From: Randy Pollack
To: PermitSonoma-Wells-PublicInput
Subject: Well Ordinance
Date: Tuesday, November 1, 2022 10:45:52 AM
Attachments: image001.png
image002.png
image003.png

EXTERNAL

Good Morning,

When will the well ordinance be brought to the Board for consideration?

Thanks,

Randy

White Brenner LLP

Randy Pollack | Partner
T 916.468.0621 | randy@whitebrennerllp.com

White Brenner LLP
1414 K Street, 3rd Floor, Sacramento, CA 95814
T 916.468.0950
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***Effective February 2021 - Churchwell White LLP is now White Brenner LLP.**

From:	Friends of Gualala River
To:	PermitSonoma-Wells-PublicInput; Nathan Quarles; Robert Pennington; Sheryl Bratton
Cc:	Friends of Gualala River
Subject:	Friends of Gualala River comments on the proposed draft Well Ordinance
Date:	Wednesday, February 22, 2023 12:58:41 PM
Attachments:	2023-02-22-SCWellOrdinance-FoGR-Memo.pdf FoGR_Kamman_comments_County-Well-Ordinance_Public-Trust.pdf Resume Master-Kamman, Greg-2020.08.25-expert-witness.pdf

EXTERNAL

Comments are below; also attached in pdf format, along with a letter from hydrologist Greg Kamman, his resume, and eight (8) photographs.

To: Nathan Quarles
Deputy Director, Engineering and Construction
Permit and Resource Management Department
County of Sonoma
Email: Nathan.Quarles@sonoma-county.org
Well Ordinance Public Comments
Submitted via email: PermitSonoma-Wells-PublicInput@sonoma-county.org

From: Friends of Gualala River Board of Directors
P.O. Box 1543
Gualala, CA. 95445
Email info@gualalariver.org

Date: February 22, 2023

Subject: Friends of Gualala River comments on the proposed draft Well Ordinance

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Friends of Gualala River (FoGR) is a grassroots nonprofit organization that has worked for over thirty years to protect the Gualala River watershed (GRW) and the species living in it.

This memorandum builds on the one that FoGR submitted to PRMD on February 2, which highlighted our questions and concerns regarding the County's proposed Well Ordinance and the Public Trust Review Area (PTRA).

FoGR retained Greg Kamman a California certified hydrologist and registered professional geologist, who has working knowledge of the Gualala River watershed, to review the proposed well ordinance amendments, supporting materials and to include provisions for evaluation of the impacts to the Public Trust Resources in the GRW. Attached is Mr. Kamman's letter.

FoGR agrees with Mr. Kamman's conclusion that the proposed permit screening process delineating the PTRA fails to protect the public trust resources in the GRW "because it does not consider or incorporate the current state of high streamflow depletions occurring in the watershed." Mr. Kamman describes faults with the methodology used in determining the pumping ratio developed for the GRW. He highlights significant data gaps and concludes that the estimates of groundwater demand/pumping and recharge estimates are underestimated and

overestimated, respectively, which “taken independently or in combination will tend to reduce the risk level for stream depletions.”

As Mr. Kamman notes, “the Gualala River is already experiencing severe streamflow depletions more severe than that estimated in the OEI report.” Attached are photos taken in 2021 affirming this fact. And FoGR agrees with Mr. Kamman’s conclusion that due to the flawed working proposal methodology for delineating the PTRA on the Gualala River and its tributaries, “a watershed-scale analysis that evaluates the existing and proposed cumulative impacts from pumping and changes in recharge is warranted to determine areas that are protective of streamflow depletion.” FoGR requests that the County select The Rohde Proposal, or similar, for the well permit screening process.

FoGR would be happy to discuss our concerns and requests with the County further. Thank you for your attention to FoGR’s input concerning this critical policy approach.

Sincerely,
Lynn Walton, Vice President
Friends of Gualala River

Friends of Gualala River

P.O. Box 1543

Gualala, CA. 95445

Email info@gualalariver.org

To: Nathan Quarles
Deputy Director, Engineering and Construction
Permit and Resource Management Department
County of Sonoma
Email: Nathan.Quarles@sonoma-county.org
Well Ordinance Public Comments
Submitted via email: PermitSonoma-Wells-PublicInput@sonoma-county.org

From: Friends of Gualala River Board of Directors

Date: February 22, 2023

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Sincerely,
Lynn Walton, Vice President
Friends of Gualala River

February 21, 2023

Board of Directors
Friends of Gualala River
P.O. Box 1543
Gualala, CA 95445

Subject: Review of Proposed Amendments to the Sonoma County Well Ordinance Provisions for Evaluation of Impacts to Public Trust Resources

Dear Board of Directors:

I am a hydrologist with over thirty years of technical and consulting experience in the fields of geology, hydrology, and hydrogeology. I have been providing professional hydrology and geomorphology services in California since 1989 and routinely manage projects in the areas of surface- and groundwater hydrology, water supply, water quality assessments, water resources management, and geomorphology. Most of my work has been in the Coast Range watersheds of California. I have been conducting hydrologic and geologic research in the Gualala River watershed on a continual basis since 2001. My areas of expertise include: characterizing and modeling watershed-scale hydrologic and geomorphic processes; evaluating surface- and ground-water resources/quality and their interaction; assessing hydrologic, geomorphic, and water quality responses to land-use changes in watersheds and causes of stream channel instability; assisting and leading in the development of CEQA environmental compliance documents and project environmental permits; and designing and implementing field investigations characterizing surface and subsurface hydrologic and water quality conditions. I earned a Master of Science degree in Geology, specializing in sedimentology and hydrogeology as well as an A.B. in Geology from Miami University, Oxford, Ohio. I am a Certified Hydrogeologist (CHG #360) and a registered Professional Geologist (PG #5737) in the state of California. A copy of my resume is attached.

I have been retained by the Friends of the Gualala River (FOGR) to review the proposed amendments to the Sonoma County Well Ordinance to include provisions for evaluation of impacts to public trust resources. This review has focused on the applicability of the permit screening process to the Gualala River watershed. Information I have reviewed includes the following.

1. Permit Sonoma's 8/9/2022 summary report
2. Draft Ordinance amendments to Chapter 25B
3. Notice of CEQA Categorical Exemption
4. Permit Sonoma staff's meeting presentation from August 9, 2022
5. Public comments to Draft Ordinance amendments received through August 8, 2022
6. Robert Pennington's presentation at the Well Ordinance Joint Working Group meeting on February 1, 2023
7. Agenda to Policy Working Group 5 meeting on February 8, 2023, and the following meeting materials:
    a. Sonoma County Council's "Legal Backdrop – Well Ordinance Policy Development" paper dated November 17, 2022
    b. Jay Jasperse and Robert Pennington's paper entitled, "Preliminary Draft – For Discussion Purposes Only, Potential Technical Workgroup Recommendations for Adaption on Technical Approach" dated February 7, 2023
    c. Permit Screening Flow Chart (working and Rohde proposals).
    d. Recommendations Report outline dated February 2, 2023
    e. OEI's report entitled, "Draft Sonoma County Well Ordinance Public Trust Review Area Delineation", prepared for Permit Sonoma and dated February 2023

In addition, I have reviewed information at the following websites: County of Sonoma Well Ordinance Update Map[1] and The Nature Conservancy's California Natural Flows Database[2].

Based on my review of these materials, it is my professional opinion that the "working proposal"[3] permit screening process that delineates Public Trust Review Areas (PTRA) is not protective of public trust resources in the Gualala River watershed because it does not consider or incorporate the current state of high streamflow depletions occurring in the watershed. Information indicates that the Gualala River is experiencing high streamflow depletions and even the low risk of relatively small increases in depletions predicted under the working proposal screening process would contribute to and exacerbate current cumulative impacts to flow and aquatic ecosystems in the watershed. Although I was not able to find documentation elaborating on the "Rohde proposal" permit screening process, based on review of the meeting flow chart, it is my opinion that it would be more applicable to the Gualala River watershed as it quantifies and considers the cumulative effects of proposed and existing well pumping on streamflow depletions and environmental flows. The technical rationale for these opinions is presented below.

Working Proposal Permit Screening Process

It is my understanding that the current delineation of PTRA on the County's Sonoma Well Ordinance Update Map identify areas subject to the working proposal permit screening process. The methodology for determining PTRA river reaches, stream buffer widths, and risk of stream flow depletion is presented in the draft study report completed by OEI (February 2023). OEI report estimates the amount of

[1] https://sonomacounty.maps.arcgis.com/apps/webappviewer/index.html?id=8baedfd50be640b0b11548537f89fee2

[2] https://rivers.codefornature.org/#/home

[3] During the February 8, 2023 Public Working Group meeting a permit screening flow chart was presented for the "Working Proposal" and an alternative flow chart for the "Rohde Proposal".

groundwater usage and recharge in the Gualala River watershed to derive a groundwater pumping ratio (groundwater pumping volume/estimated recharge volume). They report a groundwater pumping ratio of <2.5% for most of the Gualala River watershed (Figure 6, pg. 13). The report describes the relationship between groundwater pumping ratio and summer stream flow depletion as follows (pg 14).

> *To classify each subwatershed as having a Low, Medium, or High level of streamflow depletion we utilized the findings of Richter et al. (2012) who proposed presumptive standards for environmental flow protection in the absence of detailed studies evaluating site -specific environmental flow needs. A high level of ecological protection is presumed to be provided when flow alterations are no greater than 10% and a moderate level of protection is provided when flow alterations are in the 11-20% range (Richter et al., 2012). The distributed model scenarios indicate that streamflow depletion of 10% or less occurs when the groundwater pumping ratio remains below ~5% and streamflow depletion of 11-20% occurs when the groundwater pumping ratio remains below ~10%. Based on these findings, subwatersheds with a groundwater pumping ratio of less than 5% were coded as Low for streamflow depletion, subwatersheds with a groundwater pumping ratio of between 5 and 10% were coded as Medium, and subwatersheds with a pumping ratio in excess of 10% were coded as High for streamflow depletion.*

Based on the estimated groundwater pumping ratio (<2.5%) for the Gualala River watershed, there is a low risk for streamflow depletion. But, since the Gualala River and tributaries are considered to have high habitat value (potential coho summer rearing), many reaches are mapped as PTRA with a medium risk for stream flow depletion. However, based on review of the California Natural Flows Database, it appears that the Gualala River is already experiencing severe streamflow depletions more severe than that estimated in the OEI report.

Current Streamflow Depletions on Gualala River

The California Natural Flows Database are predicted natural flows statewide expressed as monthly and functional flow metrics. A primary purpose for developing these predictions is to understand how alterations in natural flow patterns impact human uses and native species habitat. The functional flow metric predictions are part of the California Environmental Flows Framework (CEFF), a statewide approach to develop stream segment-scale ecological flow criteria that protect native aquatic species and communities. In the Gualala River watershed, Functional Flow metric predictions are derived using the reference gauge on the South Fork Gualala River near the Sea Ranch. No other Functional Flow metrices are provided for other watershed flow gauges, likely due to an insufficient period of record. A summary of estimated natural flows versus observed average monthly flows on the South Fork for approximately one mile downstream of the reference gauge is provided in Table 1 and Figure 1. The amount of stream flow depletion occurring along this reach is summarized in Figure 2.

