AQUALLIANCE
DEFENDING NORTHERN CALIFORNIA WATERS

CSPA

california
water impact
network

April 23, 2022

California Department of Water Resources
1416 9th Street
Sacramento, CA 95814

Re: Corning Subbasin Groundwater Sustainability Plan

To whom it may concern:

AquAlliance, the California Sportfishing Protection Alliance, and the California Water Impact Network (hereinafter AquAlliance) submit the following comments and questions on the Corning Subbasin Groundwater Sustainability Plan ("Corning GSP" or "Plan"). There are serious flaws in the Plan that require significant changes to the document, without which the public and policymakers are truly left in the dark and dangerous consequences are obfuscated.

Introduction

The goal of the Sustainable Groundwater Management Act (SGMA) is to sustainably manage groundwater resources for long-term reliably and multiple economic, social, and environmental benefits for current and future beneficial uses based on the best available science (Water Code 113). The people of California have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and in the integrated management of the state's water resources to meet the state's water management goals. Proper management of groundwater resources will help protect communities, farms, and the environment against prolonged dry periods and climate change, while preserving water supplies for existing and potential beneficial use. Failure to manage groundwater to prevent long-term overdraft infringes on overlying and other proprietary rights to groundwater.

California's Water Code specifically established as state policy that *every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes* (WC 106.3(a)). State agencies, including the California Department of Water Resources (CDWR), the State Water Resources Control Board (SWRCB), and the State Department of Public Health, are required to *consider this state policy when revising, adopting,* *or establishing policies, regulations, and grant criteria when those policies, regulations, and criteria are pertinent to the uses of* water (WC 106.3(b)). The Water Code also creates a state policy *that the use of water for domestic purposes is the highest use of water and that the next highest use is for irrigation* (WC 106). The Groundwater Sustainability Agencies (GSAs) were created by SGMA and are delegated by the state the authority to create and implement a Groundwater Sustainability Plan (GSP), which makes the GSA(s) a political subdivision of the state. Therefore, approval of any SGMA GSP created by a GSA(s) or county agency, which is then approved by the CDWR and the SWRCB, must be consistent with the state policies that protect and prioritize the public's right to safe and available supply of groundwater for all beneficial uses.

Implementation of the SGMA requires the creation of a GSP that provides for the development and reporting of those data necessary to support sustainable groundwater management, including those data that help describe the basin's geology, the short- and long-term trends of the basin's water balance, and other measures of sustainability, and those data necessary to resolve disputes regarding sustainable yield, beneficial uses, and water rights. A presumption inherent in SGMA is that sustainable management of a groundwater basin won't repeat or perpetuate the management errors of the past. That the design of the Corning Subbasin GSP sustainability monitoring program requires years of declining groundwater levels before an undesirable result can occur suggests that the past mismanagement practices will persist. The November 2021 Corning Subbasin[1] Final GSP fails to meet the SGMA goal of water resource sustainability and protection of the water rights of all beneficial users and uses.

The proposed sustainable management criteria presented in the Corning GSP fail to demonstrate as required by SGMA that the goal of groundwater sustainability is achievable and will occur within 20 years of GSP adoption for: (1) chronic lowering of groundwater levels, (2) reduction of groundwater storage, (3) degraded water quality, (4) depletions of interconnected surface waters, and (5) inelastic land subsidence. The Final Corning GSP fails to protect the beneficial uses for all users of groundwater in the subbasin because of the following:

- The final plan sets the minimum thresholds (MTs) for unreasonable results in the management the groundwater levels at depths that can result in 16% or more of the domestic wells going dry for sustained periods, if not permanently.
- The final plan requires without analysis or justification that before an unreasonable result can occur, the MTs for a sustainability indicator must be continuously and simultaneously exceeded for 24 months (2 years) at a minimum of 20% at representative groundwater monitoring wells.
- The final plan estimates that sustainable management of the groundwater levels and groundwater storage with the projected 2070 scenario will allow for a cumulative change in storage of -19,700 acre-feet (af) in the next 50 years, which is contrary to the estimated Historical baseline cumulative surplus from 1974 to 2015 of 290,300 af.
- The estimated difference between the Historical average annual and the projected 2070 average annual change in storage is -7,200 acre-feet per year (afy), or 360,000 af by 2070.

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[1] California Groundwater Basin number 5-021.51, part of the Sacramento Valley Groundwater Basin.

- The 2070 scenario estimated maximum annual change in storage during critically dry and dry water years is -41,800 afy, approximately 50% greater than the Historical baseline change of -27,450 afy, and over 100 times the 2070 annual average loss in groundwater storage.
- The final plan *operational flexibility* (OF) for sustainable management, the difference between the depths of the management objectives (MOs) and the MTs, is sufficient to allow for an average decline in groundwater levels that's approximately 3 times greater than the difference between the MOs and lowest groundwater levels since 2012 before an undesirable result can be declared.
- The final plan OF volume is large enough to allow for groundwater level decline for 5 continuous critically dry and dry water years before the minimum threshold depth is reached, which must then be followed by two more consecutive years with levels continuously below the MTs before an undesirable result needs to be declared.
- The final plan assumes that sustainable management of the subbasin will allow groundwater pumping to increase by 36,300 afy above the Historical baseline, a 27% increase, with 96% of the increase going to agricultural uses.
- The final plan assumes that sustainable management of the subbasin with the 2070 scenario will result in annual average net stream gains (groundwater discharge minus stream seepage) of -4,600 afy, which is -37,700 afy below the Historical baseline of a +33,100 afy. This is a loss of approximately -114% in annual average net stream gains over the Historical baseline.
- The final plan assumes that sustainable management of the subbasin with the 2070 scenario will result in annual average net stream gains of -37,700 afy below the Historical baseline while groundwater pumping increases 36,300 afy above the Historical baseline, a change ratio of -104%. In other words, the proposed 2070 scenario increase in groundwater pumping will cause a decline in interconnected surface waters that exceeds the pumping increase.
- The final plan requirement for simultaneous, continuous exceedance of the MT at multiple representative monitoring wells can result in significant magnitudes and expansive areas of decline in groundwater levels, groundwater storage, water quality, interconnected surface waters, and possibly surface elevations (inelastic subsidence) as long as one of the monitored stations in the group doesn't continuously exceed the MT. In other words, there is no limit to decline in the beneficial uses of groundwater if measurements in *one* of the monitoring stations within a group is above the MT at least once every 24 months.
- The final plan fails to analyze, monitor, or consider the potential impacts to water quality from the proposed allowable changes in groundwater levels and storage, except for one constituent, salinity. Although the final plan calls for coordination in management of water quality with other governmental agencies, the plan doesn't indicate what the MTs are for all the potential contaminants of concern in the Corning subbasin, or what and how GSP management actions will be taken whenever a water quality impact is identified.

- The final plan requires that at least 25% of the 15 RMP water quality network monitoring wells, i.e., 3 wells, must exceed the MT for 2 consecutive years *where it is established that the GSP implementation is the cause of the exceedance to trigger an undesirable resul*t. The justification for requiring water quality exceedance in multiple wells for multiple years isn't clear and seems to be allowing for the expansion of water quality degradation before the Corning GSAs will act to prevent an undesirable result. The requirement that someone must prove that the GSP implementation caused the water quality exceedance isn't consistent with the SGMA requirement to protect water quality.
- The final plan sets the MT rate of inelastic subsidence that appears to exceed the current conditions while providing no current assessment of the sensitivity of local infrastructure to subsidence.
- The final plan doesn't provide a requirement for frequent monitoring of subsidence benchmarks or monitoring of critical infrastructure, but instead leaves the responsibility of subsidence monitoring and analysis to others with the frequency of reporting dependent on the work schedules and funding of DWR and others.

The Final Corning GSP Fails to Comply with SGMA and the Water Code.

The following sections provide expanded discussions of the deficiencies listed above regarding how the Corning GSP fails to protect the beneficial uses for all users of groundwater in the subbasin.

1. The Corning GSP sets the MTs for unreasonable results in the management of groundwater levels at depths that can result in 16% or more of the domestic wells going dry for sustained periods, if not permanently, Section 6.6.2.2 (pages 6-21 to 6-26, pdf 430 to 435). This could possibly result in 315 of the 1,970 domestic wells in the subbasin going dry, see well count in Table 2-5 (page 2-34, pdf 100).

   The representative monitoring point (RMP) network of wells for measuring groundwater levels includes 37 shallow wells and 21 deep wells, Section 5.2.4 (pages 5-7 to 5-11, pdf 369 to 374). The RMP wells are subdivided into three regions: stable, slight decline, and declining, based on the historical stability of groundwater levels, Figures 6-1 and 6-2 (pages 6-12 and 6-13, pdf 421 and 422, and AquAlliance Exhibit 1. The MTs for the RMP groundwater level wells are set based on whether the recent historical (2010 to 2019) groundwater levels are stable or declining. Minimum thresholds were set using one of the two criteria (page 6-8, pdf 417):

   - *For wells that had recent historical (between 2010 and 2019) stable groundwater elevations (stable wells): Minimum fall groundwater elevation since 2012 minus 20-foot buffer.*

   - *For wells that had recent historical (between 2010 and 2019) declining groundwater elevations (declining wells): Minimum fall groundwater elevation since 2012 minus 20% of minimum groundwater level depth.*

Both criteria appear to be arbitrary and designed to allow for the groundwater level to decline below the recent lowest elevation measured during a drought. This will likely subject many domestic well owners to experience their lowest groundwater levels with all the accompanying negative impacts: dry wells, poor water quality, higher pumping cost, etc. AquAlliance Exhibit 1-2 has a summary at the bottom of the table of the average MOs and MTs depths and depth differences for each class of RMP monitoring well taken from Tables 5-2, 5-7 and 6-2 (pages 5-8 and 5-9, 5-37, and 6-15 and 6-16, pdf 370-371, 399, 424-425). The average difference in depth in the shallow wells between the MO and the lowest groundwater elevation since 2012) (MO – 2012) ranges from 4.1 feet to 15.9 feet, with the basin-wide average at 6.9 feet. The difference in the shallow well elevation from the lowest groundwater levels since 2012 to the MTs (2012 – MT) ranges from 16.5 feet to 23.12 feet, with a basin-wide average of 17.8 feet. The shallow well MTs allow for a decline in depth ranging from 2.6 to 5.9 times greater than the historical decline from the MOs to the 2012 low [(MO-MT)/(MO-2012)], with a basin-wide average of 3.7 times, or 370% greater. In other words, domestic wells that on average experience a historical decline of 6.9 feet will now be allowed to experience an average maximum decline of 25.6 feet. This increase appears to be significant and unreasonable, and it apparently allows for the **dewatering of 16% of the known domestic wells, or possibly more,** because of the requirement for 2 consecutive years below the MT depth before an undesirable result occurs, Table 6-1 and Section 6.6.4.1 (pages 6-1, 6-34 and 6-35, pdf 416, 443 and 444).

The Corning GSP apparently considers a 370% increase from the average MO-to-MT depths to be a beneficially <u>practical</u> sustainable management criterion, stating that *[t]he proposed minimum thresholds for groundwater elevation will not necessarily protect all domestic wells because it is impractical to manage a groundwater basin in a manner that fully protects the shallowest wells* (page 6-26, pdf 436). By "shallowest wells" the plan seems to consider the shallowest 16%, or 315 wells, unworthy of protection regardless of which wells that have already gone dry since 2012 (i.e., past droughts) as well as those that will go dry in the future under Corning GSP sustainability criteria.

2. The Corning GSP does propose to establish a Well Mitigation Program, Section 7.3.2.1 to 7.3.2.7 (pages 7-12 to 7-15, pf 490 to 493) with various objectives and costs estimated at $100,000 to $500,00 per year, but the funding source(s) isn't clearly specified. The plan states that this well mitigation program would help identify and avoid impacts to well owners with a more complete inventory of wells and by … *the GSAs providing education and outreach to well owners to deepen or replace wells*, Section 7.3.2.1.7 (page 7-15, pdf 493). The outline for the Well Mitigation Program generally describes determination of which well owners might benefit from the program:

> *Eligibility and access documentation to determine which Subbasin residents are eligible to participate in the mitigation program, well eligibility based on well construction*

> *parameters, and protocols to determine potential mitigation actions such as well deepening, repair, or replacement.*

The description of the Well Mitigation Program only commits to taking potential mitigation actions without giving any specifics on how the $500,000 per year cost was determined or the amount of funds committed to each potential mitigation action, or any matching fund requirements for eligible well owners.

The Well Mitigation Program in its current form is just a concept, not an actual commitment to mitigate the impacts from the proposed increased groundwater pumping. The Corning GSP doesn't link the increase in groundwater production to the implementation of this mitigation program. In other words, increased pumping can apparently go forward, without a program to deepen, repair, or replace impacted domestic wells.

To be a functional mitigation program, the Corning GSAs need to make a firm commitment to implement the program within the next 3 years as shown in Table 7-3 (page 7-15, pdf 493) and expand the description of the program to include specific information on the funding source(s), the availability of these funds (local, state, or federal), the legal requirements for acquiring the funds, the criteria for prioritizing expenditures, the requirements for eligibility to receive funds, the funding match requirements for eligible well owners, the criteria for deciding to deepen, repair a well, add a water quality treatment system, or replace it with new well construction, the administrative procedures for the program, and the steps a resident must take to obtain well repair or replacement funds. In addition, the GSP should address criteria that will be used to evaluate a well that needs to be the deepened, repaired, or replaced to comply with the recent Governor's Executive Order N-7-22,[2] and any additional local agency permitting requirements.

