farm advisors and politicians of many stripes. These concerns are:

- That the model has been and will be presented in a manner that does not acknowledge or downplays its limitations as a predictive and management tool and which raise expectations which cannot be realized about the efficacy of extending the irrigation season into late-winter and early spring in order to enhance flows for fish.
- That model runs and related claims will be used to justify additional temporary permits and multi-year out-of-season irrigation withdrawals from the Scott River and or tributaries before

model parameters are sufficiently calibrated, that is, adjusted based on real data, so as to reduce the models sensitivity and uncertainty significantly and before groundwater extraction is effectively controlled.

- That future out-of season irrigation projects/experiments will continue the precedent of not looking at the impact of project diversions on flows, aquatic habitat and species of concern, especially in the stream reach immediately below the point of diversion.
- That for the above reasons, the UCD's work in Scott Valley will lead to more, not less, conflict.