Table 1: Dry-season flow metrics for South Fork Gualala River (Source: California Natural Flows Database – see footnote 2)

FLOW METRIC	10th pctl	50th pctl	90th pctl	Observed Med.
Dry-season baseflow	5.63 CFS	9.55 CFS	18.5 CFS	5.08 CFS
Dry-season high baseflow	29.7 CFS	57.8 CFS	114 CFS	37.9 CFS
Dry-season start	Apr. 28	May. 27	Jun. 17	May. 22
Dry-season duration	149 DAYS	189 DAYS	231 DAYS	198 DAYS

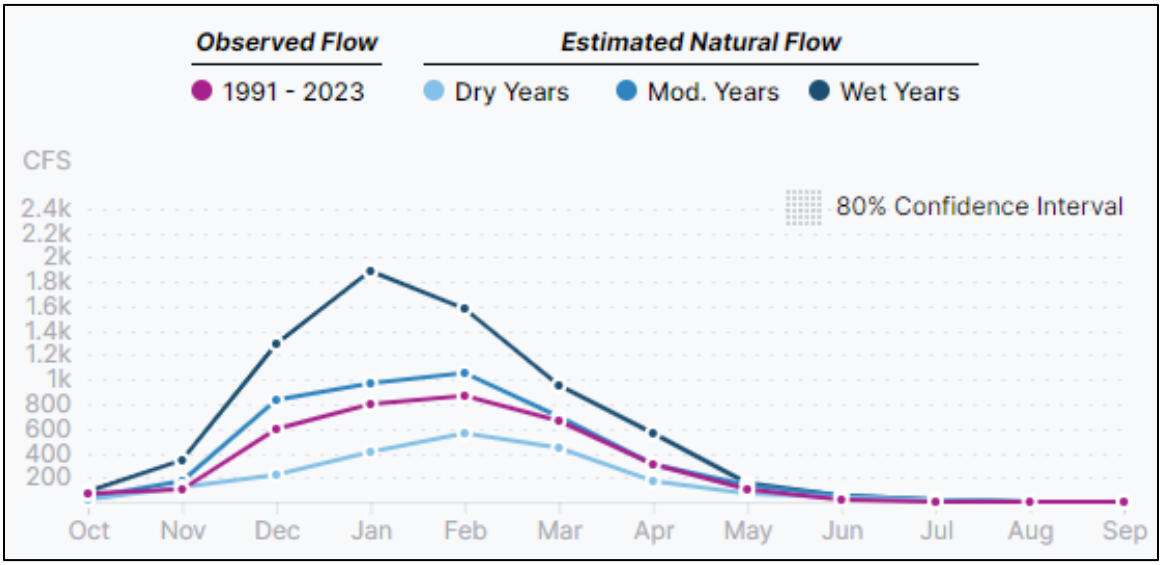

Figure 1: Hydrographs of observed and estimate natural average monthly flows by water year-type (Source: California Natural Flows Database – see footnote 2).

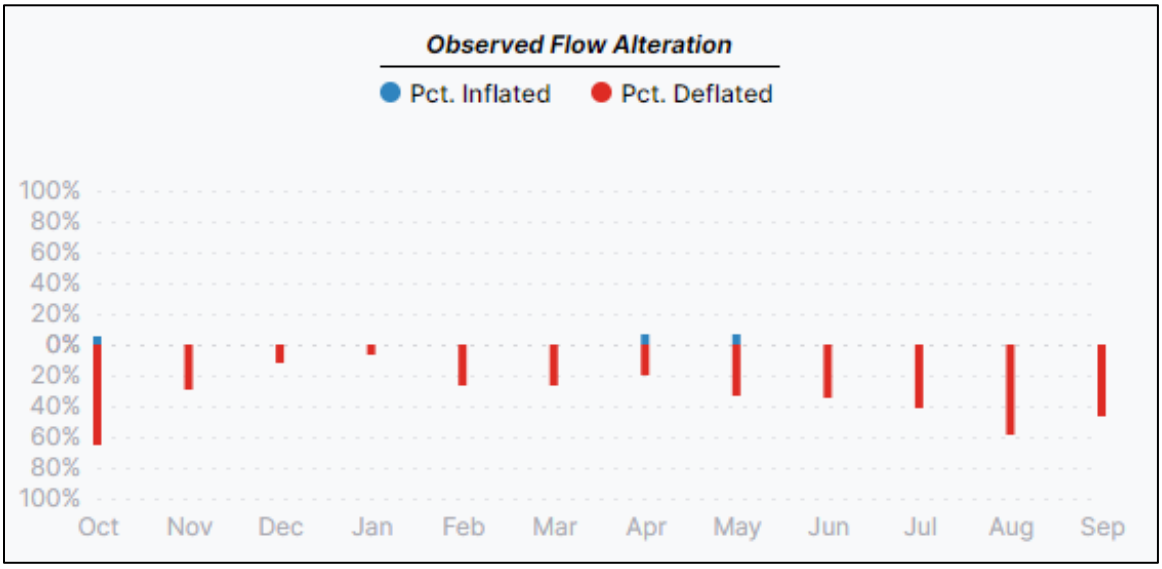

Figure 2: Estimated flow alterations for South Fork Gualala River; streamflow depletions expressed by red bars (Source: California Natural Flows Database – see footnote 2)

The data in Table 1 indicate that current average dry-season baseflow rates have declined by nearly 50 percent and the duration of the dry-season has increased by 9 days. Figure 2 indicates that flow rates during the months of July through September have declined by 41-, 59-, and 47-percent, respectively, with higher declines (65 percent) in October and lesser declines during the rest of the year. The estimated declines in natural stream flow rates on the South Fork Gualala River are an indicator of the current impacted state of the upstream watershed.

Opinion on Current Streamflow Depletions

The current depletion in stream flows on the Gualala River are likely due to a combination of processes occurring in the watershed, including land-use change (e.g., timberland conversion to agriculture) and timber harvest, associated increases in water demand, and climate change. These processes lead to reduced groundwater recharge and supply that sustain dry-season creek flows.

Vineyards occupy a large percentage of the ridge top lands laying between the Wheatfield Fork and Buckeye Creek in the vicinity of Annapolis. Much of this area drains to the California Natural Flows reference gauge located on the South Fork. Based on my review of CEQA documents for some of these vineyard developments, I'm aware that they include drainage and reservoir systems that capture and store runoff for irrigation that otherwise would be available for groundwater recharge. Many also rely on groundwater pumping for domestic, processing, and irrigation uses. Although not located in Sonoma County, my prior research indicates a historic decline in summer baseflows on the North Fork Gualala River like that occurring on the South Fork. This is further evidence of anthropogenic impacts on stream flow and aquatic ecosystems occurring in the watershed. It is also important to point out that the streamflow depletions occurring on the mainstem South Fork of the Gualala River are influenced by changes in recharge and groundwater supply occurring in the headwater regions of the watershed far outside the designated PTRA buffer zones.

There are data gaps in the working proposal permit screening process that call into question its suitability in the Gualala River watershed. For example, the Policy Working Group have determined that the pumping ratio (i.e., groundwater pumping/estimated recharge) developed for the watershed is highly uncertain "since geology was not used in recharge estimates." This calls into question the suitability of the denominator variable of the pumping ratio equation.

I am also critical of the numerator side of the pumping ratio used for the Gualala River watershed (i.e., estimate of groundwater demand/pumping). The OEI (2023) report states that groundwater pumping estimates in the watershed are based on rate and fee studies prepared for the three Groundwater Sustainability Agencies that service the Petaluma, Sonoma and Santa Rosa groundwater basins. I am suspect at how well these data reflect the groundwater demands in the Gualala River watershed. The report also states that estimates of groundwater demands (pumping) are reduced through implementation of surface water rights that are fully exercised for domestic and irrigation uses. It is unclear how this is handled during dry years when there is not enough surface water to exercise a full water right – is the difference made up through increased groundwater pumping ala the Central Valley?

Based on working knowledge of the Gualala River watershed geology, hydrology, and land use, it is my opinion that the recharge estimates (denominator) used to derive the pumping ratio are overestimated and the groundwater pumping/demand estimates (numerator) are underestimated, which taken independently or in combination will tend to reduce the risk level for stream depletions. The <2.5 percent pumping ratio estimate and associated low risk of stream flow depletion determined under the working proposal screening process for the Gualala River does not capture or agree with the current high stream flow depletion rate of 49 percent for the July through September period as derived from the California Natural Flows Database. This can be illustrated using the OEI report graphic (Figure 7, page

14) that compares the relationship between groundwater pumping ratio and mean July through September percent stream flow depletion, represented here as Figure 3. Based on this figure, a stream experiencing a 49 percent decline in streamflow for this period would have a pumping ratio more than 20 percent. This graphic also indicates that, based on the California Natural Flows Database, the South Fork Gualala River is already in the high-risk zone for streamflow depletion.

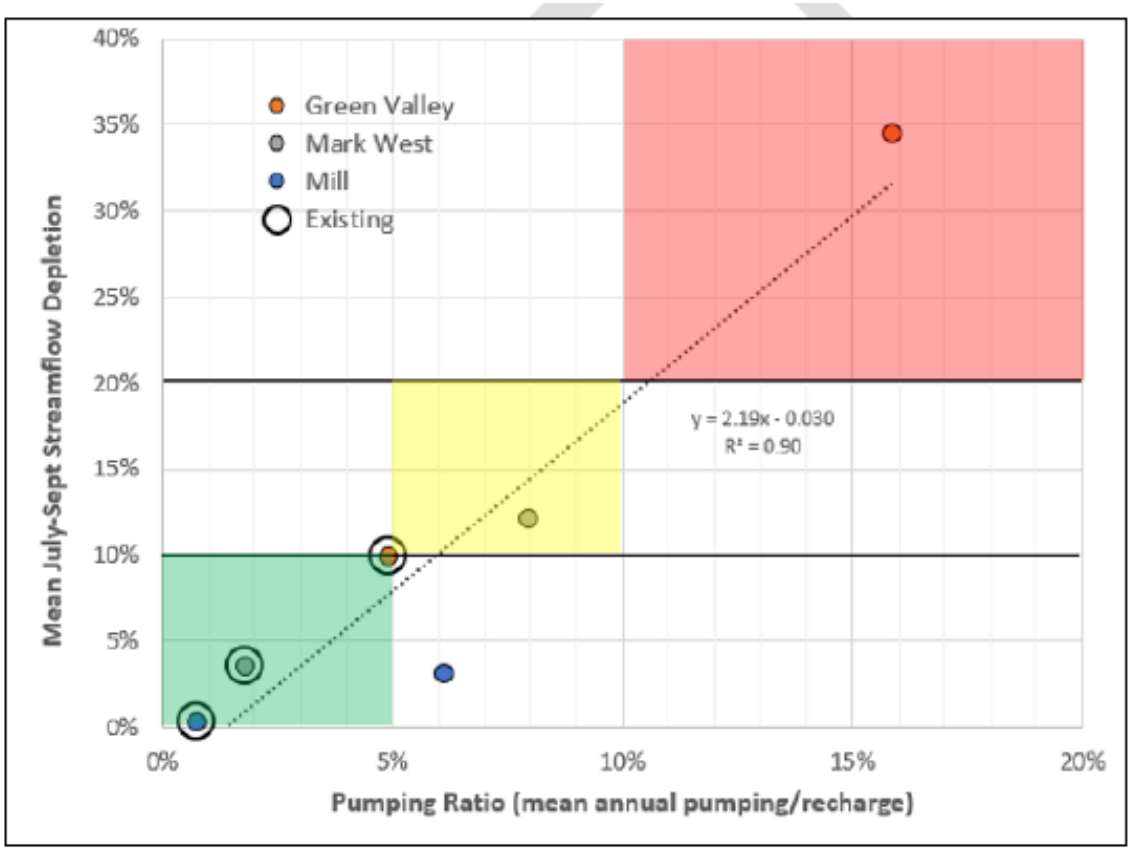

Figure 3: Relationship between the groundwater pumping ratio and summer streamflow depletion (Source: Figure 7, OEI 2023 report)