3. The Corning GSP requires that groundwater levels fall below their minimum groundwater elevation thresholds for 24 consecutive months (2 years) in 20% of the wells before an undesirable result can be declared, Table 6-1 and Section 6.6.4.1 (pages 6-1, 6-34 and 6-35, pdf 416, 443 and 444). The plan apparently assumes that harm to the "long-term" beneficial uses and users only occurs when there are 24 continuous months of harm across a broad area of the subbasin, which then triggers an undesirable result and the need for the GSAs to take action.

   The Corning GSP provides additional language to the definition of a SGMA undesirable result, noting that this language isn't part of the definition given in the SGMA regulations. The GSP lists the six groundwater conditions from Water Code Section 10721 that can trigger an undesirable result, Section 6.1, (pages 6-2 to 6-4, pdf 411 to 413). The plan then adds the following explanatory text to the definition of undesirable result:

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[2] https://www.gov.ca.gov/wp-content/uploads/2022/03/March-2022-Drought-EO.pdf

> *Undesirable Result is not defined in the GSP Regulations. However, the description of undesirable result states that it should be a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the subbasin. An example undesirable result is more than 20% of the measured groundwater levels being lower than the minimum thresholds. Undesirable results should not be confused with significant and unreasonable conditions. Significant and unreasonable conditions are physical conditions to be avoided; an undesirable result is a quantitative assessment based on minimum thresholds.* (underline added)

Apparently, the Corning GSP is making a distinction between a groundwater condition that's undesirable to only a few from a condition that affects many. This seems to be making an arbitrary threshold on the *practical* number of residents that can be inconvenienced by a dry or impaired well. For example, the assumption that it is *practical* to allow 16% of domestic wells can go dry in the Corning Subbasin, which is a significant and unreasonable condition for those residents, but apparently not sufficiently "significant and unreasonable" to the residents of the subbasin as a whole so as to trigger an undesirable result and the need for sustainable management action(s). The GSAs' authority to set the *practical* threshold of how many residences can be made to have a significant and unreasonable condition is unclear. When combined with the 20% requirement for collective MT exceedance for 24 consecutive months, the GSP sustainability management criterion for chronic lowering of groundwater levels may violate Water Codes 106, 106.3(a) and 106.3(b) because it fails to prioritize groundwater for domestic purposes and protect the groundwater in the subbasin to provide for an adequate supply of safe, clean and affordable water for human consumption, cooking and sanitary purposes.

4. The Corning GSP doesn't specify how the 20% of the RMP wells will be selected, or whether they can be adjacent, discontinuous, or spread across the subbasin. Can there be more than one 20% group? The monitoring plan does split the groundwater level monitoring network into 37 shallow and 21 deep wells (greater than 450 feet below the ground surface,(bgs)) so that suggests that at least two 20% groups are allowed. The reasoning for selecting the 20% well groups raises several questions:

   - What are the selection criteria for 20% groups of groundwater level monitoring wells? Are they based on the portion of the subbasin being monitored by these wells, how groundwater production in the subbasin is being managed, where sustainability projects are being implemented, when the groundwater levels wells drop below their MT elevations, or some combination of these and other criteria?
   - How many wells are required to make a 20% group? Can it be 8 wells out of the 37 shallow wells, 5 wells from the 21 deep wells, or does it need to be 12 wells from a total of 58 wells?
   - How many 20% MT exceedance groups are possible in each aquifer zone, only one, up to 5, or more?

- Can the areas of the subbasin monitored by multiple 20% groups overlap?
- Can a well be in multiple 20% groups at the same time?
- Can an undesirable result be declared after 24 months of MT exceedance in the deep aquifer, but not be declared for the overlying shallow aquifer, or vice versa?
- What is the start date of the 24-consecutive-month clock? Does it start on the earliest day that any one of the 20% wells exceeds its MT, on the day the last of the 20% well exceeds its MT, or some other intermediate date?
- What happens to the start date of the 24-consecutive-month clock if additional RMP wells exceed their MTs after the day that there's a minimum number of wells needed for a 20% group? In other words, does the start date begin anew when a well is added to an existing group?
- Are these additional wells made part of the existing group or does a new group have to be formed once there are enough additional wells to make another 20% group?
- If there are multiple 20% MT exceedance groups, how is the determination of an undesirable result made if the exceedance in any one group is less than 24 months, but the combined duration of the exceedance for all groups is greater than 24 months?
- It is unclear if the wells assigned to a group stay in the same group forever, change when there are fewer than 20% of the wells in the group, or change when the 24-month clock stops.
- What happens when the locations of the first 20% group of wells cover a large portion of the subbasin, and then additional MT exceedance wells are clustered with in the first group's area around a local pumping depression in numbers sufficient to form another 20% group?
- Why does the MT exceedance need to be continuous in 20% of the monitoring wells for 24 months when dewatering of a single domestic or small agricultural well can cause significant harm to the user(s) if it occurs repeatedly for only a few months?
- Why is the dewatering of a domestic and/or small agricultural well for less than 24 months considered a beneficially sustainable practice that's in compliance with Water Code Sections 106 and 106.3(a)?
- Why is dewatering of domestic and/or small agricultural wells that might occur cyclically each summer considered a beneficially sustainable practice, and who is benefitting? Certainly it is not to the small landowner.

5. AquAlliance Exhibits 2 through 5 are modifications of groundwater, land surface, and surface water budgets in the Corning GSP. The modifications include columns and rows that calculate the budget component differences between the average values, differences in the component values by water year type, calculated sums and differences for groundwater pumping and storage, stream gains and losses, and the difference between the Historical baseline and the Current baseline with the Projected 2070 water budget. Columns and rows in these exhibits have been labeled for these comments.

AquAlliance Exhibit 2 lists the values and changes in the Historical and projected 2070 groundwater budget components with summaries for groundwater pumping and storage for the overall average, and the three different water year type groups, critically dry and dry (CD/D), below normal and above normal (BN/AN), and wet (W). The Historical baseline average annual groundwater pumping for all year types is 135,900 afy, Exhibit 2-1A (row 20, column C). Historical baseline pumping increased for CD/D water years by 7% to 145,050 afy and deceased for the other two water year types (row 20, columns G through J). For the projected 2070 scenario, the subbasin average groundwater pumping will be increased above the Historical baseline by 36,300 afy, or 27%, to 172,200 afy, Exhibit 2-2C (row 68, columns D and E) and Exhibit 2-1B (row 44, column C). Projected 2070 pumping will increase 37,250 afy during CD/D water years, 38,500 afy for AN/BN years, and 35,300 afy for W years, Exhibit 2-2C (rows 68, columns E through J).

Increases in groundwater pumping for the 2070 scenario also result in changes in groundwater storage. The Historical baseline average annual change in groundwater storage is a positive 6,900 afy, which resulted in a cumulative change in groundwater storage of 290,300 acre-feet (af), Exhibit 2-1A (rows 21 and 22, column C). During Historical CD/D water years, the storage loss is negative at -27,450 afy (row 21, column E). The 2070 scenario annual average change in storage is -300 afy with a cumulative change of -19,700 af over 50 years (rows 45 and 46, column C). While the 2070 annual average change in groundwater storage doesn't seem significant, the loss in storage during CD/D years increases to -41,800 afy, an additional loss over the Historical baseline of -14,350 afy, Exhibit 2-1B (row 45, column E) and Exhibit 2-2C (row 69, column E). The additional loss in storage for the 2070 scenario is approximately 39% of the 37,250 afy increase in groundwater pumping (-14,350 afy / 37,250 afy = 0.385 = 39%), Exhibit 2-2C (rows 68 and 69, column E). This additional loss in groundwater storge during CD/D water years, or drought years, is important because the change in storage during droughts can be used to establish the depth of the MTs, which will be discussed below in Comment No. 11.

6. The additional loss in groundwater storage with the 2070 scenario isn't the only important decrease in the Corning GSP water budget caused by the increase in pumping. The increase in groundwater pumping also causes a significant decline in the interconnected surface water flows. AquAlliance Exhibit 2 calculates the change in the net stream gains, i.e., the amount of groundwater discharging to the streams minus the amount of surface water seeping to groundwater. For the Historical baseline, the annual average net stream gain is a positive 33,100 afy, Exhibit 2-1A (row 23, column C). In other words, the streams gain flow from discharging groundwater. There is an assumption that when streams gain flow from groundwater and the flow changes with the pumping of groundwater, then those streams are interconnected surface waters and subject to SGMA.[3]

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[3] See these articles about how the disconnection of streams and groundwater results in maximum stream flow losses that spread as the groundwater depression enlarges.

The Historical baseline net stream gain is also positive for all water year types (row 23, columns E through J). In contrast, the 2070 scenario has a net loss in average annual stream flow of -4,600 afy, Exhibit 2-1B (row 47, column C). This 2070 scenario loss in annual stream flow continues in the CD/D and BN/AN water years with a maximum loss of -11,000 afy, Exhibit 2-1B (row 47, columns E through J). Although the 2070 Wet year has a positive net stream gain of 3,700 afy, it is a -47,200 afy reduction from the Historical baseline wet year gain of 50,900 afy, Exhibits 2-1A and 2-1B (column I, rows 47 versus 23) and Exhibit 2-2C (row 70, column I).

The 2070 scenario loss in net stream gain is greater than the increase in groundwater pumping. The 2070 scenario average annual loss in stream flow relative to the Historical baseline of -37,700 afy is approximately 104% of the 36,300 afy 2070 increase in average annual groundwater production, Exhibit 2-2C (rows 68, 70 and 71, column C). The 2070 scenario stream flow loss from the Historical baseline continues for the different water year types ranging from -81% to -134%, Exhibit 2-2C (rows 70 and 71, columns E to J).

The Corning GSP planned increase in groundwater pumping with the 2070 scenario appears to result in both a loss in groundwater storage and a loss in surface water flows, Exhibit 2-1B (rows 45, 46 and 47, column C). These losses contrast with the Historical baseline where annual average for both water budget components is positive, Exhibit 2-1A (rows 21, 22 and 23, column C). The 2070 loss in surface water flow that exceeds the increase in pumping suggests that the subbasin may be at a hydraulic and ecological tipping point. The Corning GSP proposed 2070 management of subbasin raises the several questions about the sustainability of future stream flows:

Brunner P., Cook P. G., and Simmons C. T., 2009, Hydrogeologic controls on disconnection between surface water and groundwater, Water Resources Research, v. 45, W01422, pp. 1-13.
https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2008WR006953

Brunner P., Cook P.G. and Simmons C.T., 2011, Disconnected Surface Water and Groundwater: From Theory to Practice, Ground Water, v. 49, no. 4, pp. 460-467.
https://libra.unine.ch/Publications/Philip_Brunner/25762

Cook P.G., Brunner P., Simmons C.T., Lamontagne S., 2010, What is a Disconnected Stream?, Groundwater 2010, Canberra, October 31, 2010 – November 4, 2010, p. 4.
https://www.researchgate.net/profile/Philip-Brunner/publication/266251504_What_is_a_Disconnected_Stream/links/54dfa2c80cf29666378b9e57/What-is-a-Disconnected-Stream.pdf

Fox G.A. and Durnford D.S., 2003, Unsaturated hyporheic zone flow in stream/aquifer conjunctive systems, Advances in Water Resources, v. 26, pp.. 989-1000.
http://www.geol.lsu.edu/blanford/NATORBF/5%20Modeling%20Papers%20of%20Groundwater%20Flow%20of%20Stream&Aquifer%20Systems/Fox%20et%20al_Water%20Resources_2003.PDF

- Why is a loss in stream flow that exceeds the increase in groundwater pumping by 104% considered a beneficially sustainable management practice?
- Shouldn't the loss in stream flow caused by an increase in pumping be considered an undesirable result to interconnected surface waters, and a negative impact to the Public Trust?
- Doesn't SGMA require that the proposed 2070 scenario groundwater production in the Corning Subbasin be reduced below the proposed sustainable yield of 171,800 afy, Section 4.4.6 (pages 4-88 and 4-89, pdf 361 and 362), to prevent the undesirable results of a significant and unreasonable loss of interconnected surface water flow?
- Does the additional loss of surface water proposed by the GSP require a water rights diversion and storage permit? If yes, where is the point of diversion and what are the permit conditions?
- Does SGMA allow a GSP to reduce surface water flows without a full water availability analysis that documents the impacts of the reductions on existing water rights, demonstrates that the minimum surface water flows and by-pass flow requirements will be met, and shows that ecological and Public Trust resources will be protected?

7. In addition to the calculation of the basin-wide loss in interconnected stream flow with the 2070 scenario, the Corning GSP provides data on the change in stream flows for three major surface water bodies in the subbasin: the Sacramento River, Stony Creek and Black Butte Lake, and Thomes Creek, Exhibit 4.

   The Sacramento River is the only major stream during the Historical baseline period that had a positive net gain in flow from groundwater discharge, i.e., an increase in surface flows, Exhibit 4-1A (row 3, columns B through I). Stony Creek and Black Butte Lake received a small amount of discharge from groundwater, but that's minor compared to the seepage losses, so the net stream gain was negative, Exhibit 4-1A (row 4 through 8, columns B through I). For Thomes Creek, the net stream gain was all negative with apparently no groundwater discharging to the creek, Exhibit 4-1A (rows 9 through 11, columns B through I). Note, streams that don't receive discharge from groundwater can still be affected by changes in groundwater level and therefore be interconnected, see references listed in footnote 2 of Comment No. 6.