Because the likely causes for stream flow depletions on the Gualala River does not fit with the working proposal methodology for delineation of PTRA on the Gualala River and tributaries, it is my opinion that a watershed-scale analysis that evaluates the existing and proposed cumulative impacts from pumping and changes in recharge is warranted to determine areas that are protective of streamflow depletion. Therefore, I support abandoning the working proposal permit screening approach for the Rohde Proposal or something similar.

Please feel free to contact me with any questions regarding the material and conclusions contained in this letter.

Sincerely,

Greg Kamman, PG, CHG
Senior Ecohydrologist

cbec eco engineering

Hydrology | Hydraulics | Geomorphology | Design | Field Services

Greg Kamman, PG, CHG
Senior Ecohydrologist

Education

MS, 1989, Geology, Sedimentology and Hydrogeology, Miami University, Oxford, OH

BA, 1985, Geology, Miami University, Oxford, OH

Professional Registration

1993, Professional Geologist, California, #5737

1995, Certified Hydrogeologist, California, #360

Professional Experience

cbec, inc., eco-engineering, West Sacramento, CA, Senior Ecohydrologist, 2020-present

Kamman Hydrology & Engineering, Inc., San Rafael, CA, Principal Hydrologist/Vice President, 1997-2020

Balance Hydrologics, Inc., Berkeley, CA , Sr. Hydrologist/ Vice President, 1994-1997

Geomatrix Consultants, Inc., San Francisco, CA, Project Geologist/Hydrogeologist, 1991-1994

Environ International Corporation, Princeton, NJ, Sr. Staff Geologist/Hydrogeologist, 1989-1991

Miami University, Oxford, OH, Field Camp Instructor and Research Assistant, 1986-1989

Greg Kamman is a professional geologist and certified hydrogeologist with over 30 years of technical and consulting experience in the fields of geology, hydrology, and hydrogeology. He specializes in directing and managing projects in the areas of surface and groundwater hydrology, stream and tidal wetland habitat restoration, water supply and water quality assessments, water resources management, and geomorphology. Mr. Kamman has worked extensively throughout California's coastal watersheds and estuaries, and on multiple projects in Oregon and Hawaii.

Mr. Kamman's experience and expertise includes evaluating surface and groundwater resources and their interaction, stream and wetland habitat restoration assessments and design, characterizing and modeling basin-scale hydrologic and geologic processes, assessing watershed hydraulic and geomorphic responses to land-use change , and designing and conducting field investigations characterizing surface and subsurface hydrologic and water quality conditions. Greg commonly works on projects that revolve around sensitive fishery, wetland, wildlife, and/or riparian habitat enhancement within urban and rural environments. Mr. Kamman performs many of these projects in response to local, state (CEQA) and federal statutes (NEPA, ESA), and other regulatory frameworks. Mr. Kamman frequently applies this knowledge to the review and expert testimony on state and federal water operation plan EIR/EIS reports, Groundwater Sustainability Plans, Habitat Conservation Plans, and biological assessments.

Mr. Kamman is accustomed to working multi-objective projects as part of an interdisciplinary team including biologists, engineers, planners, architects, lawyers, and resource and regulatory agency staff. Mr. Kamman is a prime or contributing author to over 360 technical publications and reports in the discipline of hydrology, the majority pertaining to the protection and enhancement of aquatic resources. Mr. Kamman has taught the following courses: stream restoration through U.C. Berkeley Extension (2001-2008); wetland hydrology through San Francisco State University's Romberg Tiburon Center (2007 and 2012-2014); and presented webinars (2020) to California Water Boards staff on hydrologic and hydraulic modeling. He has devoted his career to the protection, enhancement and sustainable management of water resources and associated ecosystems.

SELECTED EXPERIENCE

Floodplain Management Projects

Flood Reduction, Mitigation Planning, and Design on Yreka Creek, Siskiyou County, CA
City of Yreka as subcontractor to WRA, Inc., 2008-2010

Mr. Kamman completed a series of field and hydraulic model investigations for restoration planning and design along Yreka Creek to reduce flood hazards and potential damage to the City's water treatment plant and disposal field infrastructure. This work also addresses and satisfies dike repair mitigation conditions stipulated by state resource agencies. While achieving these goals, Mr. Kamman tailored analyses and study objectives to assist the City in: enhancing the ecological floodplain restoration along Yreka Creek; providing opportunities for expanded public access and trail planning consistent with the goals of the Yreka Creek Greenway Project; and improving the water quality of Yreka Creek.

Key elements of this work included: review and synthesize existing information; identify and analyze the feasibility for three conceptual alternatives; and conceptual design and report preparation. Funding for implementation of restoration work over such a large area was a significant concern to the City. Therefore, designs identify and define phasing in a fashion that gives the City flexibility in implementation.

SELECTED EXPERIENCE *(CONTINUED)*

West Creek Drainage Improvement Assessment, Marin County, CA
Marin County Flood Control, 2006-2008

Mr. Kamman prepared a study focused on characterizing existing flood conditions and developing and evaluating flood reduction measures along West Creek in Tiburon. The work was completed through the implementation of hydrologic and hydraulic feasibility and design assessments. The conceptual design and analysis of potential flood reduction strategies (alternatives) was completed through the development of a HEC-RAS hydraulic model that simulates historic, existing and proposed project flood conditions. It was intended that the conceptual design developed under this scope of work would be of sufficient detail and quality to initiate project permitting and the environmental compliance process and documentation. Opportunities for riparian corridor and aquatic habitat enhancement were also considered and integrated into the conceptual design. Mr. Kamman also developed and assessed six alternative flood hazard reduction measures. The hydraulic model results for each alternative were compared against baseline conditions in order to evaluate their ability to alleviate flood hazards.

Gallinas Creek Restoration Feasibility Assessment, Marin County, CA
San Francisco Bay Institute, 2003-2005

Mr. Kamman completed a feasibility assessment for restoration of Gallinas Creek in northern San Rafael. Restoration will require removal of a concrete trapezoidal flood control channel and replacement with an earthen channel and floodplain in a "green belt" type corridor. Work included the collection of field data and development of a HEC-RAS hydraulic model to evaluate and compare existing and proposed project conditions. Designs must continue to provide adequate flood protection to the surrounding community. The study also includes and evaluation of existing habitat values, potential habitat values, and restoration opportunities and constraints.

Hydrologic and Hydraulic Evaluation for Trinity County Bridge Replacement, Trinity County, CA
Trinity County Planning Department, 2002

Mr. Kamman completed technical peer review of peak flow estimates and hydraulic design parameters associated with the replacement of 4 bridges across the upper Trinity River in Trinity County, California. A primary study component was accurately predicting the magnitude and frequency of flood releases from Trinity Dam. Numerous flood frequency analytical approaches were evaluated and used throughout this study.

Restoration of Lower Redwood Creek Floodway and Estuary, Humboldt County, CA
California State Coastal Conservancy and Humboldt County DPW, 2002-2003

Mr. Kamman provided technical review for the development of a hydraulic model to evaluate river and estuary restoration alternatives along the lower portions of Redwood Creek between Orrick (Highway 1) and the Pacific Ocean. This work was completed to evaluate the feasibility for creek/estuary restoration alternatives developed by the County, and effects on flood hazards along this flood-prone reach.

In order to better address and evaluate the current flood hazards along the entire floodway and identify potential flood hazard reduction measures, Mr. Kamman was retained to update HEC-2 models previously prepared by the Army Corps, and to evaluate the impacts of vegetation encroachment (increased roughness) and sediment deposition on floodway conveyance. Mr. Kamman expanded the Corps hydraulic model with newly completed channel surveys and channel roughness observations. The impetus for this work was to assist the County in identifying mutually beneficial strategies for ecosystem restoration and flood hazard reduction. Technical work was completed under close coordination and communication with county engineers. Study results and findings were presented at public meetings of local area landowners and stakeholders.

Tembladero Slough Small Community Flood Assessment, Monterey County, CA
Phillip Williams & Associates, Ltd., 1997

Mr. Kamman completed a flood information study of Tembladero Slough near Castroville on behalf of the San Francisco District Corps of Engineers. The purpose of this work was to identify and document local flood risks existing in the community and propose potential floodplain management solutions as part of the Corps 1995/1997-flood recovery process. Work centered on conducting a field reconnaissance, reviewing available historical data, and conducting discussions/interviews with local landowners and agency personnel.

Fluvial Projects

Muir Woods National Monument Bank Stabilization Plan for Conlon Creek, Marin County, CA
Golden Gate National Parks Conservancy (GGNPC), 2018-present

Mr. Kamman developed a grading and drainage plan for the Conlon Avenue Parking Lot, located adjacent to Redwood Creek and sensitive Coho salmon habitat. More recently, he has assisted GGNPC and the NPS in assessing the planning and design for creek bank stabilization and ecological enhancement at a failed culvert on a tributary channel at the project site. This work includes constructing a HEC-RAS model to evaluate: culvert removal and channel design; fish passage; and water quality impacts. Work is currently in development of 50% engineering design.

Hydrology and Hydraulic Assessments for Design of Butte Sink Mitigation Bank Project, Colusa County, CA
WRA, Inc., 2017-2018

Mr. Kamman was retained to provide hydrology and hydraulic modeling support in the development of design and Draft Prospectus for the Butte Sink Mitigation Bank (Bank). This work entailed developing the necessary hydrology information, hydraulic model and documentation to support further design, environmental compliance and agency approvals/permitting of the Bank. The main objective of work was to develop a design that provides the necessary ecological conditions and functions for successful establishment and operation of the Bank.