   The projected 2070 scenario exhibits a significant reduction in the net stream gain in all three of these surface water bodies, which is consistent with the basin-wide change, Exhibit 4-1B. **The Sacramento River will have the greatest change in net stream flow with an annual average of loss of -63,000 afy, a -178% loss from the Historical baseline**, Exhibit 4-2C (row 31, columns B and C). The majority of the subbasin stream flow losses continue with the Sacramento River for all water year types (row 31, columns B through I). The sum of the changes in the three surface water bodies is a loss averaging -86,000 afy with the water year type losses ranging from -57,850 afy to -84,200 afy, Exhibit 4-2C (row 42, columns B through I). Note that the sum of the losses in net stream gains for these three surface water bodies is greater than the basin-wide loss in net stream gains for the annual average and all water year types; compare Exhibit 4-2C (row 42, columns B through I) with Exhibit 2-2C (row 70, columns C through J). It is unclear what causes this difference even though the summation of the three stream net gains doesn't include the change in the net gains from Black Butte Lake. Including the lake doesn't make up for the difference between the two surface water budgets.

The conclusion that's reached from the change in net stream gains using both the basin-wide and the three itemized surface water body water budgets is that the 2070 scenario predicts significant and unreasonable losses from interconnected surface waters, which should be considered an undesirable result, and a negative impact to the Public Trust. The GSP doesn't quantify or analyze the effects of the interconnected surface water loss on beneficial uses of the surface water. Without the beneficial uses and water availability analyses, the management of the subbasin should maintain the Historical baseline surface water flows.

Maintaining Historical baseline surface water flows may require reductions in the annual groundwater pumping below the historical rates because of climate change. AquAlliance Exhibit 3 compares the Current scenario water budget to the Projected 2070 scenario. The Current scenario water budget evaluates the existing supply, demand, and change in storage under the most recently available population, land use, and hydrologic conditions, Section 4.1.3 (page 4-13, pdf 286). The Current water budget shows an increase in annual average groundwater pumping to 157,900 afy, an increase of 22,000 afy over the Historical baseline of 135,900 afy. The Current scenario has an annual average net stream gain of 10,000 afy, a change of -23,100 afy from the 33,100 afy Historical baseline, AquAlliance Exhibits 2-1A and 3-1A (rows 20 and 23, column C). As with the 2070 scenario, the Current scenario ratio of the change in net stream gain to change in groundwater pumping is negative and greater than one at -105% (-23,100 afy / 22,000 afy = -1.05 = -105%). This suggests that future climate changes may cause a reduction in net stream gain even with the Historical baseline rates of groundwater pumping.

Corning GSP and the management actions should be revised so that the 2070 scenario groundwater production is made sustainable by not causing losses in interconnected surface waters. Future subbasin groundwater management should maintain the flows in the subbasin stream and river to, at a minimum, match the Historical baseline in flow quantity, flow timing and flow location.

8. AquAlliance Exhibit 5 gives the values for the Land Surface Budget for the Historical baseline, part A, and the projected 2070 scenario, part B. The differences between the baseline and the 2070 scenario are given in part C. Overall there is an increase in the total inflow and outflow with the 2070 scenario, Exhibit 5C (rows 26 and 31, columns C through J). However, the direction of change is not the same for each water budget component.

The 2070 scenario inflow for precipitation and applied groundwater both increase over the Historical baseline, but the applied surface water decreases. For the 2070 scenario the total outflow increases with the increases in evapotranspiration and overland flow. These increases in outflow appear to cause the decrease in deep percolation and return flow to streams, Exhibit 5C (rows 27 and 30, columns C through J). The total change in soil and unsaturated zone storage from Historical baseline to the 2070 scenario is negative for the annual average and the BN/AN water year, positive for the CD/D drought water years, and zero for the wet years, Exhibit 5C (row 32, columns C through J). It is unclear if the loss in return flow to streams in the Land Surface Budget, Exhibit 5 (row 30), is a part of the net stream gains component in the Groundwater and Surface Water budgets, Exhibits 2, 3 and 4.

9. The MT depths are apparently calculated assuming the sustainable yield of 171,800 afy for the 2070 scenario. The Corning GSP calculates a sustainable yield by subtracting the average annual negative change in annual groundwater storage in the projected 2070 scenario from the average annual groundwater production, Section 4.4.6 (pages 3-61 and 3-62, pdf 361 and 362), Table 4-15 (page 4-69, pdf 432), and AquAlliance Exhibit 2-1B (rows 44 and 45, Column C). As discussed in Comments Nos. 6 and 7, the proposed 2070 scenario management of the subbasin will result in a significant loss in interconnected surface waters while groundwater pumping is allowed to increase presumably up to this sustainable yield. Note that the projected pumping during CD/D water years is greater than the sustainable yield at 182,300 afy, AquAlliance Exhibit 2-1B (row 44, column E).

   The calculation of the 2070 scenario sustainable yield, using only the change in storage, doesn't address the undesirable loss to interconnected surface waters. The estimated 2070 scenario loss of interconnected surface waters should be considered an undesirable result for the Corning Subbasin unless beneficial uses and water availability analyses are done to demonstrate that the management actions and the GSP cause no significant and unreasonable impacts on the subbasin's beneficial uses of water, water users, and/or Public Trust resources. The GSP does cite a portion of the description of role of the sustainable yield estimate in SGMA from the 2017 Sustainable Management Criteria Best Management Practices,[4] Section 4.4.6 (page 4-88, pdf 361). The following is the full text from the BMP document with italics and underlines added:

<u>Role of Sustainable Yield Estimates in SGMA</u>

> *In general, <u>the sustainable yield of a basin is the amount of groundwater that can be withdrawn annually without causing undesirable results</u>. Sustainable yield is referenced in SGMA as part of the estimated basinwide water budget and as the outcome of avoiding undesirable results.*

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[4] https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-6-Sustainable-Management-Criteria-DRAFT_ay_19.pdf

> *Sustainable yield estimates are part of SGMA's required basinwide water budget. Section 354.18(b)(7) of the GSP Regulations requires that an estimate of the basin's sustainable yield be provided in the GSP (or in the coordination agreement for basins with multiple GSPs). A single value of sustainable yield must be calculated basinwide. This sustainable yield estimate can be helpful for estimating the projects and programs needed to achieve sustainability.*
>
> *SGMA does not incorporate sustainable yield estimates directly into sustainable management criteria. Basinwide pumping within the sustainable yield estimate is neither a measure of, nor proof of, sustainability. Sustainability under SGMA is only demonstrated by avoiding undesirable results for the six sustainability indicators.*

If this description of the role of the sustainable yield estimate in SGMA is followed, then the loss of flows in interconnected surface waters should be accounted for in the yield estimate. The Historical baseline water budget shows that the net stream gains are always positive for each water year type, AquAlliance Exhibit 2-1A (row 23, columns C through J). Even the Current scenario water years have positive net stream gains, although they are reduced from the Historical baseline, also see Comment No. 7, AquAlliance Exhibit 3-1A (row 23, columns C through J), whereas the net gains for the 2070 scenario are all negative, except for wet water years when a positive 3,700 afy gain is estimated, a 93% reduction from the Historical baseline of 50,900 afy for wet water years, AquAlliance Exhibit 2-1B (rows 23, 47 and 70, columns C through J).

The GSP's estimate of the sustainable yield for the Corning Subbasin using only the storage imbalance isn't consistent with the requirements of SGMA because it ignores the undesirable result to interconnected surface waters. The definition of sustainable yield in SGMA, WC 10721(w), requires that annual groundwater withdrawals do not cause *an undesirable result*, that is one or more. All six of the sustainability indicators listed in WC 10721(x) need to be considered when estimating the volume of groundwater that can be sustainably produced, that is, the sustainable yield.

The sustainable yield for the Corning Subbasin should be revised to account for impacts on interconnected surface water flows and the other five sustainability indicators. If [t]*he key to demonstrating a basin is meeting its sustainability goal is by avoiding undesirable results* (page 33 in DWR, 2017, Sustainability BMPs footnote 3), then the GSP must prevent impacts to interconnected surface waters and the other undesirable results.

Without an impact analyses, the Corning Subbasin sustainable yield must result in net stream gains to interconnected surface water that are equal to or greater than the Historical baseline at the start of SGMA. This may require a reduction in groundwater pumping from the Historical baseline if other components of the water budget result in additional losses to surface water flows or other undesirable results, see Comment No. 7. The multiple scenarios of the Corning Subbasin need to be run using the subbasin's groundwater model until a water budget that doesn't result in undesirable results is achieved. The estimated groundwater pumping from that iterative analysis would be the appropriate sustainable yield.

The conclusion that's reached from the changes in net stream gains with both the basin-wide and the three itemized surface water body water budgets is that the 2070 scenario predicts **significant and unreasonable losses from interconnected surface waters** which should be considered an undesirable result, and a negative impact to the Public Trust. The Corning GSP doesn't quantify or analyze the effects of the interconnected surface water loss on beneficial uses, users, or the Public Trust. Without the beneficial uses and water availability analyses, the management of the subbasin shouldn't allow degradation of the interconnected surface waters sustainability indicator below levels of the Historical baseline, and, in fact, may need to improve the conditions in the subbasin to correct the management problems that lead to the subbasin's SGMA high-priority status[5], which triggered the need to develop a GSP for the Corning Subbasin.

10. The apparently arbitrary decisions used in setting the MT depths were discussed above in Comment No. 1. A more appropriate method for establishing the MT depths to prevent undesirable results is to use the historical data of changes in groundwater levels and groundwater storage during periods of extended below-normal water years,(i.e., droughts). The Corning GSP provides information on the groundwater water budgets for each type of water year with the Historical baseline, Current, and Projected 2070 scenarios in Appendix 4D Tables 4D-6, 4D-14, and 4D-34, respectively (appendices only file pdf 421, 429, and 449). The cumulative change in groundwater storage for the Historical baseline is plotted in Figure 3-31 (page 3-75, pdf 224). The GSP doesn't provide a plot of the other scenario cumulative change in storage.

    AquAlliance Exhibit 6 is a plot of the Current and Projected 2070 cumulative changes in groundwater storage based on the groundwater model of the Corning Subbasin. A table is included on the exhibit that lists values for the averages and three water year types for the Historical baseline, Current, and 2070 scenario water budgets, see AquAlliance Exhibits 1, 2 and 3. Lines are drawn on top of the cumulative change graphs that estimate the slope of the annual loss groundwater storage during droughts lasting 3 or more years. The estimated annual loss in storage ranges from -34,375 afy to -57,600 afy. The estimated average annual loss in groundwater storage for the 2070 scenario in CD/D water years falls within this range at -41,800 afy, AquAlliance Exhibit 2-1B (row 45, column D).

    The Corning GSP also provides information on the changes in groundwater level in the subbasin from 2010 to 2015 on Figure 3-22 (page 3-55, pdf 204) and the change in groundwater storage during this time in Table 4D-2 (appendices only file pdf 417), and in Section 3.2.3 (pages 3-72 and 3-74, pdf 222 and 223). Using the average changes in

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[5] Corning Subbasin 5-021.51, high priority with 22.5 priority points, accessed 4.16.2022; https://gis.water.ca.gov/app/bp-dashboard/final/

groundwater levels and the cumulative change in groundwater storage from 2010 to 2015, an estimate can be made of the basin-wide volume of groundwater yielded with each 1-foot decline in groundwater level. The volume in acre-feet per foot (af/f) can then be used to estimate a basin-wide average decline groundwater during consecutive years of drought.

AquAlliance Exhibit 7 provides several tables that list and calculate the average decline in depth of groundwater from 2010 to 2015 taken from Figure 3-22 and sorted into the stable, slight decline and declining sub-regions as shown on Figure 6-1 (page 6-12, pdf 421). The decrease in groundwater levels from 2010 to 2015 ranged from -9.2 feet for the stable region to -16.8 for the declining region, with a basin-wide average of -13.75 feet. Using this average decline and the cumulative loss in groundwater storage of -114,600 af calculated from data in Table 4D-2, a basin-wide average yield of 8,334 af/f is estimated. Using the 207,342 total acres for the Corning Subbasin, Section 3.1.1 (page 3-1, pdf 150), an average specific yield of approximately 4% is calculated for the shallow aquifer system.

If the acreage for the available groundwater is less than the full subbasin area, the specific yield increases to approximately 5.56% and 8.33% for 150,000 and 100,000 acres of available groundwater source area. Using the estimated basin-wide yield of 8,334 af/f, a calculation can be made for the basin-wide average decline in groundwater level that would occur during multiple CD/D water years, i.e., a drought, for both the Historical baseline and the 2070 scenario.

11. The sustainable management of groundwater as envisioned by SGMA likely requires that a temporary groundwater storage surplus be **maintained** to meet the needs of users during droughts and to protect the beneficial uses of streams, wildlife, and groundwater dependent ecosystem (WC 10721(w)). That is, subbasin management actions should provide for storing sufficient groundwater needed to counter the losses from a drought to protect and minimize drought impacts to all beneficial uses and users, and the Public Trust.

    If that is a goal of SGMA, shouldn't the depth of the MTs be set at a depth caused by declining groundwater levels for a reasonable number of continuous years of drought after adjusting for the temporary storage surplus created during normal, above normal, and wet years? Shouldn't a GSP use a method based on anticipated storage loss during a drought, rather than the arbitrary method of the Corning GSP that set the depths far below the recent historical maximum, which then results in several decades of continuous groundwater level declines and loss in storage before an undesirable result needs to be declared?