Lagunitas Creek Salmonid Winter Habitat Enhancement Project, Marin County, CA
Marin Municipal Water District, 2013-2018

Mr. Kamman designed and led a study to evaluate opportunities to enhance winter habitat for coho and other salmonids in Lagunitas Creek and its largest tributary - Olema Creek. This work was done as a two-phase assessment and design effort. The first phase (completed in 2013) included a winter habitat assessment to evaluate existing juvenile salmonid winter habitat in Lagunitas Creek and lower Olema Creek. The results of this assessment were used to prioritize winter habitat needs, and identify opportunities for winter habitat enhancement to increase

SELECTED EXPERIENCE *(CONTINUED)*

the winter carrying capacity of coho salmon and steelhead. The second phase (completed in 2017) consisted of a designing winter habitat enhancements. These enhancements focused on restoring floodplain and in-channel habitat structures. Winter habitat enhancement work also needed to consider potential impacts to or benefits for California freshwater shrimp (Syncaris pacifica), a federally endangered species.

This work included field reconnaissance, topographic surveys and the preparation of final design drawings at nine different project sites. An overall self-maintaining design approach was developed to guide individual project plan, with minimal earthwork and disturbance to existing riparian and wetland habitat. Self-sustained, natural evolution of a multi-thread channel within a more active floodplain is a desired outcome of project actions. Design elements and structures are intended to enhance or restore natural hydrologic processes to promote geomorphic evolution of more active high flow (side) channels and floodplain. Design elements include construction of 24 individual log structures.

Lower Miller Creek Management and Channel Maintenance, Marin County, CA
Las Gallinas Valley Sanitary District, 2013-2015

Mr. Kamman was commissioned to formulate and implement a plan for sediment removal and improved flood flow conveyance in the Lower Miller Creek channel. The need for improved flood and sediment conveyance is driven by the following factors. Progressive accumulation of course sediment in the project reach had reduced area wide discharge efficiencies along Miller Creek and at District outfalls. The District had an immediate need to dredge Lower Miller Creek to protect existing operations and facilities. Miller Creek supports a population of federally listed Steelhead, and adjacent wetland areas potentially support other state and federally listed special status species. Therefore, permitting requirements and cost efficiency required minimizing the extent and frequency of channel excavation/maintenance that may adversely impact habitats in the wetland and riparian corridor.

The design objective of the project was to define and optimize an integrated channel maintenance, flood, and sediment management plan, that protects existing facilities from stream and coastal flood hazards. The plan's objective was to minimize costs and ecological impacts of future anticipated and designed maintenance activities required under District operations. Working with District Staff, Mr. Kamman developed a suite of potential project alternatives and identified a preferred approach. Mr. Kamman completed all CEQA compliance (IS/MND) and permitting. Mr. Kamman also managed and directed development of engineered drawings and assisted in bid document preparation.

Mr. Kamman provided site assessment, long term management planning and channel maintenance support to the Sanitary District to maintain flood conveyance, manage sediment aggrading at District outfalls, and improve ecological values in the intertidal Bayland reaches of Miller Creek. The creek supports multiple federal and state listed endangered species. Initial work included completing hydraulic and geomorphic assessments to characterize causes of channel aggradation, and quantify sediment yields. Assessments included evaluation of climate change impacts on habitat and flood hazards, and water quality modeling of District outfalls to quantify tidal exchange and dilution. Based on this analysis and supporting biological resource assessments, Mr. Kamman identified alternatives for channel maintenance, performed a cost benefit assessment of dredging alternatives, and is assisted the District in developing short and long term management objectives. Mr.Kamman also led a multidisciplinary design team in the preparation of engineering plans and specifications as well as permits and environmental compliance documents.

Vineyard Creek Channel Enhancement Project, Marin County, CA
Marin County Department of Public Works, 2007-2013

Mr. Kamman managed the preparation of designs and specifications for a flood conveyance and fish habitat and passage improvement project on Vineyard Creek. Creek corridor modifications included replacing the box culvert at the Center Road crossing with a free span bridge or bottomless arch culvert (civil and structural design by others), providing modifications to the bed and bank to eliminate erosion risks to adjacent properties and improve water quality, promoting active channel conveyance of both water and sediment, and providing improved low and highflow fish passage, improved low flow channel form and enhanced in-stream habitat, repairing eroding banks, and expanding/enhancing adjacent channel floodplains. The riparian corridor was replanted to provide a low-density native understory, "soft" bank erosion protection, and increased tree canopy along the tops of banks. Mr. Kamman prepared the JARPA for the project and conducted permit compliance and negotiations with all participating resource agencies. Designs and permitting also address the known presence of Native American artifacts. This work was contracted under an expedited design schedule and phased construction was initiated the summer of 2008 and continued the summer of 2009.

Bear Valley Creek Watershed and Fish Passage Enhancement Project, Marin County, CA
The National Park Service and Point Reyes National Seashore Association, 2005-2013

Working on behalf of the NPS and PRNSA, Mr. Kamman completed a watershed assessment and fish passage inventory and assessment for Bear Valley Creek. Work included a geomorphic watershed assessment and completing field surveys and hydraulic modeling (including flood simulations) of ten road/trail crossings to identify and prioritize creek and watershed restoration efforts while considering and addressing current flooding problems at Park Headquarters – a major constraint to channel restoration efforts that would likely exacerbate flooding. Mr. Kamman also completed a suite of conceptual restoration designs (Phase 1) including: the replacement of two county road culvert crossings with bridges; channel creation through a ponded freshwater marsh (former tidal marsh); and replacement of 4 trail culverts with prefabricated bridges; and associated in-channel grade control and fishway structures. Engineered drawings and specifications were also developed for some of these sites to assist PORE with emergency culvert replacements after damages sustained during the New Year's Eve flood of 2005. Mr. Kamman also directed geotechnical, structural and civil design of project components.

Two projects were completed in 2006 on emergency repair basis resulting from flood damages suffered during the New Year's Eve storm of 2005. The two most recent projects were constructed in 2013, consisting of a large bank repair and adjacent to main access road/trail and culvert replacement further upstream on same road. The bank repair utilized bioengineering approaches including engineered log revetments and log diversion vanes.

SELECTED EXPERIENCE *(CONTINUED)*

Kellogg Creek Restoration Project, Contra Costa County, CA
Olberding Environmental on behalf of the Contra Costa County Water District, 2012-2013

Mr. Kamman led the development of PS&E to restore 3,000 linear feet of riparian and associated creek corridor habitat. Project was designed as compensatory mitigation for direct and indirect impacts to jurisdictional waters from the Los Vaqueros Reservoir Expansion Project that Contra Costa Water District. Work included field investigations and data analysis to characterize hydrologic/ geomorphic conditions and numerical modeling to optimize desired inundation and hydroperiods. Work was completed under subcontract to.

Miller Creek Sanitary Sewer Easement Restoration, Marin County, CA
Las Gallinas Valley Sanitary District, 2010

Working on behalf of the District, Mr. Kamman completed field surveys and technical feasibility studies to develop engineering plans and specifications for a stream bank restoration project to protect an exposed sanitary sewer pipeline, stabilize incised banks, and promote an ecologically healthy stream corridor along an approximately 50 linear foot damaged reach of Miller Creek. The design includes backfill and materials to accommodate construction of a vegetated stabilized slope. The eroded bank repair included design of a 1:1 Envirolok vegetated slope with geogrid reinforced soil lifts extending eight to ten feet back from the slope face. One-quarter-ton rock will be placed in front of the Envirolok wall at the toe of the reconstructed bank to provide added scour protection. In order to perform the work, the project site will be dewatered. An existing felled tree perpendicular to the creek flow will be relocated and secured into the right creek bank with root wad remaining in active channel. All work on the bank and within the creek bed must be completed pursuant to project permits due to presence of steelhead trout.

California Coastal Trail Planning and Design at Fitzgerald Marine Reserve, San Mateo County, CA
WRA, Inc., 2008-2009

Mr. Kamman provided hydrology and hydraulics expertise in the planning and design for the 0.25-mile segment of the California Coastal Trail at the Fitzgerald Marine Reserve. The project was overseen by the San Mateo County Parks Department. This segment of Coastal Trail provides improved access from the trailhead to the beach as well as a free span bride over Vicente Creek. Greg completed the field surveys and hydraulic modeling to assist an interdisciplinary team to design the project. Understanding the hydrology of Vicente Creek and quantifying flood conditions was critical to successfully designing and constructing the free span bridge. He also evaluated how creek hydrology and coastal wave processes interact at the beach outfall in order to identify opportunities and constraints to beach access improvements (which will include crossing the creek on the beach) during both wet and dry season conditions in order to evaluate both permanent and seasonal crossing design alternatives.

Hydrologic Assessment and Conceptual Design for Conservation and Wetland Mitigation Bank Project, Stanislaus County, CA
WRA, Inc., 2009

Working as a subcontractor to WRA, Inc., Mr. Kamman provided hydrology, geomorphology and engineering support for the planning and design for a Conservation and Wetland Mitigation Bank on the San Joaquin River, in the Central Valley near Newman, California. The property is currently owned by the Borba Dairy Farms. The primary objective of the study was to characterize the hydrologic and geomorphic controls on the spatial distribution of habitat types. To meet this objective, Mr. Kamman's assessment included: (1) collecting and synthesizing hydrologic data to characterize existing and historic streamflow, geomorphic and shallow groundwater conditions; (2) filling a data gap by collecting topographic data of hydrologic features; (3) developing a hydraulic model capable of predicting water surface profiles for a range of design flows; and (4) quantifying the linkage between surface water/groundwater conditions and specific vegetation communities and habitat types through implementation of reference site assessments. Mr. Kamman also provided conceptual design and permitting support in evaluating habitat enhancement and creation opportunities on the site.

Redwood Creek Floodplain and Salmonid Habitat Restoration, Marin County, CA
Golden Gate National Recreation Area and Golden Gate Parks Conservancy, 2005-2008

Mr. Kamman lead development of a preferred project alternative and final project design drawings and specifications for a floodplain and creek restoration and riparian corridor enhancement effort on lower Redwood Creek above Muir Beach at the Banducci Site. A primary objectives of the project was to: improve salmonid passage/rearing/refugia habitat; riparian corridor development to host breeding by migratory song birds; and wetland/pond construction to host endangered red-legged frog. The preferred design includes: excavation along the creek banks to create an incised flood terrace; engineered log deflector vanes; removing and setting back (constructing) approximately 400-feet of levee; creating in- and off-channel salmonid rearing and refugia habitat; reconnecting tributary channels to the floodplain; and creating California red-legged frog breeding ponds. Designs were completed in 2007 and the project constructed in the summer of 2007.

Considerable hydraulic modeling was completed to evaluate and develop means to help reduce chronic flood hazards to surrounding roadways and properties. Alternatives that included set-back levees and road raising were developed and evaluated. Detailed and careful hydraulic (force-balance) analyses and computations were completed as part of engineered log deflector designs. These were unique and custom designed structures, building on past project efforts and in consultation with other design professionals.