    The average annual Historical baseline change in groundwater storage for CD/D water years is -27,450 afy, AquAlliance Exhibit 2-1A (row 21, column E). Using the 8,334 af/f basin-wide yield and the Historic baseline change in annual storage, an average annual decline in groundwater level of -3.29 ft is calculated, AquAlliance Exhibit 7. For a drought of 3 consecutive CD/D water years, a cumulative storage loss of -82,350 af would be accompanied by a -9.9 ft decline in groundwater level. For 4 consecutive CD/D water years, the cumulative storage loss would be -109,800 af with a groundwater level decline of -13.2 ft. This estimated decline in groundwater level is consistent with the 2010 -2015 decline of 13.75 ft.

If the change in groundwater storage for CD/D water years with the 2070 scenario of -41,800 afy is used, the decline in groundwater would be approximately -5 feet per drought year. For 3 consecutive 2070 scenario CD/D drought years, the decline would be -15 feet, and for 4 consecutive years the decline would be -20 feet. The -20 feet is consistent with the Corning GSP setting the MT depth for the stable shallow aquifer zone at the [*m*]*inimum fall groundwater elevation since 2012 minus 20-foot buffer*, AquAlliance Exhibit 1. In other words, the MTs are apparently set to allow for 4 years of additional drought after groundwater levels decline to the lowest fall groundwater elevation since 2012. Declaration of an undesirable result wouldn't occur until after another 2 years of continuous drought under the GSP's 24-month exceedance requirement, or 6 years after the lowest historical groundwater level is reached. The decline to the lowest elevation since 2012 may take one or more years based on the elevation difference between the MOs and the 2012 low, AquAlliance Exhibit 1-2. Therefore, the MTs appear to be set to allow for 7 years of continuous drought at the 2070 scenario rate of storage loss. Setting the MT depths to trigger an undesirable result in the lowering of groundwater level at 7+ years of drought is a questionable management practice that will likely result in significant and unreasonable impacts to shallow domestic wells and interconnected surface waters.

12. A more appropriate method for determining the MT depth would be to use the estimated decline in groundwater levels from an extended period of drought, such as 3 years. The MTs depths would be set at the depth below the MOs that accommodates the decline in groundwater levels during this extended period of drought. From the discussion in Comment No. 11, the MTs for 2070 scenario should be set at no deeper than 15 feet below the MO elevations. The MT depth may need to be less to accommodate the 24 months of MT exceedance requirement.

    The GSP proposes that a declaration of an undesirable result can be made only after groundwater levels decline below the MT depth and remain there for 24 continuous months. If the MTs are set at 15 feet below the MOs, then a drought of 5 years could occur before an undesirable result would be declared with possibly an additional 10 feet of groundwater decline. This would result in 25 feet of groundwater level decline under the 2070 scenario and a total storage loss of approximately 200,000 af (25 years X 8,334 af/f = 208,350 af), which is not quite double the 114,600 af historical storage loss from 2010 to 2015, AquAlliance Exhibit 7. This suggests that perhaps **a more appropriate sustainable depth for the MTs should be set at 5 feet below the MOs** that allows only 1 year of drought storage loss with the assumption that an additional 2 years of drought can occur before an undesirable result is declared.

13. As discussed in Comment Nos. 6, 7 and 9, the 2070 scenario assumption that the Corning Subbasin has a sustainable yield of 171,800 afy is inappropriate because this volume of

pumping results in significant and unreasonable loss to interconnected surface waters, which is a SGMA unreasonable result. The 2070 scenario CD/D water year pumping is estimated at 182,300 afy, which results in greater losses to stream flow than with the average annual 2070 production, AquAlliance Exhibit 2-1B (rows 44 and 47, columns C and E).

As discussed in Comment No. 9, the sustainable yield of the subbasin needs to be recalculated based on beneficial uses and surface water availability analyses so that none of the six SGMA undesirable results occur. Without the beneficial uses and water availability analyses, the GSP should assume that the future pumping volumes are no greater than the Historical baseline. The **sustainable yield pumping may need to be less to accommodate future climate changes**, see Comment No. 7. With a reduction in sustainable yield pumping volume, the annual loss in groundwater storage will likely be reduced. A reduction in CD/D water year storage losses would require recalculation of the proper depth for the MTs below the MOs, which would likely reduce the elevation difference between the MOs and MTs.

14. The Corning GSP identified salinity, nitrate, and arsenic as Contaminants of Concern (COC) for the subbasin, Section 3.2.6.3 (page 3-94, pdf 243). The plan also identified the locations of historical and current contaminant cleanup sites, Figures 3-37 through 3-40 and Table 3-8 (pages 3-86 through 3-90, pdf 235 through 239). The COC at the cleanup site include fuels, solvents, herbicides, fumigants, and pesticides, Table 3-8. The GSP states that *…local, state, and federal water quality standards applicable to the Subbasin need to be taken into consideration when setting water quality sustainable management criteria (SMC)*, and that *…existing water quality monitoring programs may be used by the GSA to help collect data during GSP implementation and establish consistency with other programs*, Section 6.8.2 (page 6-41, pdf 450).

    Despite the occurrence of multiple COCs in the subbasin, the GSP will track as a sustainable management criterion only one water quality COC, salinity, using Total Dissolved Solids (TDS) concentrations. To track salinity, the GSP will rely on a RMP groundwater quality monitoring well network of 15 wells, made up of 11 municipal wells in the City of Corning and Hamilton City, and 4 small water supply wells, Section 5.4.1.6, and Figure 5-8 (page 5-27 and 5-28, pdf 389 and 390). Tables 5-3 and 5-4 (pages 5-21 and 5-25, pdf 383 and 387) list public water supply wells and groundwater quality network wells, but the 15 RMP network water quality wells aren’t clearly identified in these tables, except in Figure 5-8, which has only general well owner identifications. Therefore, the actual wells the GSP will use for the RMP water quality monitoring network aren’t clearly identified by name and location. A table is needed that lists the RMP groundwater water quality wells names, well locations, well owners, screened intervals, well types, water quality monitoring frequency, all the COC that will be monitored at each well, the water quality standards for each COC, the monitoring and reporting frequency, and the monitoring and reporting agency.

    The SMC for groundwater quality requires that at least 25% of the 15 RMP network water quality monitoring wells, i.e., 3 wells, must exceed the salinity MT for 2 consecutive years *where it is established that the GSP implementation is the cause of the exceedance to trigger an undesirable resul*t, Table ES-1, and Section 6.8.4.1 (page ES-22, 6-45 and 6-46, pdf 42, 455 and 456). The justification for requiring water quality exceedance in multiple wells for multiple years isn't clear and seems to allow for the expansion of water quality degradation before the Corning GSAs will act to prevent an undesirable result. Taking action to protect water quality, especially for drinking water supplies, isn't something that is normally delayed until the problem gets widespread and pervasive. In addition, the requirement that someone must prove that the GSP implementation caused the exceedance isn't consistent with the SGMA requirement to protect water quality.

The definition of unreasonable result for water quality degradation includes the migration of contaminant plumes that impair water supplies, WC 10721(x)(4), even when the plumes aren't caused by the GSA's implementation of the GSP. The GSAs can't ignore the water quality impacts just because their past actions didn't cause the problem. The sustainability standard directs the GSAs to prevent the spread of the contaminant(s), regardless of who is to blame for the plume or water quality degradation. Actions by the GSAs shouldn't need to wait for long-term exceedance of a water quality standard at multiple wells across a large portion of the subbasin before actions are taken to mitigate the impact. In addition, groundwater management actions should prevent the migration of contaminant plumes into the Corning Subbasin from adjacent subbasins.

The GSP should describe future management actions that will be taken to prevent the spread of contaminants even before they exceed the water quality standards at one or more of the RMP network wells, and at the other water quality monitoring wells in the Corning Subbasin and adjacent subbasins. The GSP should also address how the Well Mitigation Program will assist domestic wells owners whose wells have become polluted. Assistance such as well head testing and treatment should be part of the Corning GSPs water quality mitigation program.

Although the Corning GSP calls for coordination in management of water quality with other governmental agencies, the plan doesn't indicate what are the MOs or MTs for all the potential contaminants of concern in the Corning Subbasin, or what GSP management actions will be taken whenever a water quality impact is identified by these coordinating agencies.

What is the role of the GSAs in protecting water quality for all beneficial uses and users? In particular, the protection of domestic water supply must be the primary concern for managing the subbasin, WC 106.3(a). SGMA empowers the GSAs with the authority to control pumping rates and locations throughout the subbasin to protect all beneficial uses and users of groundwater, an authority over groundwater resources that other regulatory agencies don't possess. This is likely the reasoning behind the recent Governor's Executive Order N-7-22.

The Corning GSP should provide a concise description of what projects and management actions the GSAs will be taking to prevent degradation of the subbasin water quality for all potential COCs, describe how the GSAs will remedy in a timely manner any water quality degradation that occurs, and develop a Well Mitigation Program that is fully funded and provides for meaningful assistance to impacted well owners with repair, treatment, and/or well replacement.

15. The Corning GSP sets the MO at zero feet *for inelastic subsidence solely due to lowered groundwater elevations throughout the subbasin, in addition to any measurement error*, Section 6.9.3 (page 6-55, pdf 464). If the InSAR dataset is used with its measurement error of 0.1 ft, then annual subsidence of 0.1 ft or less would not be considered measurable inelastic subsidence.

    The MT rate for inelastic subsidence is 0.50 ft over 5 years, Table ES-1 and Sections 6.9.2 (pages 6-48, pdf 457). Although the Corning Subbasin has experienced little to no historical inelastic subsidence since the start of monitoring in 2004 (page 6-48, pdf 457), the MT was set …*to maintain consistency with neighboring subbasins,* Section 6.9.2.3 (pages 6-55 and 6-54, pdf 462 and 463). The neighboring subbasin to the south, Colusa Subbasin, has historically experienced inelastic subsidence and the MT for subsidence for that subbasin is also 0.5 feet over 5 years. Figure 6-11 shows the InSAR land subsidence data for the area at the southern border between the two subbasins surrounding Orland and Hamilton City (page 6-49, pdf 458). A north-south oriented area of subsidence ranging from -0.25 to -0.75 feet occurs just south of Orland. The Corning GSP indicates that groundwater pumping in the Colusa Subbasin near Orland has …*the potential to impact the ability of the Corning Subbasin GSAs to meet the subsidence minimum thresholds*… (page 6-54, pdf 463). Apparently, to be *consistent* with a neighboring subbasin that's experiencing ongoing subsidence, the Corning GSP will use the same MT, so that an undesirable result from subsidence doesn't have to be declared.

    The Corning GSP doesn't offer a reasonable explanation for why an MT that allows northward expansion of the Colusa Subbasin subsidence is beneficial to the infrastructure and landowners in the Corning Subbasin. The GSP notes that there's been very little historical long-term subsidence in the Subbasin, and if this doesn't change in the future, then beneficial users and land uses should not be impacted by the subsidence minimum threshold, Section 6.9.2.4 (page 6-54, pdf 463).

    While it is probably true that if the Corning Subbasin continues to have little or no inelastic subsidence, the MT value will have no effect. However, it might not be true if subsidence begins to occur, especially if it's migrating northward from the Colusa Subbasin, that the 0.50 ft over 5 years MT subsidence rate is a reasonable standard for an area that hasn't experience inelastic subsidence. The logic of the Corning GSP in setting the MT the same as the Colusa GSP seems to be that if they are 'okay' with this amount of subsidence, then we should be 'okay' too. No actual assessment of the impacts of this level of subsidence on the infrastructures in the Corning Subbasin are proposed in the GSP.

The Corning GSP takes the approach that:

> *The undesirable result for subsidence allows for no more than 0.5 foot of cumulative subsidence in the Subbasin during a 5-year period. This amount of subsidence is not likely to impact beneficial users and land uses such as highways, canals, and pipelines as it is about equal to the total subsidence in one portion of the Subbasin and no impacts to infrastructure have been reported to date. No other beneficial users or land uses are anticipated to be impacted by subsidence in the Subbasin.* Section 6.9.4.3 (page 6-57, pdf 466)

This technical standard of “not likely” to cause an impact to beneficial users and land uses needs some technical justification. The Corning GSP should be revised to provide specific information on the critical infrastructure in the Subbasin that includes: a description of the structures, the entities responsible for maintenance, how much subsidence these structures can tolerate without structural damage, the linkage and/or interdependence of these structures, the alternatives should a structure fail, the estimated costs for repairing structural damage, and the frequency of structural inspections, etc.

In addition to evaluating critical infrastructure, the GSP should address how small areas of subsidence, such as sinkholes, will be managed. Sinkholes, peat decomposition, and natural settlement can all be triggered by declining groundwater levels. The GSP appears to require proof that settlement or subsidence is due to groundwater pumping, Section 6.9 (page 6-47, pdf 456). The GSP doesn’t explain how and by whom this determination will be made, in particular, when the subsidence doesn’t cover a broad area and affects only a few private structures, like homes. The GSP seems to say that the landowner is responsible for demonstrating to the GSAs that the cause of any local settlement is groundwater decline due to pumping. Even if the landowner was able to prove the cause was declining groundwater levels, the GSP doesn’t appear to propose any mitigation program to assist in making structural repairs.

Lastly, the Plan fails to disclose the numerous sinkholes within and just outside the subbasin. The sinkholes were widely discussed by local and state government from August 2021 forward, allowing time to insert this information in the draft and final GSPs.[6] [7] This serious omission adds to the conclusion that the Corning GSP and GSAs are not ready to take on the task of managing the subbasin.

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[6] Massa, Rick August 16, 2021 e-mail to Lisa Hunter of Glenn County. “We have learned of orchardists that are experiencing sink holes in their orchards.”

[7] "Ms. Hunter also stated that staff was made aware of sink holes developing in the Colusa and Corning subbasins, and that a site visit has been conducted with Department of Water Resources." Glenn Groundwater Authority December 14, 2021 minutes p. 2 (packet pdf p. 8).