This project demonstrates Mr. Kamman's ability to work closely with the project stakeholders to develop a preferred restoration alternative in a focused, cost-effective and expedited fashion. This was achieved through close coordination with the NPS and the effective and timely use of design charrette-type meetings to reach consensus with participating stakeholders. Conceptual through full PS&E were completed on-time and on-budget in 2007 and was project constructed in the fall of 2007. Mr. Kamman worked closely with NPS staff to "field fit" the project, by modifying grading plans to protect existing riparian habitat. Mr. Kamman also provided construction management and oversight to floodplain grading and installation of engineered log structures. Based on field observations, the project is performing and functioning as desired.

Pilarcitos Creek Bank Stabilization Project, San Mateo County, CA
TRC Essex, 2006-2007

Mr. Kamman directed field surveys and technical modeling analyses to develop restoration design alternatives for a Bank Stabilization Project on Pilarcitos Creek

SELECTED EXPERIENCE *(CONTINUED)*

in unincorporated San Mateo County, California. This work included hydrology and hydraulic design and preparation of plan sheets and technical specifications as well as a revegetation plan. Due to the importance of protecting an existing gas mainline, the design package will be completed in close coordination with TRC Essex geotechnical staff and revegetation subcontractor and PG&E civil staff. Design feasibility analyses focused on developing hydraulic design criteria for the project, including: estimates of design flood flow magnitudes (2-, 5-, 10-, 25-, 50- and 100-year floods); water surface elevation estimates for a suite of design floods; associated average channel velocities and shear stresses; and estimates for riprap sizing for channel bank toe protection. Plan sheets, technical specifications and cost estimates were provided for review and approval.

Watershed Assessments

Evaluation of Project Impacts on Oregon Spotted Frog, Klamath County, OR
Oregon Water Watch and Earthjustice, 2016-2019

Mr. Kamman designed a suite of hydrologic, hydraulic and geomorphic studies to evaluate proposed change operations of the Crane Prairie, Wickiup and Crescent Lake dams and reservoirs as related to harm to Oregon spotted frogs. Work began with analyzing impacts associated with proposed water delivery operations and developing a proposed alternative prioritizing protection and enhancement of frog habitat. This work followed with a technical review and critique of the USFWS's Biological Assessment. Work included preparation of four declarations for the clients.

Tennessee Hollow Creek Riparian Corridor Restoration, San Francisco County, CA
Presidio Trust, 2001-present

Mr. Kamman has been leading and assisting the Trust and Golden Gate National Recreation Area (GGNRA) in the planning and design on over a dozen multi-objective riparian corridor restoration and watershed management projects in the Tennessee Hollow/Crissy Marsh watershed since 2001. Specific project objectives include: daylighting creeks; riparian corridor restoration; expanding Crissy Marsh; enhancing recreation, education, archeological, and cultural resource opportunities; improving water quality discharges to San Francisco Bay; and remediation of numerous landfills within the watershed. Typical initial phases of work focus on characterizing surface and groundwater conditions within each project area and identifying opportunities and constraints to restoration of natural wetlands and creek/riparian corridors. Notable challenges of this work include restoring heavily disturbed natural resources in an urban setting while integrating designs with recreation, archeology/cultural resources, education and remediation programs. Mr. Kamman has acted as lead hydrologist and designer on eight separate reaches in the 271-acre Tennessee Hollow Creek watershed and several other projects within and in the vicinity of Mountain Lake.

All task authorizations under these on-call and individual design contracts and included hydrology and water quality assessments and conceptual restoration planning and design. The project areas overlapped both the Presidio Trust and NPS-GGNRA management areas. Preliminary construction cost estimates for project alternatives within the Tennessee Hollow watershed range from $10- to $20- million. Several restoration projects are also tied to providing mitigation for the current San Francisco Airport expansion and Doyle Drive Seismic Improvement projects. Several projects have been constructed since 2012 (Thompson's Reach, El Polin Loop), two projects (East Arm Mtn. Lake and YMCA Reach) were constructed in 2014, and MacArthur Meadow restoration in 2016.

This work illustrates the Mr. Kamman's ability to complete a broad variety of hydrologic analyses, including: multiple years of rigorous and thorough surface water and groundwater hydrologic and water quality monitoring throughout the entire watershed to characterize and quantify existing hydrologic conditions; development of a detailed watershed-scale water budget for existing and proposed land-used conditions (capturing existing and proposed vegetation cover types and land use activities) to calculate groundwater recharge estimates input into the numerical watershed model; preparation of EA sections on water resources and water quality (NEPA compliance) regarding Environmental Conditions, proposed Impacts, and Proposed Mitigations associated with the project; preparing detailed alternative plans; and coordination and preparation of engineered plans/specifications for construction. All work was completed on budget and in a timely fashion.

Mountain Lake Water Budget, San Francisco County, CA
Presidio Trust, 2012-2017

Mr. Kamman was retained to develop a water balance model for Mountain Lake in the Presidio of San Francisco. Through development of a water balance model, the Trust seeks to understand: the major source(s) of inflow to both Mountain Lake; anticipated seasonal (monthly) changes in water level relative to various outflow assumptions; and the relationship of surface and groundwater interaction. This information gained from this study will be used to: 1) better understand and manage lake levels for ecological habitats; 2) identify flood storage capacity of Mountain Lake and fluctuations in lake level under various storm conditions; 3) better understand and maintain wetland habitat in the east arm; and 4) complete mass balance calculations to assess water quality in and feeding into the lake.

To implement this study, Mr. Kamman developed a water budget model to identify and quantify the primary water inputs and outputs to the lake and determine major controls over water storage. Primary water budget variables analyzed includes: precipitation; evaporation/evapotranspiration; groundwater exchange; and surface runoff. This study also included a long-term field investigation completed between 2012 and 2016 to: identify all point source inputs such as culverts and drainage outlets; identify diffused surface runoff inputs from surrounding lands, including a golf course; better characterizing the function and performance of the primary lake outfall structure; monitor groundwater levels surrounding the lake; and continuously monitor lake water level and storage over a mult9i-year period. These data were used to quantify water budget variables used to build the water budget model. Precipitation and barometric pressure data used in the model was provided by the Trust maintained weather station. Model daily evaporation estimates came from a variety of local area gauges maintained by state agencies.

The water budget model developed for this study is successful in accurately simulating historic water level conditions. The model using a daily time-step appears more accurate than model using a weekly time-step, but both provide reasonable agreement with observed conditions. The model is highly sensitive to groundwater exchange with the lake. The water budget is also a proven useful tool for the design and analysis of improvements to the lake outfall structure and establishing flood storage needs to protect the adjacent highway.

SELECTED EXPERIENCE *(CONTINUED)*

Cordilleras Creek Hydrologic Assessment, San Mateo County, CA
City of Redwood City, 2002-2003

Mr. Kamman assisted the Cordilleras Creek Watershed Coordinator in planning, seeking funding, and implementing a hydrologic and biologic assessment of the Cordilleras Creek watershed. Work completed included completing a full creek reconnaissance and channel stability assessment, preparation of a watershed assessment work plan, presentations at public meetings, and study/review of flooding issues in the watershed. Challenges faced in this predominantly privately owned watershed include removal of numerous fish passage barriers and educating/coordinating property owners.

Capay Valley Hydrologic and Geomorphic Watershed Assessment, Yolo County, CA
Yolo County RCD, 2008-2010

Mr. Kamman designed and supervised a hydrologic, geomorphic watershed assessment, and conceptual restoration design for the Capay Valley segment of Lower Cache Creek . Funding for the project was from a CALFED Watershed Program grant. The Capay Valley reach of Cache Creek experiences considerable stream bank erosion, which contributes to downstream sedimentation. The channel instability also threatens adjacent homes and can negatively impact the riparian habitat along the creek that functions as an important wildlife corridor from the Western Coastal Range to the Yolo Bypass. Additionally, a significant proportion of methylmercury transported into the Bay-Delta originates from the Cache Creek watershed. The main goal of this proposed study is to address both the causes and the aforementioned consequences of bank erosion.

The assessment was designed to evaluate and quantify changes in hydrologic and geomorphic conditions in response to historical changes in land-use and water development (e.g., diversions, reservoir construction, groundwater pumping, etc.). This assessment also evaluated how historic human induced changes in hydrologic and geomorphic conditions affect riparian ecology in terms of the lost or altered floodplain area, character, and inundation frequency. A key product of this assessment was to distinguish between “natural” and “accelerated” bank erosion, and to identify the underlying causes (both natural and anthropogenic) so that appropriate solutions can be developed. Desired outcomes of the study included: reduce bank erosion by developing restoration designs for typical trouble sites; produce a ranking system to prioritize sites for stabilization and restoration; contribute to community education through watershed science education and the Yolo STREAM Project outreach program; improve water quality through reduction in accelerated erosion; and contribute to riparian corridor restoration and support the RCD’s Wildlife Conservation Board funded efforts to remove non-native tamarisk and around from the creek corridor. Work was completed through a broad spectrum of field and analytical investigations that received close review by the RCD, stakeholders, and a Technical Advisory Committee.

Ventura River Unimpaired Flow and Habitat Assessment, Ventura County, CA
City of Buenaventura and Nautilus Environmental, 2006-2007

Mr. Kamman completed a hydrology feasibility assessments as part of evaluating the reuse of Ojai Valley Sanitary District (OVSD) effluent for other beneficial uses. Currently, OVSD discharges treatment plant effluent to the lower Ventura River. The City and OVSD recognize that the reduction in the discharge of treated effluent to the Ventura River could have an environmental effect on sensitive and endangered species. In light of these concerns, this study was conducted to determine if a reuse project is feasible without significant environmental harm.

The assessment included hydrologic and geomorphic field and analytical assessments of past (unimpaired), current and proposed surface and groundwater flow conditions over a wide range of dry- through wet water year-types. The main objective if these analyses was to determine the linkage to water quality and aquatic habitat conditions including: flow durations; extent of gaining vs. losing reaches; low flow inundation/wetted area; and influence on barrier beach dynamics. Mr. Kamman collaborated with a team of other professionals to prepare a facility plan documenting the analyses and conclusions of respective water recycling investigations.

Hydrologic Analysis of FERC Minimum Flows on Conway Ranch Water Rights, Mono County, CA
Law Office of Donald Mooney, 2001-2002

Mr. Kamman completed a hydrologic analysis to evaluate if FERC’s proposed Minimum Flow Plan for Mill Creek would interfere with the exercise of the Conway Ranch’s water rights from Mill Creek. The approach to this analysis was to quantify the duration of time the Conway Water right was met under historic gaged and simulated proposed Minimum Flow Plan conditions. The primary objective of the analysis was to evaluate impacts during the winter period when flows are typically limited due to water storage as snow pack. Minimum Flow Plan conditions were simulated by developing a spreadsheet model that redistributes actual (historic) Lundy Lake releases in a fashion that maintains a minimum flow of 4 cfs to Mill Creek to accommodate the downstream Southern California Edison’s (SCE) power plant. The analysis period for both historic and simulated Minimum Flow Plan conditions consisted of water years (WY) 1990 through 1998 to capture an exceptionally diverse range of wet and dry year-types.