Conclusion

For all the reasons discussed in our comments on the Corning Subbasin here, the Plan fails to meet SGMA's goal of water resource sustainability and protection of the water rights of all beneficial users and uses. In accordance with legal requirements to protect the Public Trust, the Plan also fails. It also appears that the GSP will foist the responsibility to demonstrate damage from undesirable results on the unsuspecting public, creating an impossible burden for all but the large water districts with deep pockets. The Plan must be rejected by DWR and the SWRB.

Respectfully submitted,

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AquAlliance Exhibit 1-1

Corning Subbasin RMP Wells[1]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	RMP Network	State Well Number	Well Type	Groundwater Level Trend	Total Well Depth, Feet	Perforated Interval (feet bgs)	Reference Point Elevation (feet AMSL)	MO Depth, (feet)	MO Elevation, (feet AMSL)	MT Depth, (feet)	MT Elevation, (feet AMSL)	MO - MT, (feet)	2012 Minimum GW Depth, (feet)	2012 Minimum GW Elevation, (feet AMSL)	Difference MO and 2012 Min. Depth, Feet	Difference MT and 2012 Min. Elevation, Feet
1	Shallow	21N01W04N001M	Domestic	Stable	100	--	137.68	21.6	116.1	48.4	89.3	26.8	28.4	109.3	6.8	20.0
2	Shallow	22N01W19E003M	Irrigation	Stable	500	80 - 400	157.79	29.7	128.1	60.1	97.7	30.4	40.1	117.7	10.4	20.0
3	Shallow	22N01W29N003M	Observation	Stable	400	189 - 380	149.99	26.6	123.4	58.3	91.7	31.7	38.3	111.7	11.7	20.0
4	Shallow	22N02W01N003M	Observation	Stable	440	210 - 370	161.50	25.0	136.5	62.2	99.3	37.2	42.2	119.3	17.2	20.0
5	Shallow	22N02W15C004M	Observation	Stable	258	210 - 220	192.25	48.2	144.1	108.3	84.0	60.2	88.3	104.0	40.2	20.0
6	Shallow	23N02W16B001M	Irrigation	Stable	120	100 - 120	186.53	51.2	135.3	88.1	98.4	36.9	68.1	118.4	16.9	20.0
7	Shallow	23N02W28N004M	Observation	Stable	205	100 - 170	204.43	61.7	142.7	100.1	104.3	38.4	80.1	124.3	18.4	20.0
8	Shallow	23N02W34A003M	Irrigation	Stable	125	104 - 124	171.01	35.5	135.5	61.8	109.2	26.3	41.8	129.2	6.3	20.0
9	Shallow	23N02W34N001M	Industrial	Stable	100	70 - 100	185.92	40.0	145.9	74.1	111.8	34.1	54.1	131.8	14.1	20.0
10	Shallow	24N02W17A001M	Domestic	Stable	140	120 - 140	212.20	41.3	170.9	61.3	150.9	20.0	41.3	170.9	0.0	20.0
11	Shallow	24N02W20B001M	Domestic	Stable	120	100 - 120	223.43	50.0	173.4	73.1	150.3	23.1	53.1	170.3	3.1	20.0
12	Shallow	25N02W31G002M	Irrigation	Stable	115	93 - 113	223.80	32.4	191.4	54.5	169.3	22.1	34.5	189.3	2.1	20.0
13	Deep	22N01W29N002M	Observation	Stable	670	549 - 641	150.68	28.8	121.9	73.5	77.2	44.7	53.5	97.2	24.7	20.0
14	Deep	22N02W01N002M	Observation	Stable	730	700 - 710	161.31	26.6	134.7	86.8	74.5	60.2	66.8	94.5	40.2	20.0
15	Deep	22N02W15C002M	Observation	Stable	825	760 - 781	192.37	70.8	121.6	134.7	57.7	63.9	114.7	77.7	43.9	20.0
16	Deep	23N02W28N002M	Observation	Stable	580	550 - 570	204.37	70.5	133.9	104.4	100.0	33.9	84.4	120.0	13.9	20.0
17	Deep	25N03W36H001M	Irrigation	Stable	524	--	241.00	57.7	183.3	80.1	160.9	22.4	60.1	180.9	2.4	20.0
18	Shallow	22N02W18C003M	Observation	Slight Decline	188	165 - 175	225.54	77.1	148.4	93.9	131.6	16.8	78.3	147.3	1.1	15.7
19	Shallow	22N03W01R002M	Observation	Slight Decline	314	270 - 280	228.53	84.6	143.9	104.9	123.6	20.3	87.4	141.1	2.8	17.5
20	Shallow	22N03W05F002M	Irrigation	Slight Decline	218	188 - 218	298.89	94.4	204.5	121.0	177.9	26.6	100.8	198.1	6.4	20.2
21	Shallow	22N03W06B001M	Domestic	Slight Decline	210	195 - 210	309.90	45.8	264.1	71.9	238.0	26.1	59.9	250.0	14.1	12.0
22	Shallow	22N03W12Q003M	Domestic	Slight Decline	124	112 - 123	232.94	58.1	174.8	69.7	163.2	11.6	58.1	174.9	-0.1	11.6
23	Shallow	23N03W04H001M	Irrigation	Slight Decline	270	200 - 270	261.90	67.9	194.0	81.5	180.4	13.6	67.9	194.0	0.0	13.6
24	Shallow	23N03W13C006M	Observation	Slight Decline	182	95 - 135	215.59	70.0	145.6	92.5	123.1	22.5	77.1	138.5	7.1	15.4
25	Shallow	23N03W16H001M	Domestic	Slight Decline	150	144 - 150	278.08	84.7	193.4	103.8	174.3	19.1	86.5	191.6	1.8	17.3
26	Shallow	23N03W22Q001M	Irrigation	Slight Decline	380	--	235.97	83.3	152.7	106.1	129.9	22.8	88.4	147.6	5.1	17.7
27	Shallow	23N03W24A003M	Domestic	Slight Decline	199	180 - 199	207.44	70.0	137.4	88.8	118.6	18.8	74.0	133.4	4.0	14.8
28	Shallow	23N03W25M004M	Observation	Slight Decline	155	120 - 130	237.40	87.1	150.3	114.7	122.7	27.6	95.6	141.8	8.5	19.1
29	Shallow	24N02W29N003M	Observation	Slight Decline	388	200 - 290	213.76	55.7	158.1	90.6	123.2	34.9	75.5	138.3	19.8	15.1
30	Shallow	24N03W02R001M	Domestic	Slight Decline	270	--	257.95	69.4	188.6	85.4	172.6	16.1	71.2	186.8	1.8	14.2
31	Shallow	24N03W03R002M	Domestic	Slight Decline	132	112 - 132	279.46	72.2	207.3	86.7	192.8	14.5	72.3	207.2	0.1	14.5
32	Shallow	24N03W14B001M	Industrial	Slight Decline	140	130 - 140	294.05	98.8	195.3	118.6	175.5	19.9	98.8	195.2	0.1	19.8
33	Shallow	24N03W16A001M	Irrigation	Slight Decline	195	85 - 195	290.97	90.3	200.7	108.4	182.6	18.1	90.3	200.6	0.1	18.1
34	Shallow	24N03W24E001M	Domestic	Slight Decline	224	212 - 220	298.45	129.3	169.2	161.8	136.7	32.6	134.8	163.6	5.6	27.0
35	Shallow	24N03W26K001M	Irrigation	Slight Decline	245	103 - 175	283.46	92.4	191.1	110.9	172.6	18.5	92.4	191.0	0.1	18.5
36	Shallow	24N03W35P005M	Domestic	Slight Decline	120	100 - 120	251.46	59.5	192.0	71.4	180.1	11.9	59.5	192.0	0.0	11.9
37	Deep	22N02W18C001M	Observation	Slight Decline	1,062	841 - 1029	224.64	134.2	90.4	161.1	63.5	26.9	134.3	90.4	0.0	26.9
38	Deep	22N03W01R001M	Observation	Slight Decline	515	470 - 480	228.17	93.0	135.2	111.6	116.6	18.6	93.0	135.2	0.0	18.6
39	Deep	23N03W13C004M	Observation	Slight Decline	835	815 - 825	215.88	84.8	131.1	108.7	107.2	23.9	90.6	125.3	5.8	18.1
40	Deep	23N03W25M002M	Observation	Slight Decline	513	470 - 500	237.68	86.2	151.5	126.1	111.6	39.9	105.1	132.6	18.9	21.0
41	Deep	24N02W29N004M	Observation	Slight Decline	741	590 - 710	213.45	58.0	155.5	88.6	124.9	30.7	73.8	139.6	15.9	14.8

AquAlliance Exhibit 1-2

Corning Subbasin RMP Wells[1]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	RMP Network	**State Well Number**	**Well Type**	**Groundwater Level Trend**	**Total Well Depth, Feet**	**Perforated Interval (feet bgs)**	**Reference Point Elevation (feet AMSL)**	**MO Depth, (feet)**	**MO Elevation, (feet AMSL)**	**MT Depth, (feet)**	**MT Elevation, (feet AMSL)**	**MO - MT, (feet)**	**2012 Minimum GW Depth, (feet)**	**2012 Minimum GW Elevation, (feet AMSL)**	**Difference MO and 2012 Min. Depth, Feet**	**Difference MT and 2012 Min. Elevation, Feet**
42	Shallow	24N03W17M001M	Domestic	Decline	108	**100 - 108**	316.48	100.2	216.3	**126.0**	190.5	25.8	105.0	211.5	4.8	21.0
43	Shallow	24N03W29Q001M	Observation	Decline	372	130 - 360	316.18	104.6	211.6	136.9	179.3	32.3	114.1	202.1	9.5	22.8
44	Shallow	24N04W14N002M	Domestic	Decline	180	--	375.52	128.1	247.4	153.7	221.8	25.6	128.1	247.4	0.0	25.6
45	Deep	23N03W07F001M	Irrigation	Decline	790	240 - 790	314.40	104.5	209.9	126.0	188.4	21.5	105.0	209.4	0.5	21.0
46	Deep	23N03W17R001M	Irrigation	Decline	720	360 - 720	302.50	94.8	207.7	115.2	187.3	20.4	96.0	206.5	1.2	19.2
47	Deep	23N04W13G001M	Irrigation	Decline	560	--	360.71	162.1	198.6	201.0	159.7	38.9	167.5	193.2	5.4	33.5
48	Deep	24N03W17M002M	Irrigation	Decline	505	315 - 495	316.80	120.0	196.8	144.0	172.8	24.0	120.0	196.8	0.0	24.0
49	Deep	24N03W29Q002M	Observation	Decline	575	490 - 550	315.76	103.2	212.6	140.9	174.9	37.7	117.4	198.3	14.3	23.5
50	Deep	24N04W33P001M	Irrigation	Decline	780	250 - 780	424.56	184.6	240.0	241.1	183.5	56.5	200.9	223.6	16.4	40.2
51	Deep	24N04W34K001M	Irrigation	Decline	750	310 - 750	421.50	197.6	223.9	237.1	184.4	39.5	197.6	223.9	0.0	39.5
52	Deep	24N04W34P001M	Irrigation	Decline	535	290 - 475	440.10	225.8	214.3	256.6	183.5	30.8	225.8	214.3	0.0	30.8
53	Deep	24N04W36G001M	Irrigation	Decline	750	320 - 750	362.20	147.8	214.4	179.0	183.2	31.2	149.2	213.0	1.4	29.8
54	Shallow	24N05W23L001M	Stock	--	235	--	530.90	185.1	345.8	218.9	312.0	33.8	--	--	--	--
55	Shallow	Glenn TSS Well	Observation	--	TBD	TBD	TBD	--	262.8	--	237.5	25.3	--	--	--	--
56	Deep	Glenn TSS Well	Observation	--	TBD	TBD	TBD	--	184.0	--	149.3	34.7	--	--	--	--
57	Shallow	Tehama CWT Well	Observation	--	TBD	TBD	TBD	--	199.6	--	181.8	17.8	--	--	--	--
58	Deep	Tehama CWT Well	Observation	--	TBD	TBD	TBD	--	186.1	--	160.3	25.8	--	--	--	--

1. Data taken from Tables 5-2. 5-7 and 6-2.

- Highlighted wells part of ICSW monitoring network, Table 5-7.
- Bolded and undrerlined wells have MT depth below lower screen depth.