The primary method used to quantify changes in flow between historical and simulated Minimum Flow Plan conditions was to prepare and compare flow duration curves for each condition during both the winter and summer periods during a variety of water year types. Model results were tabulated for each conditions to determine the differences in the percentage of time target flows were equaled or exceeded. Based on these findings, Greg was contracted to complete more in-depth monthly modeling.

Groundwater Management Projects

Assessments of Groundwater-Surface Water Interaction, Stanislaus County, CA
The Law Offices of Thomas N. Lippe, APC and California Sportfishing Protection Alliance, 2015-present

Since 2015, Mr. Kamman has been assessing groundwater conditions within Stanislaus County and evaluating potential impacts of groundwater pumping on surface water flow and aquatic habitat of the Stanislaus, Tuolumne and San Joaquin Rivers. Mr. Kamman completed a comprehensive review and synthesis report of available groundwater and interconnected surface water (ISW) reports and data. Using available soils, geology and hydrology information, Mr. Kamman also delineated and mapped subterranean streams and Potential Stream Depletion Areas (PSDAs) to identify stream corridors susceptible to adverse impacts from groundwater pumping. This information is intended to help Groundwater Sustainability Agencies identify potential impacts to ISW.

SELECTED EXPERIENCE *(CONTINUED)*

Most recently, Mr. Kamman has been retained to review and comment on 7 Groundwater Sustainability Plans (GSPs) for critically overdraft groundwater subbasins within or adjacent to Stanislaus County. This review focused on how GSPs address Groundwater Dependent Ecosystems (GDE) and ISW. Comments included recommendations on monitoring and study plans to identify and quantify impacts of groundwater pumping on stream flow rates and associated ecological habitats.

Assessment of Surface Water-Groundwater Interaction, Humboldt County, CA
Friends of the Eel River (FOER), 2020-present

Mr. Kamman is currently providing technical assistance in understanding surface water-groundwater interactions in the Lower Eel River Valley. Work includes reviewing and synthesizing available reports and hydrologic data and providing a science-based opinion on the role groundwater plays in supporting stream flow and aquatic habitats. This analysis addresses conditions and changes associated with seasonal and long-term wet-dry cycles. Data gaps will be identified and documented during the analysis.

This work is being completed to support FOER efforts at protecting aquatic resources within the framework of current water management practices and the public trust doctrine under California law. Additionally, this work includes providing hydrologic and hydrogeologic review, comment and recommendations during development of the basin's Groundwater Sustainability Plan (GSP) under the California Sustainable Groundwater Management Act (SGMA).

Scott Valley Subbasin Technical Hydrogeologist Assistance, Siskiyou County, CA
Klamath Tribal Water Quality Consortium and Quartz Valley Indian Reservation, 2019-present

Mr. Kamman is providing technical review and comment on the groundwater models and associated studies in the Scott Valley groundwater subbasin under the Sustainable Groundwater Management Act (SGMA) process. Work includes: review of groundwater models; synthesis and review of available groundwater quality data; assisting to identify constituents of concern; and review of the planning and technical studies being used to develop a basin Groundwater Sustainability Plan (GSP).

Middle Russian River Valley Shallow Groundwater Storage Enhancement Study, Sonoma County, CA
Friends of the Eel River, 2016

Working on behalf of Friends of the Eel River, Mr. Kamman completed a study to identify and quantify the volume of recoverable aquifer storage along two independent 6-mile reaches within the alluvial fill valley of the Russian River. The approach to this study was to quantify how channel incision has reduced shallow groundwater levels and quantify how much aquifer storage can be increased if channel bed elevations are restored to historic levels. The goal of this investigation was to identify feasible approaches to increase groundwater storage that would off-set losses associated with the termination of out-of-basin diversions from the Eel River. This work was completed through: intensive review and mapping of available groundwater level data; quantification of aquifer hydraulic properties; and calculating the shallow aquifer storage volume. In total, reclaiming the shallow aquifers within these two areas yield a total added storage volume of over 20,000 AF.

Green Gulch Farm (GGF)/Zen Center Water Resources Investigation, Marin County, CA
Green Gulch Farm, 1998-2019

Mr. Kamman completed a multi-phase study to evaluate the short- and long-term water uses and resources at GGF. Work was initiated by developing comprehensive water usage/consumption estimates and assessing available water resources, including spring, surface water, and ground water sources. Water demand estimates included quantifying potable and agricultural water usage/demands. Once reliable water supplies were identified and water usage/demand figures calculated, Mr. Kamman provided recommendation for improvements to water storage and distribution systems, land-use practices, conservation measures, treatment methods, waste disposal, and stream and habitat restoration. The initial phase of work included: in-depth review of available reports and data; review of geology maps and aerial photography; review of water rights and historic land use records; field reconnaissance including year-round spring flow monitoring; mapping and quantifying existing runoff storage ponds; and surface water peak- and base-flow estimates.

The second phase of work included identification of possible groundwater sources and siting and installation of production wells. This included sighting three drilling locations, obtaining County and State well drilling permits for a domestic water supply; coordination and oversight of driller; and directing final well construction. Upon completion of a well, Mr. Kamman directed a well pumping yield test and the collection and analysis of water quality samples (including Title 22) for small water supply system use. The final phase of work included assisting GGF with water treatment system options at the well head and integration of the groundwater supply into an existing ultra-violet light treatment system servicing spring water sources. Work was completed in 2000 with a budget of approximately $25,000, including all driller and laboratory subcontracting fees.

Stanford Groundwater Assessments, Santa Clara County, CA
Stanford University Real Estate Division, 2012-2016

Mr. Kamman provided technical hydrogeologic services to evaluate groundwater conditions and drainage requirements associated with the construction of several new facilities on or near Page Mill Road. The main objective of this study is to determine the seasonal depth to groundwater beneath the project site under existing and potential future conditions and provide an opinion on if the project is required to comply with the City of Palo Alto, Public Works Engineering Basement Exterior Drainage Policy (effective October 1, 2006). This work included obtaining and reviewing available technical reports, maps and literature pertaining to groundwater conditions in the project vicinity. Based on this review, we have prepared a letter report of findings and recommendations.

Bodega Bay Wetland Water Supply, Sonoma County, CA
Friends of Bodega Bay, 2007

Mr. Kamman Conducted an evaluation of the groundwater underflow feeding a large coastal wetland in Bodega Bay and recommended mitigation measures for potential losses in supply associated with proposed residential development in recharge areas. Work included: long-term monitoring of ground water quality and supply; monitoring surface water and spring flow and water quality; assessing and characterizing the interaction between surface and subsurface water sources during different seasons and water year-types; developing a detailed water budget for the site to assess impacts to recharge areas; and developing a number of physical solutions to mitigate for recharge losses.

SELECTED EXPERIENCE *(CONTINUED)*

L.A. Department of Water and Power, Groundwater Recharge Facility Operation Study, Los Angeles County, CA
ICF Consulting, 2006

Working as a subcontractor to ICF Consulting of Laguna Niguel, California, Mr. Kamman provided technical assistance in the hydraulic modeling of sediment accumulation in selected spreading ground facilities owned and operated by the Los Angeles Department of Public Works. The object of this work is to evaluate changes in infiltration and groundwater recharge rates over time within the spreading grounds in association with sediment accumulation from turbid waters.

Corde Valle Golf Club Surface-Groundwater Interaction Study, Santa Clara County, CA
LSA Associates, 2004

On behalf of LSA Associates of Pt. Richmond, CA, Mr. Kamman completed a 3rd party independent review of available reports and data sets (boring logs, well water levels, groundwater quality, aquifer pump-test, and surface water monitoring) to evaluate if pumping of the Corde Valle irrigation well is adversely impacting flow in West Llagas Creek. This investigation was implemented in response to a concern expressed by California Department of Fish and Game staff regarding the potential for differential drying of the West Branch of Llagas Creek along Highland Avenue. The analysis was also complicated by the likely effects of pumping from surrounding off-site wells.

Aquifer Testing for Tennessee Hollow Watershed Project, San Francisco County, CA
Presidio Trust, 2002

The Mr. Kamman assisted in the design and implementation of an aquifer test at the Presidio of San Francisco. We prepared an aquifer test work plan and conducted step-drawdown and constant-rate aquifer tests at the site using both manual and electronic data collection methods. This work included interpretation of the aquifer test results using software-based solution methods and prepared a written summary of methods and findings. In addition, Mr. Kamman located, coordinated and managed a drilling effort for the logging and installation of several groundwater monitoring wells in the project area to address identified data gaps.

San Joaquin River Riparian Corridor Restoration Project, San Joaquin Valley, CA
McBain-Trush, 2002

Mr. Kamman completed an assessment of historic and existing shallow groundwater conditions beneath and adjacent to the San Joaquin River between Friant Dam and the Merced River. This work focused on reviewing available reports and flow/groundwater- level data to characterize surface water and groundwater interaction and implications for riparian vegetation, water quality and fishery habitat restoration. Hydrologic analyses were performed to identify the location and seasonal evolution of losing and gaining reaches an implication on future restoration planning and design efforts. The main deliverable for this analysis was a report section focused on describing the historical changes in regional and local groundwater conditions in the San Joaquin Valley and evolution of anthropogenic activities (e.g., groundwater withdrawals, irrigation drainage systems and return flows, development of diversion structures, changes in land-use; and introduction of CVP/State Water Project deliveries) and associated impacts on deep/shallow groundwater levels, surface water flows, and surface and groundwater quality.

Tidal, Estuarine & Coastal Projects

Quartermaster Reach Wetland Restoration Project, San Francisco County, CA
Presidio Trust, 2006-present

Mr. Kamman was retained in 2006 as part of a multi-disciplinary team to develop restoration alternative designs for a 10-acre filled and paved site marking the historic confluence of Tennessee Hollow Creek and Crissy Marsh adjacent to San Francisco Bay. The Trust's planning documents define the main objectives for Tennessee Hollow restoration as: a) "Restoration [of Tennessee Hollow] will expand riparian habitat and allow for an integrated system of freshwater streams and freshwater, brackish, and tidal marsh, re-establishing a connection to Crissy Marsh" and b) "Restore and protect Tennessee Hollow as a vibrant ecological corridor". The project is located within the setting of a National Park and a National Historic Landmark District. Thus, another goal for the project is to protect the area's historic buildings and sensitive cultural and archeological resources to the extent possible, to enhance visitor experience to the area, and to integrate creek restoration with other urban land uses.

Mr. Kamman provided H&H technical input and consultation to the design team to develop a restoration project consisting of a creek-brackish marsh-salt marsh interface and associated upland habitats. His work included evaluating surface water, groundwater and tidal sources. In addition, the development of a hydrodynamic model has informed and guided a preferred project design, including evaluation of storm surge, road crossing and Tsunami impacts to the project. A technical challenge addressed with the use of the model included predicting and quantifying salt/brackish marsh habitat zones within the restored wetland in response to periodically but prolonged closed-inlet conditions to Crissy Marsh - a water body that serves as the downstream connection to the proposed project.

Another unique challenge to this project includes integrating restoration planning and design efforts with the replacement and retrofit of Doyle Drive, the main on/off-ramp for the Golden Gate Bridge, being replaced along the entire northern boundary of the Presidio. Mr. Kamman is providing long-term technical review of this project to the Trust with respect to impacts to water resources and associated existing ecological habitats. The Quartermaster project also falls within the managerial jurisdiction of both the Presidio Trust and NPS-GGNRA, requiring work in close cooperation with both Presidio Trust and National Park Service (NPS) staff.

Salt River Ecosystem Restoration Project, Humboldt County, CA
Humboldt County RCD, 2005-2019

Mr. Kamman provided hydrology, engineering and environmental compliance services towards the planning and design of river and tidal wetland restoration on the Salt River (Eel River Delta plain) near Ferndale, California, in Humboldt County. The purpose of the Salt River Ecosystem Restoration Project (SRERP) is to restore historic processes and functions to the Salt River watershed. These processes and functions are necessary for re-establishing a functioning riverine, riparian, wetland and estuarine ecosystem as part of a land use, flood alleviation, and watershed management program. The Salt River Project has three components: 1) dredging the lower Salt River and lower Francis Creek from near the Wastewater Treatment Plant downstream for 2.5 miles; 2) restoring 247 acres of wetland estuary habitat in the lower Salt River within the 440-acre former

SELECTED EXPERIENCE *(CONTINUED)*

dairy; and 3) reducing sediment inputs from tributary watersheds. The Salt River Project was designed using an "ecosystem approach" to address hydrology, sedimentation, and fish and wildlife habitat.

As part of project feasibility assessment, Mr. Kamman completed a hydrologic and water quality monitoring program, and developed a MIKE11 hydrodynamic model of the lower Salt River and Eel River estuary in Humboldt County, for the Humboldt County RCD. The purpose of this work was to complete a hydrologic, geomorphic, and hydraulic modeling assessments of the character and dominant physical processes controlling flow of water and sediment through the lower Salt River. Land use changes in the area have caused significant aggradation and infilling of the Salt River, significantly reducing tidal exchange, fish passage, and exacerbating flooding in upland areas. A primary goal of this study is to evaluate the feasibility of proposed restoration elements intended to increase tidal prism and exchange and in-channel sediment scour and transport. The desired outcome is a sustained increase in river conveyance capacity to improve drainage of surrounding flood-prone lands and improve aquatic, wetland, and riparian habitat.

As part of project development and feasibility assessment, Mr. Kamman completed a hydrologic and water quality monitoring program and MIKE11 hydrodynamic model development of the lower Salt River and Eel River estuary in Humboldt County for the Humboldt County RCD. The purpose of this work is to complete a hydrologic, geomorphic, and hydraulic modeling assessments of the character and dominant physical processes controlling flow of water and sediment through the lower Salt River. Land use changes in the area have caused significant aggradation and infilling of the Salt River, significantly reducing tidal exchange, fish passage, and exacerbating flooding in upland areas. A primary goal of this study is to evaluate the feasibility of proposed restoration elements intended to increase tidal prism and exchange and in-channel sediment scour and transport. The desired outcome is a sustained increase in river conveyance capacity to improve drainage of surrounding flood-prone lands and improve aquatic, wetland and riparian habitat.

Western Stege Marsh Restoration Project, Contra Costa County, CA
Tetra Tech, 2008-2010

Mr. Kamman provided technical hydrology and wetland hydraulics support to post-project monitoring of the Western Stege Marsh Restoration Project. His involvement began by providing an independent technical review of previous year's hydrologic monitoring results to evaluate the proposed monitoring success criteria and the rationale used to develop these criteria. This work entailed reviewing historic monitoring data and available natural slough channel geometry data-sets for San Francisco Bay area marshes. Mr. Kamman's study approach was to independently develop desired and sustainable channel geometry relationships for natural, healthy San Francisco Bay salt-marshes and compare them to the published success criteria. Greg was also retained to implement the Year 4 post-project hydrologic monitoring, with modifications to aid in better linking hydrologic processes to ecological conditions and function within the restored marsh. This work consisted of completing more targeted water level monitoring and channel geometry surveys in reference marsh areas containing desired physical and ecological attributes. These data were used to develop geomorphic success criteria (target channel geometry) more tailored to the project marsh and augment the criteria provided in available literature. Working closely with the project team of scientists, Mr. Kamman compared these hydrologic monitoring results to available vegetation surveys to better assess the overall success and evolutionary trend of the marsh.

Giacomini Wetland Restoration Project, Marin County, CA
The National Park Service and Point Reyes National Seashore Association, 2003-2012

Mr. Kamman managed a multi-year project for the NPS in the design and feasibility analysis of a tidal wetland, riparian, and freshwater marsh complex, on the 500-acre Giacomini Dairy Ranch, at the south end of Tomales Bay. The project began in 2003 and included hydraulic, hydrologic, and geomorphic assessments to characterize existing physical conditions, developing restoration alternatives, and completing hydrologic feasibility analyses. Restoration alternatives evaluated creation of a mosaic of subtidal through upland wetland and riparian habitat zones, as well as improvements to salmonid passage, red-legged frog habitat, tidewater goby habitat, and clapper-rail habitat. Emphasis was placed on completing detailed studies to quantify project-induced changes in flood frequency, magnitude and duration, impacts on water quality to local groundwater supply wells, and changes in sediment and water quality conditions in Tomales Bay.

Beginning in 2006, Mr. Kamman managed and assisted design engineers, preparing plans, specification, and cost estimates for a three phased construction schedule, that was completed in the summer of 2008. This project illustrates Mr. Kamman's ability to complete a broad variety of hydrologic feasibility analyses, including flood frequency analyses for contributing watersheds, reproducing historic flood events through numerical modeling, flow duration analysis and evaluation of environmental flow regimes, development of a water budget for created freshwater marsh and frog breeding ponds, sediment yield estimates, completing field monitoring (flow, water level, groundwater level, sediment, and water quality monitoring) to characterize existing site hydrologic and geomorphic conditions (fluvial and tidal), wind-wave setup and run-up for levee stability determination and construction design, coordinating and performing topographic and hydrographic surveys, performing hydrodynamic and water quality modeling of existing and alternative conditions, developing detailed construction cost estimates preparation of technical reports and design drawings and specifications in support of NEPA/CEQA environmental compliance, and public meeting presentation and participation. In addition, Mr. Kamman managed staff in the generation of DEM and TIN models of the existing site and all action alternatives. All work was completed on budget and in a timely fashion, despite repeated expansions to the project boundary and last minute changes driven by endangered species issues.

Critical Dune Habitat Restoration to Protect Threatened and Endangered Species, Marin County, CA
The National Park Service, 2009-2010

Mr. Kamman provided and managed engineering, design, and implementation planning support for the restoration of 300 acres of critical dune habitat at Abbots Lagoon within the NPS Point Reyes National Seashore. He developed engineered drawings, technical specifications and engineer's cost estimates, and assisted NPS in defining a range of methodologies suitable to local conditions and sensitive flora and fauna. This area of the park supports the best remaining intact dune habitat, including some of the largest remaining expanses of two rare native plant communities: American dune grass (Leymus mollis) foredunes, and beach pea (Lathyrus littoralis). European beach grass and iceplant were removed from

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the project site using mechanical removal and hand removal techniques. The project goal was to remove these invasive species from approximately 135 acres of prime dune habitat in the 300-acre project site, while not impacting sensitive species and habitats. The intended result was to remobilize this historic dune field and restore their natural form and migratory processes.

This project illustrates Mr. Kamman's ability to work closely with NPS staff to balance habitat protection and restoration across the landscape. As part of project design, he developed grading plans, and specified work flow, equipment movement and access routes which minimize impacts to special status species. Extensive fencing and exclusions zone planning was required to protect existing native habitats, and minimize tracking of plant stock to or through restored sties. In addition work elements had to be structured and prioritized to maximize ground work subject to budgetary constraints and work flow uncertainties. All work has been completed on budget and in a timely fashion, even with repeated expansions to the project boundary and affected area and last minute changes driven by endangered species issues.

Lower Gualala River and Estuary Assessment and Management Plan, Mendocino County, CA

California State Coastal Conservancy and Gualala River Watershed Council, and Sotoyome RCD, 2002-2005

Mr. Kamman worked with fisheries biologists to evaluate the hydrologic and water quality conditions in the lower Gualala River and estuary and identify and evaluate potential impacts to summer rearing habitat for salmonids and other aquatic organisms. This work included: assessing how the impacts of upstream land use (logging and water diversions) have altered water delivery and water quality to the Lower River and estuary over time; characterizing the physical coastal and riverine processes controlling opening and closure of the estuary inlet and lagoon morphology; monitoring and characterizing real-time and seasonal changes in lagoon water level and water quality; and evaluating the sediment transport capacity and geomorphic condition of the lower river and estuary. Mr. Kamman took the lead in developing and editing a management plan for the lagoon, prescribing actions to preserve, protect and enhance ecological habitats (with emphasis on salmonids) within the lagoon and lower Gualala River.

This project was completed on-time and on-budget and demonstrates Mr. Kamman's ability to integrate physical, water quality and biological data and information into a coherent and understandable description of the interrelated processes controlling the aquatic ecology of a lagoon system. A big challenge on this project was completing a high-quality and defensible field monitoring program on a "shoe-string" budget. The outcome of this study provides important understanding on how and why steelhead are surviving in a heavily logged (95% private ownership) watershed. The management plan prescribes recommendations to preserve and protect the lagoon as primary rearing habitat for steelhead.

Suisun Bay Tidal Wetland Restoration Design, Contra Costa County, CA

East Bay Regional Park District and LSA Associates, 1999-2005

Mr. Kamman provided hydrologic design services to the restoration of a 55-acre tidal wetland on Suisun Bay. The design will maximize habitat for special status fish species, and (to the extent possible) habitat for other special status animal and plant species. Working with a multi-disciplinary design team, Mr. Kamman assisted in developing a design based on analysis of habitat needs, tidal hydrodynamic and geomorphic processes, sedimentation rates and soil characteristics. Project tasks included: a site analysis defining existing ecological and hydrologic conditions; a hydrologic and biological restoration opportunities and constraints analysis to define restoration and management objectives; and hydrodynamic and sedimentation modeling to evaluate design alternatives. The final restoration and management plan included a grading plan, landscape revegetation plan and monitoring and maintenance plans. This work again illustrates his capabilities in the characterization of physical site conditions, development and feasibility analysis of project alternatives, and preparation of preliminary designs of sufficient detail to allow for environmental compliance through the CEQA/NEPA process.