	Average MO Depth, ft	**Average MT Depth, ft**	**MO - MT, ft**	**(MO-MT) / (MO-2-12)**	**MO - 2012, ft**	**2012 - MT, ft**
All Shallow	70.6	96.2	25.6	3.7	6.9	17.8
All Deep	107.9	143.0	35.0	3.2	10.8	24.3
Stable Shallow	38.6	70.9	32.3	2.6	12.3	20.0
Stable Deep	50.9	95.9	45.0	1.8	25.0	20.0
Slight Decline Shallow	78.4	99.1	20.6	5.0	4.1	16.5
Slight Decline Deep	91.2	119.2	28.0	3.4	8.1	19.9
Decline Shallow	111.0	138.9	27.9	5.9	4.8	23.1
Decline Deep	148.9	182.3	33.4	7.7	4.3	29.1
ICSW Shallow	54.1	88.3	34.2	2.2	15.9	18.3

AquAlliance Exhibit 2-1

Modified Corning Subbasin Historical vs 2070 Groundwater Budget

Modified Table 4D-1 Corning Subbasin Historical Groundwater Budget, Annual Average by Water Year Type

	A	B	C	D	E	F	G	H	I	J
	A	Component	Average, AFY	% Contribution*	Average in Critically Dry/Dry Years, AFY	% Change from Historical Average	Average in Below Normal/Above Normal Years, AFY	% Change from Historical Average	Average in Wet Years, AFY	% Change from Historical Average
1	**Inflows**	Deep Percolation to Groundwater	161,200	52%	116,350	-28%	176,100	13%	212,600	29%
2		Streambed Recharge	51,100	16%	46,400	-9%	56,150	11%	53,500	4%
3		Inflow from Colusa	17,700	6%	16,650	-6%	18,550	5%	18,600	5%
4		Inflow from Red Bluff	44,500	14%	43,950	-1%	45,550	2%	44,500	0%
5		Inflow from Butte	1,500	0.5%	1,350	-10%	1,400	-7%	1,800	21%
6		Inflow from Los Molinos	21,300	7%	21,200	0%	22,000	3%	20,800	-2%
7		Inflow from Vina	10,700	3%	21,200	98%	22,000	53%	20,800	46%
8		Inflow from Foothills	1,500	0.5%	1,100	-27%	1,650	14%	1,900	24%
9		Recharge to Groundwater from Black Butte Lake	2,600	1%	2,100	-19%	2,750	7%	3,000	15%
10		**Total Inflows**	**312,100**		**270,300**	**-13%**	**346,150**	**13%**	**377,500**	**19%**
11	**Outflows**	Urban and Domestic Pumping	3,600	1%	3,650	1%	3,850	7%	3,500	-3%
12		Agricultural Pumping	132,300	43%	141,400	7%	127,700	-3%	122,600	-8%
13		Outflow to Colusa	32,200	11%	32,350	0%	31,450	-2%	32,200	0%
14		Outflow to Red Bluff	12,300	4%	11,750	-4%	12,050	-2%	13,500	10%
15		Outflow to Butte	1,500	0.5%	1,550	3%	1,600	6%	1,300	-13%
16		Outflow to Los Molinos	12,900	4%	11,800	-9%	12,200	-6%	14,600	14%
17		Outflow to Vina	26,200	9%	25,000	-5%	25,650	-2%	28,200	8%
18		Groundwater Discharge to Streams	84,200	28%	70,250	-17%	83,900	0%	104,400	24%
19		**Total Outflows**	**305,200**	**-**	**297,750**	**-2%**	**298,400**	**-2%**	**320,300**	**5%**
20		**Total Groundwater Pumping**	**135,900**	**-**	**145,050**	**7%**	**131,550**	**-3%**	**126,100**	**-7%**
21	**Storage**	**Annual Change of Groundwater in Storage**	**6,900**	**-**	**-27,450**	**-498%**	**47,750**	**592%**	**57,200**	**729%**
22		**Cumulative Change of Groundwater in Storage from WY 1974 to WY 2015**	290,300	-	-	-	-	-	-	-
23		**Net Stream Gains (Discharge - Seepage)**	**33,100**	**-**	**23,850**	**-28%**	**27,750**	**-16%**	**50,900**	**54%**
24		**Net Stream Gains / GW Pumping**	**24%**	**-**	**16%**	**-**	**21%**	**-**	**40%**	**-**

Modified Table 4D-33. Corning Subbasin 2070 Annual Groundwater Budget Summary, Annual Average by Water Year Type

	A	B	C	D	E	F	G	H	I	J
	B	Component	Average, AFY	% Contribution*	Average in Critically Dry/Dry Years, AFY	% Change from 2070 Average	Average in Below Normal/Above Normal Years, AFY	% Change from 2070 Average	Average in Wet Years, AFY	% Change from 2070 Average
25	**Inflows**	Deep Percolation to Groundwater	140,300	45%	96,500	-31%	156,500	17%	184,000	28%
26		Streambed Recharge	66,100	21%	57,300	-13%	73,100	12%	71,800	8%
27		Inflow from Colusa	14,300	5%	12,800	-10%	14,850	4%	16,200	13%
28		Inflow from Red Bluff	49,800	16%	49,350	-1%	50,100	1%	50,400	1%
29		Inflow from Butte	800	0.3%	650	-19%	850	8%	1,000	24%
30		Inflow from Los Molinos	25,000	8%	24,900	0%	25,300	1%	24,800	-1%
31		Inflow from Vina	12,600	4%	24,900	98%	25,300	51%	24,800	48%
32		Inflow from Foothills	1,100	0.4%	850	-23%	1,100	0%	1,200	9%
33		Recharge to Groundwater from Black Butte Lake	2,100	1%	1,750	-17%	2,400	17%	2,300	8%
34		**Total Inflows**	**312,100**		**269,000**	**-14%**	**349,500**	**12%**	**376,500**	**21%**
35	**Outflows**	Urban and Domestic Pumping	4,900	2%	4,900	0%	4,900	0%	4,900	0%
36		Agricultural Pumping	167,300	54%	177,400	6%	164,950	-1%	156,500	-7%
37		Outflow to Colusa	37,400	12%	38,250	2%	38,150	2%	34,800	-7%
38		Outflow to Red Bluff	9,800	3%	9,350	-5%	9,600	-2%	10,600	8%
39		Outflow to Butte	2,500	1%	2,500	0%	2,500	0%	2,300	-8%
40		Outflow to Los Molinos	8,900	3%	8,400	-6%	8,650	-3%	9,800	10%
41		Outflow to Vina	20,100	6%	18,950	-6%	19,900	-1%	21,800	9%
42		Groundwater Discharge to Streams	61,500	20%	51,050	-17%	61,800	1%	75,500	23%
43		**Total Outflows**	**312,400**	**-**	**310,800**	**-1%**	**310,450**	**-1%**	**316,200**	**1%**
44		**Total Groundwater Pumping**	**172,200**	**-**	**182,300**	**6%**	**169,850**	**-1%**	**161,400**	**-6%**
45	**Storage**	**Annual Change of Groundwater in Storage**	**-300**	**-**	**-41,800**	**-13833%**	**39,050**	**13117%**	**60,300**	**20200%**
46		**Cumulative Change of Groundwater in Storage Projected to 2070**	-19,700	-	-	-	-	-	-	-
47		**Net Stream Gains (Discharge - Seepage)**	**-4,600**	**-**	**-6,250**	**-36%**	**-11,300**	**-146%**	**3,700**	**180%**
48		**Net Stream Gains / GW Pumping**	**-2.7%**	**-**	**-3.4%**	**-**	**-6.7%**	**-**	**2.3%**	**-**

** Percent contribution of component to average total inflow/outflow. Small discrepancies between inflow minus outflow and change in storage may occur due to rounding.*

AquAlliance Exhibit 2-1

Difference Between Corning Subbasin Historical and Projected 2070 Annual Groundwater Budget Summary, Annual Average By Water Year Type

	A	B	C	D	E	F	G	H	I	J
	C	**Component**	**Average Difference, AFY**	**% Change from Historical Average**	**Average in Critically Dry/Dry Years, AFY**	**% Change from Historical Average**	**Average in Below Normal/Above Normal Years, AFY**	**% Change from Historical Average**	**Average in Wet Years, AFY**	**% Change from Historical Average**
49	**Inflows**	Deep Percolation to Groundwater	-20,900	-13%	-19,850	-17%	-19,600	-11%	-28,600	-13%
50		Streambed Recharge	15,000	29%	10,900	23%	16,950	30%	18,300	34%
51		Inflow from Colusa	-3,400	-19%	-3,850	-23%	-3,700	-20%	-2,400	-13%
52		Inflow from Red Bluff	5,300	12%	5,400	12%	4,550	10%	5,900	13%
53		Inflow from Butte	-700	-47%	-700	-52%	-550	-39%	-800	-44%
54		Inflow from Los Molinos	3,700	17%	3,700	17%	3,300	15%	4,000	19%
55		Inflow from Vina	1,900	18%	3,700	17%	3,300	15%	4,000	19%
56		Inflow from Foothills	-400	-27%	-250	-23%	-550	-33%	-700	-37%
57		Recharge to Groundwater from Black Butte Lake	-500	-19%	-350	-17%	-350	-13%	-700	-23%
58		**Total Change in Inflows**	**0**	**0%**	**-1,300**	**-0.5%**	**3,350**	**1%**	**-1,000**	**-0.3%**
59	**Outflows**	Urban and Domestic Pumping	1,300	36%	1,250	34%	1,050	27%	1,400	40%
60		Agricultural Pumping	35,000	26%	36,000	25%	37,250	29%	33,900	28%
61		Outflow to Colusa	5,200	16%	5,900	18%	6,700	21%	2,600	8%
62		Outflow to Red Bluff	-2,500	-20%	-2,400	-20%	-2,450	-20%	-2,900	-21%
63		Outflow to Butte	1,000	67%	950	61%	900	56%	1,000	77%
64		Outflow to Los Molinos	-4,000	-31%	-3,400	-29%	-3,550	-29%	-4,800	-33%
65		Outflow to Vina	-6,100	-23%	-6,050	-24%	-5,750	-22%	-6,400	-23%
66		Groundwater Discharge to Streams	-22,700	-27%	-19,200	-27%	-22,100	-26%	-28,900	-28%
67		**Total Change in Outflows**	**7,200**	**2%**	**13,050**	**4%**	**12,050**	**4%**	**-4,100**	**-1%**
68		**Change In Groundwater Pumping**	**36,300**	**27%**	**37,250**	**26%**	**38,300**	**29%**	**35,300**	**28%**
69	**Storage**	**Annual Change of Groundwater in Storage**	**-7,200**	**-104%**	**-14,350**	**-52%**	**-8,700**	**-18%**	**3,100**	**5%**
70		**Net Change in Stream Gains**	**-37,700**	**-114%**	**-30,100**	**-126%**	**-39,050**	**-141%**	**-47,200**	**-93%**
71		**Net Change in Stream Gains / Change in GW Pumping**	**-104%**	**-**	**-81%**	**-**	**-102%**	**-**	**-134%**	**-**

** Percent contribution of component to average total inflow/outflow. Small discrepancies between inflow minus outflow and change in storage may occur due to rounding.*

AquAlliance Exhibit 3-1

Modified Corning Subbasin Current vs 2070 Groundwater Budget

Modified Table 4D-13 Corning Subbasin Current Groundwater Budget, Annual Average by Water Year Type

	A	B	C	D	E	F	G	H	I	J
	A	Component	Average, AFY	% Contribution*	Average in Critically Dry/Dry Years, AFY	% Change from Historical Average	Average in Below Normal/Above Normal Years, AFY	% Change from Historical Average	Average in Wet Years, AFY	% Change from Historical Average
1	Inflows	Deep Percolation to Groundwater	141,800	47%	97,650	-31%	157,450	16%	185,800	28%
2		Streambed Recharge	57,900	19%	51,200	-12%	63,400	11%	62,200	7%
3		Inflow from Colusa	14,500	5%	13,000	-10%	15,050	4%	16,200	11%
4		Inflow from Red Bluff	48,100	16%	47,550	-1%	48,250	0%	48,800	1%
5		Inflow from Butte	1,000	0.3%	850	-15%	900	-12%	1,100	11%
6		Inflow from Los Molinos	24,100	8%	24,100	0%	24,250	1%	24,100	0%
7		Inflow from Vina	12,300	4%	24,100	96%	24,250	50%	24,100	49%
8		Inflow from Foothills	1,600	0.5%	1,250	-22%	1,700	8%	2,000	24%
9		Recharge to Groundwater from Black Butte Lake	2,000	1%	1,700	-15%	2,300	18%	2,300	13%
10		**Total Inflows**	**303,300**		**261,400**	**-14%**	**337,550**	**13%**	**366,600**	**19%**
11	Outflows	Urban and Domestic Pumping	4,900	2%	4,900	0%	4,900	0%	4,900	0%
12		Agricultural Pumping	153,000	51%	163,400	7%	149,550	-2%	142,800	-7%
13		Outflow to Colusa	34,000	11%	34,950	3%	34,450	1%	31,700	-7%
14		Outflow to Red Bluff	10,300	3%	9,900	-4%	10,200	-1%	11,000	7%
15		Outflow to Butte	2,300	0.8%	2,350	2%	2,350	2%	2,100	-9%
16		Outflow to Los Molinos	9,600	3%	9,050	-6%	9,500	-1%	10,700	12%
17		Outflow to Vina	20,000	7%	19,050	-5%	19,800	-1%	21,500	8%
18		Groundwater Discharge to Streams	67,900	22%	56,900	-16%	68,400	1%	82,200	21%
19		**Total Outflows**	**302,000**		**300,500**	**-0.5%**	**299,150**	**-1%**	**306,900**	**2%**
20		**Total Groundwater Pumping**	**157,900**	**-**	**168,300**	**7%**	**154,450**	**-2%**	**147,700**	**-7%**
21	Storage	**Annual Change of Groundwater in Storage**	**1,300**	**-**	**-39,100**	**-3108%**	**38,400**	**2854%**	**59,700**	**4492%**
22		**Cumulative Change of Groundwater in Storage from WY 1974 to WY 2015**	**290,300**	-	-	-	-	-	-	-
23		**Net Stream Gains (Discharge - Seepage)**	**10,000**	**-**	**5,700**	**-43%**	**5,000**	**-50%**	**20,000**	**100%**
24		**Net Stream Gains / GW Pumping**	**6%**	**-**	**3%**	**-**	**3%**	**-**	**14%**	**-**

Modified Table 4D-33 Corning Subbasin 2070 Annual Groundwater Budget Summary, Annual Average by Water Year Type

	A	B	C	D	E	F	G	H	I	J
	B	Component	Average, AFY	% Contribution*	Average in Critically Dry/Dry Years, AFY	% Change from 2070 Average	Average in Below Normal/Above Normal Years, AFY	% Change from 2070 Average	Average in Wet Years, AFY	% Change from 2070 Average
25	Inflows	Deep Percolation to Groundwater	140,300	45%	96,500	-31%	156,500	17%	184,000	28%
26		Streambed Recharge	66,100	21%	57,300	-13%	73,100	12%	71,800	8%
27		Inflow from Colusa	14,300	5%	12,800	-10%	14,850	4%	16,200	13%
28		Inflow from Red Bluff	49,800	16%	49,350	-1%	50,100	1%	50,400	1%
29		Inflow from Butte	800	0.3%	650	-19%	850	8%	1,000	24%
30		Inflow from Los Molinos	25,000	8%	24,900	0%	25,300	1%	24,800	-1%
31		Inflow from Vina	12,600	4%	24,900	98%	25,300	51%	24,800	48%
32		Inflow from Foothills	1,100	0.4%	850	-23%	1,100	0%	1,200	9%
33		Recharge to Groundwater from Black Butte Lake	2,100	1%	1,750	-17%	2,400	17%	2,300	8%
34		**Total Inflows**	**312,100**		**269,000**	**-14%**	**349,500**	**12%**	**376,500**	**21%**
35	Outflows	Urban and Domestic Pumping	4,900	2%	4,900	0%	4,900	0%	4,900	0%
36		Agricultural Pumping	167,300	54%	177,400	6%	164,950	-1%	156,500	-7%
37		Outflow to Colusa	37,400	12%	38,250	2%	38,150	2%	34,800	-7%
38		Outflow to Red Bluff	9,800	3%	9,350	-5%	9,600	-2%	10,600	8%
39		Outflow to Butte	2,500	1%	2,500	0%	2,500	0%	2,300	-8%
40		Outflow to Los Molinos	8,900	3%	8,400	-6%	8,650	-3%	9,800	10%
41		Outflow to Vina	20,100	6%	18,950	-6%	19,900	-1%	21,800	9%
42		Groundwater Discharge to Streams	61,500	20%	51,050	-17%	61,800	1%	75,500	23%
43		**Total Outflows**	**312,400**		**310,800**	**-1%**	**310,450**	**-1%**	**316,200**	**1%**
44		**Total Groundwater Pumping**	**172,200**	**-**	**182,300**	**6%**	**169,850**	**-1%**	**161,400**	**-6%**
45	Storage	**Annual Change of Groundwater in Storage**	**-300**	**-**	**-41,800**	**-13833%**	**39,050**	**13117%**	**60,300**	**20200%**
46		**Cumulative Change of Groundwater in Storage Projected to 2070**	**-19,700**	-	-	-	-	-	-	-
47		**Net Stream Gains (Discharge - Seepage)**	**-4,600**	**-**	**-6,250**	**-36%**	**-11,300**	**-146%**	**3,700**	**180%**
48		**Net Stream Gains / GW Pumping**	**-2.7%**	**-**	**-3.4%**	**-**	**-6.7%**	**-**	**2.3%**	**-**

** Percent contribution of component to average total inflow/outflow. Small discrepancies between inflow minus outflow and change in storage may occur due to rounding.*

AquAlliance Exhibit 3-2

Modified Corning Subbasin Current vs 2070 Groundwater Budget

Modified Table 4D-13 Corning Subbasin Current Groundwater Budget, Annual Average by Water Year Type

Difference Between Corning Subbasin Current and Projected 2070 Annual Groundwater Budget Summary, Annual Average By Water Year Type

	A	B	C	D	E	F	G	H	I	J
	C	**Component**	**Average Difference, AFY**	**% Change from Historical Average**	**Average in Critically Dry/Dry Years, AFY**	**% Change from Historical Average**	**Average in Below Normal/Above Normal Years, AFY**	**% Change from Historical Average**	**Average in Wet Years, AFY**	**% Change from Historical Average**
49	**Inflows**	Deep Percolation to Groundwater	-1,500	-1%	-1,150	-1%	-950	-1%	-1,800	-1%
50		Streambed Recharge	8,200	14%	6,100	12%	9,700	15%	9,600	15%
51		Inflow from Colusa	-200	-1%	-200	-2%	-200	-1%	0	0%
52		Inflow from Red Bluff	1,700	4%	1,800	4%	1,850	4%	1,600	3%
53		Inflow from Butte	-200	-20%	-200	-24%	-50	-6%	-100	-9%
54		Inflow from Los Molinos	900	4%	800	3%	1,050	4%	700	3%
55		Inflow from Vina	300	2%	800	3%	1,050	4%	700	3%
56		Inflow from Foothills	-500	-31%	-400	-32%	-600	-35%	-800	-40%
57		Recharge to Groundwater from Black Butte Lake	100	5%	50	3%	100	4%	0	0%
58		**Total Change in Inflows**	**8,800**	**0%**	**7,600**	**2.9%**	**11,950**	**4%**	**9,900**	**2.7%**
59	**Outflows**	Urban and Domestic Pumping	0	0%	0	0%	0	0%	0	0%
60		Agricultural Pumping	14,300	9%	14,000	9%	15,400	10%	13,700	10%
61		Outflow to Colusa	3,400	10%	3,300	9%	3,700	11%	3,100	10%
62		Outflow to Red Bluff	-500	-5%	-550	-6%	-600	-6%	-400	-4%
63		Outflow to Butte	200	9%	150	6%	150	6%	200	10%
64		Outflow to Los Molinos	-700	-7%	-650	-7%	-850	-9%	-900	-8%
65		Outflow to Vina	100	1%	-100	-1%	100	1%	300	1%
66		Groundwater Discharge to Streams	-6,400	-9%	-5,850	-10%	-6,600	-10%	-6,700	-8%
67		**Total Change in Outflows**	**10,400**	**3%**	**10,300**	**3%**	**11,300**	**4%**	**9,300**	**3%**
68		**Change In Groundwater Pumping**	**14,300**	**9%**	**14,000**	**8%**	**15,400**	**10%**	**13,700**	**9%**
69	**Storage**	**Annual Change of Groundwater in Storage**	**-1,600**	**-123%**	**-2,700**	**-7%**	**650**	**2%**	**600**	**1%**
70		**Net Change in Stream Gains**	**-14,600**	**-146%**	**-11,950**	**-210%**	**-16,300**	**-326%**	**-16,300**	**-82%**
71		**Net Change in Stream Gains / Change in GW Pumping**	**-102%**	**-**	**-85%**	**-**	**-106%**	**-**	**-119%**	**-**

** Percent contribution of component to average total inflow/outflow. Small discrepancies between inflow minus outflow and change in storage may occur due to rounding.*

AquAlliance Exhibit 4-1

Corning Subbasin Changes in Net Stream Gains

Historical Baseline vs Projected 2070 Water Years

A

1974 to 2015 Annual Water Year Historical Baseline Surface Water Budget Components

	A	B	C	D	E	F	G	H	I
	River	**Average, AFY**	**% Contribution**	**Average in Critically Dry/Dry Years, AFY**	**% Change from Historical Average**	**Average in Below Normal/Above Normal Years, AFY**	**% Change from Historical Average**	**Average in Wet Years, AFY**	**% Change from Historical Average**
	Sacramento River - Table 4D-7								
1	Groundwater Discharge to Streams	88,700	1%	71,200	-20%	89,150	1%	113,000	27%
2	Streambed Recharge to Groundwater	7,300	<1%	13,600	86%	2,550	-65%	1,500	-79%
3	**Net Stream Gains (GW Discharge - SW Seepage)**	**81,400**	-	**57,600**	**-29%**	**86,600**	**6%**	**111,500**	**37%**
	Stony Creek and Black Butte Lake - Table 4D-9								
4	Groundwater Discharge to Streams	1,700	<1%	350	-79%	400	-76%	4,800	182%
5	Streambed Recharge to Groundwater	19,200	4%	19,550	2%	29,400	53%	10,600	-45%
6	Recharge to Groundwater from Black Butte Lake	17,800	4%	17,150	-4%	18,150	2%	18,500	4%
7	**Total Net Stream Gains (GW Discharge - SW Seepage)**	**-35,300**	-	**-36,350**	**-3%**	**-47,150**	**-34%**	**-24,300**	**31%**
8	**Stony Creek Net Stream Gains (GW Discharge - SW Seepage)**	**-17,500**	-	**-19,200**	**-10%**	**-29,000**	**-66%**	**-5,800**	**67%**
	Thomes Creek - Table 4D-11								
9	Groundwater Discharge to Streams	0	0%	0	0%	0	0%	0	0%
19	Streambed Recharge to Groundwater	27,000	11%	23,500	-13%	30,350	12%	29,300	9%
11	**Net Stream Gains (GW Discharge - SW Seepage)**	**-27,000**	-	**-23,500**	**13%**	**-30,350**	**-12%**	**-29,300**	**-9%**
	Total of Three Streams in Corning Subbasin - Table 4D-5								
12	Groundwater Discharge to Streams	90,400	1%	71,550	-21%	89,550	-1%	117,800	30%
13	Streambed Recharge to Groundwater[1]	53,500	0%	56,650	6%	62,300	16%	41,400	-23%
14	**Net Stream Gains (GW Discharge - SW Seepage)**	**36,900**	-	**14,900**	**-60%**	**27,250**	**-26%**	**76,400**	**107%**

B

Projected 2070 Annual Water Year Surface Water Budget Components

	A	B	C	D	E	F	G	H	I
	River	**Average, AFY**	**% Contribution**	**Average in Critically Dry/Dry Years, AFY**	**% Change from 2070 Average**	**Average in Below Normal/Above Normal Years, AFY**	**% Change from 2070 Average**	**Average in Wet Years, AFY**	**% Change from 2070 Average**
	Sacramento River - Table 4D-37								
15	Groundwater Discharge to Streams	49,300	<1%	38,900	-21%	48,450	-2%	64,500	31%
16	Streambed Recharge to Groundwater	31,000	<1%	44,000	42%	26,450	-15%	16,600	-46%
17	**Net Stream Gains (GW Discharge - SW Seepage)**	**18,300**	-	**-5,100**	**-128%**	**22,000**	**20%**	**47,900**	**162%**
	Stony Creek and Black Butte Lake - Table 4D-39								
18	Groundwater Discharge to Streams	600	<1%	650	8%	500	-17%	600	0%
19	Streambed Recharge to Groundwater	36,500	8%	25,300	-31%	49,600	36%	41,700	14%
20	Recharge to Groundwater from Black Butte Lake	17,100	4%	16,550	-3%	17,550	3%	17,600	3%
21	**Total Net Stream Gains (GW Discharge - SW Seepage)**	**-53,000**	-	**-41,200**	**22%**	**-66,650**	**-26%**	**-58,700**	**-11%**
22	**Stony Creek Net Stream Gains (GW Discharge - SW Seepage)**	**-35,900**	-	**-24,650**	**31%**	**-49,100**	**-37%**	**-41,100**	**-14%**
	Thomes Creek- Table 4D-41								
23	Groundwater Discharge to Streams	0	0%	0	0%	0	0%	0	0%
24	Streambed Recharge to Groundwater	32,300	11%	25,250	-22%	35,550	10%	38,700	20%
25	**Net Stream Gains (GW Discharge - SW Seepage)**	**-32,300**	-	**-25,250**	**22%**	**-35,550**	**-10%**	**-38,700**	**-20%**
	Total of Three Streams in Corning Subbasin[2]								
26	Groundwater Discharge to Streams	49,900	-	39,550	-21%	48,950	-2%	65,100	30%
27	Streambed Recharge to Groundwater[1]	99,800	-	85,800	-14%	79,550	-20%	72,900	-27%
28	**Net Stream Gains (GW Discharge - SW Seepage)**	**-49,900**	-	**-46,250**	**7%**	**-30,600**	**39%**	**-7,800**	**84%**

Percentages rounded off.

AquAlliance Exhibit 4-2

Corning Subbasin Changes in Net Stream Gains

Historical Baseline vs Projected 2070 Water Years

C

Difference Between Historical and 2070 Projected Annual Water Year Surface Water Budget Components

	A	B	C	D	E	F	G	H	I
	River	**Average, AFY**	**% Change from Historical Average**	**Average in Critically Dry/Dry Years, AFY**	**% Change from Average Difference**	**Average in Below Normal/Above Normal Years, AFY**	**% Change from Average Difference**	**Average in Wet Years, AFY**	**% Change from Average Difference**
	Change in Sacramento River								
29	Groundwater Discharge to Streams	-39,400	-144%	-32,300	18%	-40,700	-3%	-48,500	-23%
30	Streambed Recharge to Groundwater	23,700	225%	30,400	28%	23,900	1%	15,100	-36%
31	**Net Stream Gains (GW Discharge - SW Seepage)**	**-63,100**	**-178%**	**-62,700**	**1%**	**-64,600**	**-2%**	**-63,600**	**-1%**
	Change in Stony Creek and Black Butte Lake								
32	Groundwater Discharge to Streams	600	-65%	650	8%	500	-17%	600	0%
33	Streambed Recharge to Groundwater	17,300	-10%	5,750	-67%	20,200	17%	31,100	80%
34	Recharge to Groundwater from Black Butte Lake	-700	-104%	-600	14%	-600	14%	-900	-29%
35	**Total Net Stream Gains (GW Discharge - SW Seepage)**	**-16,000**	**55%**	**-4,850**	**70%**	**-19,500**	**-22%**	**-34,400**	**-115%**
36	**Stony Creek Net Stream Gains (GW Discharge - SW Seepage)**	**-18,400**	**-5%**	**-5,450**	**70%**	**-20,100**	**-9%**	**-35,300**	**-92%**
	Change in Thomes Creek								
37	Groundwater Discharge to Streams	0	0%	0	0%	0	0%	0	0%
38	Streambed Recharge to Groundwater	5,300	-80%	1,750	-67%	5,200	-2%	9,400	77%
39	**Net Stream Gains (GW Discharge - SW Seepage)**	**-5,300**	**80%**	**-1,750**	**67%**	**-5,200**	**2%**	**-9,400**	**-77%**
	Change in Total for Three Streams in Corning Subbasin[2]								
40	Groundwater Discharge to Streams	-40,500	-145%	-32,000	21%	-40,600	0.2%	-52,700	-30%
41	Streambed Recharge to Groundwater[1]	46,300	-13%	29,150	-37%	17,250	-63%	31,500	-32%
42	**Net Stream Gains (GW Discharge - SW Seepage)**	**-86,800**	**-335%**	**-61,150**	**30%**	**-57,850**	**33%**	**-84,200**	**3%**

Percentages rounded off.

1. The sum of the streambed recharge for all three streams exclude the recharge from Black Butte Lake based on the sums given in the GPS table.

2. Total for subbasin streams calculated by summing values in Tables 4D-37, 4D-39, and 4D-41.

AquAlliance Exhibit 5

Modified Table 4D-3. Corning Subbasin Historical Land Surface Budget, Annual Average by Water Year Type

	A	B	C	D	E	F	G	H	I	J
	A	Component	Average, AFY	% Contribution*	Average in Critically Dry/Dry Years, AFY	% Change from Historical Average	Average in Below Normal/Above Normal Years, AFY	% Change from Historical Average	Average in Wet Years, AFY	% Change from Historical Average
1	Inflows	Precipitation	391,800	65%	282,000	-28%	427,350	9%	516,700	32%
2		Applied Groundwater	135,900	22%	144,900	7%	131,550	-3%	126,100	-7%
3		Applied SurfaceWater	79,000	13%	75,900	-4%	80,500	2%	83,200	5%
4		**Total Inflows**	**606,700**	-	**502,800**	-17%	**639,400**	5%	**726,000**	20%
5	Outflows	Deep Percolation to Groundwater	157,000	26%	112,250	-29%	171,700	9%	208,000	32%
6		Evapotranspiration	292,200	48%	280,850	-4%	297,750	2%	303,000	4%
7		Overland Flow	136,000	22%	72,350	-47%	151,550	11%	212,700	56%
8		Return Flow to Streams	19,900	3%	18,900	-5%	20,750	4%	21,000	6%
9		**Total Outflows**	**605,100**	-	**484,350**	-20%	**641,750**	6%	**744,700**	23%
10	Storage	**Change in Soil and Unsaturated Zone Storage**	**1,600**	-	**18,450**	**1053%**	**-2,350**	**-247%**	**-18,700**	**-1269%**
11		**Ratio of Deep Percolation to Total Inflows**	**25.9%**	-	**22%**	-	**27%**	-	**29%**	-

Modified Table 4D-35. Corning Subbasin Projected 2070 Land Surface Budget, Annual Average by Water Year Type

	A	B	C	D	E	F	G	H	I	J
	B	Component	Average, AFY	% Contribution*	Average in Critically Dry/Dry Years, AFY	% Change from Historical Average	Average in Below Normal/Above Normal Years, AFY	% Change from Historical Average	Average in Wet Years, AFY	% Change from Historical Average
12	Inflows	Precipitation	413,700	65%	290,250	-30%	460,400	11%	536,600	30%
13		Applied Groundwater	172,100	27%	182,150	6%	169,850	-1%	161,400	-6%
14		Applied SurfaceWater	46,400	7%	46,350	0%	46,200	0%	46,700	1%
15		**Total Inflows**	**632,200**	-	**518,750**	-18%	**676,450**	7%	**744,700**	18%
16	Outflows	Deep Percolation to Groundwater	137,800	22%	93,950	-32%	154,000	12%	181,400	32%
17		Evapotranspiration	319,800	51%	309,200	-3%	322,550	1%	331,300	4%
18		Overland Flow	158,500	25%	81,400	-49%	188,200	19%	235,000	48%
19		Return Flow to Streams	15,400	2%	15,450	0%	15,000	-3%	15,700	2%
20		**Total Outflows**	**631,500**	-	**500,000**	-21%	**679,750**	8%	**763,400**	21%
21	Storage	**Change in Soil and Unsaturated Zone Storage**	**700**	-	**18,750**	**2579%**	**-3,300**	**-571%**	**-18,700**	**-2771%**
22		**Ratio of Deep Percolation to Total Inflows**	**21.8%**	-	**18%**	-	**23%**	-	**24%**	-

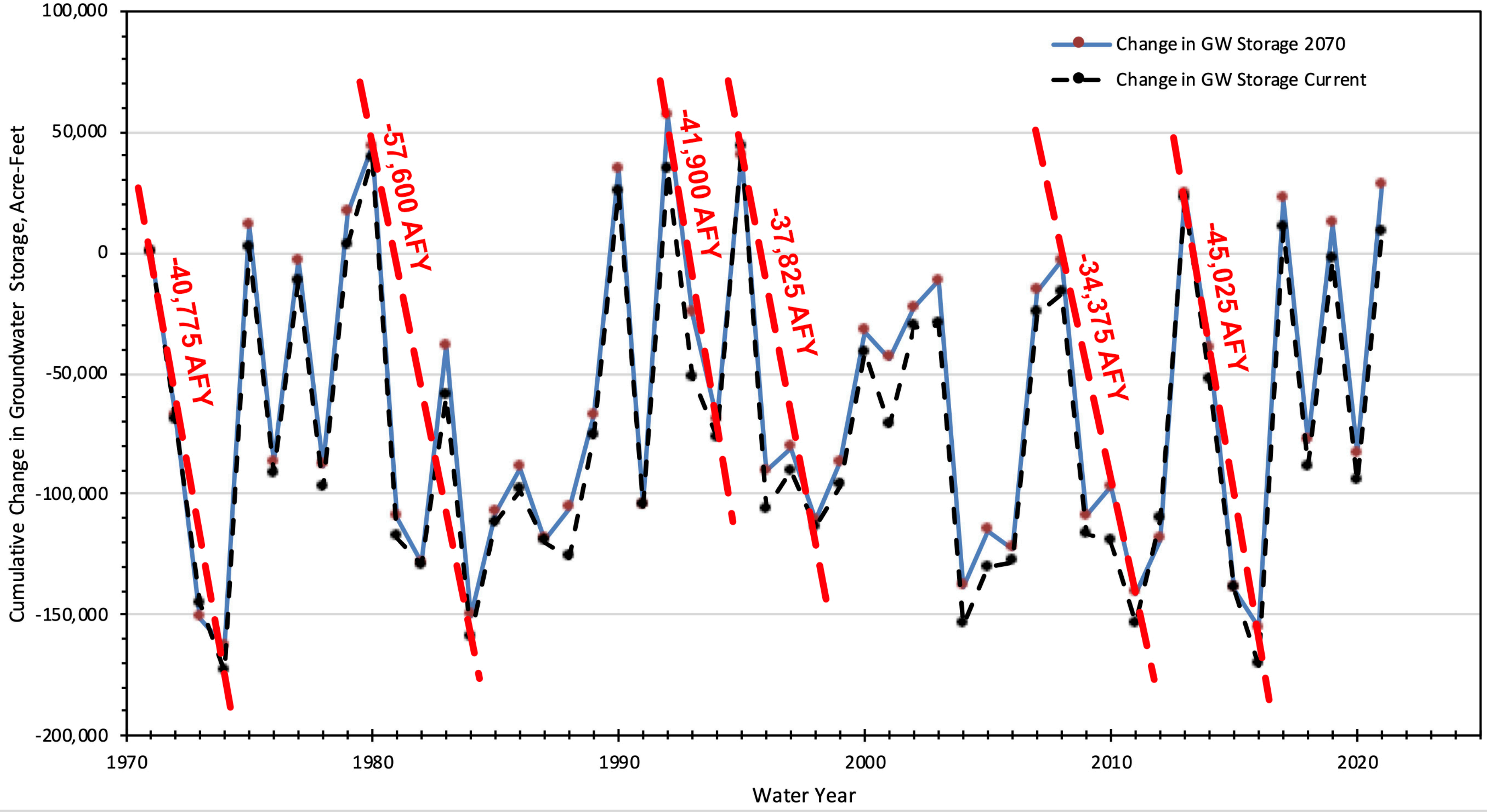
Difference Between Corning Subbasin Historical and Projected 2070 Land Surface Budget, Annual Average by Water Year Type

	A	B	C	D	E	F	G	H	I	J
	C	Component	Average, AFY	% Change from Historical Average	Average in Critically Dry/Dry Years, AFY	% Change from Historical Average	Average in Below Normal/Above Normal Years, AFY	% Change from Historical Average	Average in Wet Years, AFY	% Change from Historical Average
23	Inflows	Precipitation	21,900	5.6%	8,250	2.9%	33,050	7.7%	19,900	3.9%
24		Applied Groundwater	36,200	26.6%	37,250	25.7%	38,300	29.1%	35,300	28.0%
25		Applied SurfaceWater	-32,600	-41.3%	-29,550	-38.9%	-34,300	-42.6%	-36,500	-43.9%
26		**Change in Total Inflows**	**25,500**	4.2%	**15,950**	3.2%	**37,050**	5.8%	**18,700**	2.6%
27	Outflows	Deep Percolation to Groundwater	-19,200	-12.2%	-18,300	-16.3%	-17,700	-10.3%	-26,600	-12.8%
28		Evapotranspiration	27,600	9.4%	28,350	10.1%	24,800	8.3%	28,300	9.3%
28		Overland Flow	22,500	16.5%	9,050	12.5%	36,650	24.2%	22,300	10.5%
30		Return Flow to Streams	-4,500	-22.6%	-3,450	-18.3%	-5,750	-27.7%	-5,300	-25.2%
31		**Change in Total Outflows**	**26,400**	**4.4%**	**15,650**	**3.2%**	**38,000**	**5.9%**	**18,700**	**2.5%**
32	Storage	**Change in Soil and Unsaturated Zone Storage**	**-900**	**-56.3%**	**300**	**1.6%**	**-950**	**40.4%**	**0**	**0%**
33		**Change in Deep Perc. to Change in Inflows**	**-75%**	-	**-115%**	-	**-48%**	-	**-142%**	-

* Percent contribution of component to average total inflow/outflow. Small discrepancies between inflow minus outflow and change in storage may occur due to rounding.

AquAlliance Exhibit 6

Cumulative Change in Groundwater Storage Corning Subbasin
Current and 2070 Condition from 1971



Data taken from Table 4D-14 and 4D-34

— — —
-45,025 AFY 2070 Projected Average Annual Loss in Groundwater Storage, acre-feet per year

Groundwater Budget Annual Average by Water Year Type			
	Historical, AFY	Current, AFY	2070, AFY
Average	6,900	-1,300	-300
Critically Dry / Dry	-27,450	-39,100	-41,800
Below Normal / Above Normal	47,750	38,400	39,050
Wet	57,200	59,700	60,300

AquAlliance Exhibit 7

Estimate of Groundwater Decline During Drought Years from Historical Change in Storage
Figure 3-22 Groundwater Change Fall 2010 to Fall 2015
Change in Groundwater Levels 2010 to 2015 by Trend Regions Figure 6-1

	Regions			
Declining	**Slight Decline**	**Stable**		
-23.9	-23.1	-1.9		
-23.5	-20.5	-13.5		
-26.3	-17.0	-8.3		
-7.7	-19.2	-4.0		
-29.1	-24.2	-6.25		
-13.8	-19.6	-12.7		
-10.9	-18.4	-16.94		
-8.3	-17.7	-15.75		
-7.7	-12.6	-9.72		
	-6.5	-16.07		
	-10.1	-16.33		
	-14.0	-3.45		
	-14.7	-4.56		
	-13.7	-9.13		
	-15.0	-7.54		
	-16.27	-0.68		
	-16.43			
	-16.56			
	-13.12			
	-12.12			
-151.2	-320.8	-146.8	-618.815	Sum of Decline, feet
9	20	16	45	Number of Wells
-16.8	**-16.0**	**-9.2**	**-13.75**	Average decline, feet

Change in Storage 2010 to 2015 from Table 4D-2

Water Year	**Change in Storage, AFY**
2010	40,300
2011	62,700
2012	-39,200
2013	-40,600
2014	-91,900
2015	-45,900
Total	**-114,600**

-13.75	Average decline, feet
8,334	**Acre-Feet per Foot of Decline**
207,342	Total Acres of Corning Subbasin
4.02%	**Average Specific Yield**
150,000	Reduced Area of Water Yield
5.56%	**Average Specific Yield**
100,000	Reduced Area of Water Yield
8.33%	**Average Specific Yield**

Change in Storage 2070 CD/DWater Years

-41,800	AFY - Table 4D-33
-5.02	Feet decline per drought years
3	Average years of drought
-125,400	Total Storage loss in 3 years
-15.0	**3 years of drought average decline**
4	Average years of drought
-167,200	Total Storage loss in 4 years
-20.1	**4 years of drought average decline**

Change in Storage Historical CD/D Water Years

-27,450	AFY - Table 4D-1
-3.29	Feet decline per drought years
3	Average years of drought
-82,350	Total Storage loss in 3 years
-9.9	**3 years of drought average decline**
4	Average yrs of drought
-109,800	Total Storage loss in 4 years
-13.2	**4 years of drought average decline**