Santa Clara River Estuary and Lower River Assessment, Ventura County, CA

Nautilus Environmental on behalf of the City of Ventura, Public Works Department, 2003-2004

Mr. Kamman directed a hydrologic and geomorphic assessment of the lower Santa Clara River and estuary. This work was completed for prime contractor in an effort to assist with re-permitting of treated effluent discharges to the estuary. The proposed study entailed characterizing existing and historic hydrologic and physiographic conditions and an assessment of historic changes in inflow to the estuary. This task included a comprehensive review and evaluation of available hydrologic reports and flow data within the watershed to characterize changes in flow associated with development of numerous water projects within the Santa Clara River basin. The main deliverable from this analysis was the development of a historic unimpaired flow record to the estuary based on regional regression analyses and water operations modeling. Within the estuary, Mr. Kamman designed and conducted a multi-year monitoring program of water levels, water quality (temperature, dissolved oxygen, salinity, and pH), and sand-spit morphology in order to evaluate inlet opening/closure frequency and associated changes in aquatic habitat (esp. tidewater goby) and other ecologic communities. A considerable portion of this subtask included detailed coastal process analysis (including wave power analyses and littoral sand transport), which, considered with the inflow analysis, provides a basis to evaluate the seasonal cycle of barrier beach buildup and destruction.

This project illustrates Mr. Kamman's ability to complete a broad variety of hydrologic and coastal process analyses under strict regulatory oversight. A premier study completed on this project was the development of a detailed water and salinity budget model for the estuary to evaluate the impacts of a wide variety of proposed and modified estuary inflow regimes to determine potential future water level and salinity conditions in the lagoon and impact on frequency of inlet breaching. In addition to coordinating and implementing a variety field monitoring and surveys, Mr. Kamman also provided real-time information and input to informational and negotiation meetings with state resource and regulatory agencies.

Eden Landing Ecological Reserve Restoration, Alameda County, CA

East Bay Regional Park District, 2000-2003

Mr. Kamman developed and completed hydraulic and hydrodynamic modeling assessments for the design of an approximately 1000-acre tidal marsh restoration in former Cargil salt manufacturing ponds, located a mile inland of San Francisco Bay. The restoration goals required balancing the desires to restore tidal marsh conditions to the site, while maintaining and enhancing the open water and salt

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panne habitats preferred by resident and migratory shorebirds. The restoration plan also needed to incorporate restoration objectives with remediation of high soil salinities resulting from past salt production, subsided ground elevations, dredging of new channels to the bay, existing infrastructure constraints, public access for the San Francisco Bay Trail, and preservation of several important cultural and historical sites. Hydraulic design objectives include maximizing both interior circulation and tidal exchange between the restoration parcel and the bay. A series of one-dimensional unsteady hydrodynamic models (MIKE11) were used to design the channel network, identify high velocity areas requiring erosion protection, and characterize expected habitat conditions. An important component of this design and feasibility assessment was to translate desired ecological habitat conditions identified in the EIR into specific hydrologic design criteria, considering channel velocities, scour, sediment transport, tidal water inundation frequencies and seasonality of ponding. Mr. Kamman worked closely with EBRPD civil engineers, assisting with the translation of hydraulic design criteria into final engineered drawings and specifications.

Wetland & Pond Projects

Design of California Red-Legged Frog Breeding Ponds, San Francisco Bay Area (various), CA
The National Park Service and Golden Gate National Parks Conservancy, 1997-present

Mr. Kamman has lead or provided hydrologic and engineering design assistance to the sighting and design of nearly two dozen breeding ponds for California red-legged frog throughout the San Francisco Bay Area. Work has been completed in Marin, Sonoma, Solano, Contra Costa, Alameda, and Santa Clara Counties under the auspices of numerous federal, state, and local county/city agencies. A common study approach consists of an initial site reconnaissance of watershed conditions and identification of potential sites. The reconnaissance is followed by a surface water hydrologic sufficiency analysis using available meteorologic and stream flow information. An important variable sought during pond sighting is the presence of migration corridors between known breeding areas and/or perennial water sources. Based on in-depth research and post-project monitoring, Mr. Kamman has refined or developed site-specific evapotranspiration estimates, which commonly do not match standard applied values. Accurate evapotranspiration rates are necessary if ponds are intended to periodically dry-down as a means to preclude undesired species such as bullfrog or mosquito fish. In many instances, a seasonal groundwater-monitoring program is implemented in order to better investigate and quantify potential and seasonal groundwater contributions. Other design challenges we commonly experience include: design of impermeable liners for ponds located in upland areas or highly permeable soils; hydraulic analyses and design of outfalls/spillways; sedimentation management/ maintenance approaches; and requirements of inoculum and water used to line and fill the pond, respectively.

Hydrologic Feasibility Assessment for Mana Plain Wetland Restoration Project, Kauai, HI
State of Hawaii Department of Land and Natural Resources, 2010-2019

Working on behalf of the Mana Plain Wetland Restoration Partnership, Mr. Kamman completed a hydrologic feasibility assessment for the Mana Plain Wetland Restoration Project proposed by the State of Hawaii Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW) on the island of Kauai. The Mana Plain Wetland Restoration Project site is approximately 105 acres of low-lying abandoned sugarcane fields immediately north of the Kawaiele Waterbird Sanctuary and east of the Pacific Missile Range Facility. The purpose of the Mana Plain Wetland Restoration Project is to maximize the area of constructed wetlands within the restoration site. Palustrine emergent wetlands within the project will create habitat for four species of endangered Hawaiian waterbirds and other sensitive species, including: Hawaiian stilts; Hawaiian ducks; Hawaiian coots; Hawaiian moorhen; migratory waterfowl; and migratory shorebirds. The Mana Plain is of vital importance for the recovery of endangered waterbirds species. This restoration project will be designed to provide important breeding and feeding wetland habitats on an island where; 1) wetlands have been severely degraded, and 2) mongoose, an introduced predator, have not been established.

Mr. Kamman's work on this project included technical assessments and development of proposed restoration alternatives. Analyses completed included: a synthesis of the physical site setting (topography, geology, hydrogeology and soil); reviewing available data to characterize site meteorology, surface water drainage, water quality, and groundwater conditions; preparing a detailed water budget to describe the characteristics and processes of surface water and groundwater movement into and through the project area; evaluating project feasibility, water supply alternatives and costs; and completing a flood hazard impact assessment to evaluate potential project benefits and impacts to local area flooding. Working with the project partners, Mr. Kamman developed a preferred project alternative and supported in preparation of the project Environmental Assessment document. Mr. Kamman's firm was also retained by the State of Hawaii to develop engineering designs of the project.

MacArthur Meadow Wetland Restoration, San Francisco County, CA
Presidio Trust, 2013-2016

Mr. Kamman has been working on over a dozen independent wetland and creek restoration planning and design efforts within the Presidio of San Francisco since 2001. Most recently (2016), he developed a wetland restoration grading plan for the MacArthur Meadow Wetland Restoration Project in the central portion of the Tennessee Hollow watershed. As part of the site assessment, Greg characterized and modeled surface and groundwater interactions and identified a unique opportunity to restore 4 acres of mixed meadow, natural wetlands and creek/riparian corridor. This was possible due to the discovery of shallow groundwater conditions beneath this historically disturbed landscape. Various design components were integrated into the grading plan in order to enhance groundwater recharge and storage in the Meadow, while retarding runoff and drainage out of the wetland, including: daylighting storm drain runoff into the Meadow; reconfiguring internal channel alignments to enhance channel habitat and groundwater recharge; creation of wetland depressions to retain and recharge surface water; and removal of fill material to decrease the depth to the water table. Notable challenges of this work include restoring heavily disturbed natural resources in an urban setting while integrating designs with archeology/ cultural resources, education and remediation programs.

Dragonfly Creek Restoration Project, San Francisco County, CA
Presidio Trust, 2007-2011

Mr. Kamman designed and managed hydrologic monitoring and analysis studies in support of planning and design for riparian and wetland habitat restoration along approximately 500-linear feet of the Dragonfly Creek corridor near Fort Scott of the Presidio of San Francisco. Work has included completing subsurface

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investigations including the installation of shallow wells and a sharp-crested weir with recorder to gauge creek flows. Mr. Kamman assisted in the development and selection of a preferred project alternative, considering on-site cultural resource protection, education and resource management issues (including flood control). Mr. Kamman prepared permit applications. Major components of the project included removal of significant fill and building foundations and installation of a new creek road crossing that will maintain the historical alignment, function and architectural character of a culturally significant roadway. Mr. Kamman oversaw development of PS&E for this project, which will create mitigation wetlands for a highway earthquake retrofit project that passes through the Park.

This project illustrates Mr. Kamman's ability to complete a broad variety of hydrologic analyses, including: surface water and groundwater hydrologic monitoring to characterize and quantify existing hydrologic conditions; rainfall-runoff modeling; hydraulic modeling of flood and scour conditions (including road crossing); preservation of existing wetland habitat and vegetation communities; integration with other Presidio Trust programs; and contracting flexibility to assist in conceptual planning and environmental compliance without increasing project design costs.

Mori Point Sensitive Species Habitat Enhancement Project, San Mateo County, CA
Golden Gate National Recreation Area and Golden Gate National Parks Conservancy, 2005-2011

Mr. Kamman provided hydrologic analyses, sighting and engineering design (PS&E) for three California red-legged frog breading ponds within the 105-acre Mori Point area. These efforts were completed in association and collaboration with a larger Coastal Trail improvement and ecosystem restoration effort. Quarrying and off-road vehicle use have left this site heavily scarred. The focus of restoration work was to protect the endangered San Francisco garter snake and the threatened red-legged frog. Most of this work will be focused on invasive species removal and enhancing endangered species habitat. As part of species habitat improvement, Mr. Kamman worked with project ecologists to design the ponds to optimize breeding habitat for California red-legged frog.

Work started with an initial site reconnaissance and study of watershed conditions and identification of potential sites. The reconnaissance was followed by a surface water hydrologic sufficiency analysis using available meteorological and stream flow information and installation and monitoring of shallow piezometers to quantify the proximity and seasonal variability in depth to water table. An important variable sought during pond sighting was the presence of migration corridors between known breeding areas and/or perennial water sources. Based on in-depth research and post-project monitoring for other ponds they created in the San Francisco Bay area, Mr. Kamman refined site-specific evapotranspiration estimates. Accurate evapotranspiration rates are necessary if ponds are intended to periodically dry-down as a means to preclude undesired species such as bullfrog or mosquito fish.

Other design challenges experienced included: design of impermeable liners for ponds located in upland areas or highly permeable soils; hydraulic analysis and design of outfalls/spillways; sedimentation management/maintenance approaches; and requirements of inoculum and water used to line and fill the pond, respectively. Mr. Kamman has designed numerous ponds for the NPS and affiliates within the Bay Area, including Mori Point (constructed 2007), Banducci (constructed 2007) and Giacomini (Phase I and Phase II constructed in 2007 and 2008) project sites.

Hydrologic Assessment and Restoration Feasibility Study for Shadow Cliffs Regional Recreation Area, Alameda County, CA
East Bay Regional Park District, 2009-2010

Mr. Kamman developed and implemented an assessment to identify groundwater levels and supplemental water supplies that will sustain seasonal wetland restoration areas and riparian habitats under an altered future hydrologic regime. This work will inform a forthcoming Land Use Plan Amendment for park occupying a series of former gravel quarry pits. Work included: obtaining and synthesizing available surface water and groundwater data to characterize existing hydrologic and water supply conditions and seasonal variability; quantifying the likely changes in groundwater conditions and quarry pit lake levels in association with changes in regional water transmission and groundwater recharge operations; and identifying, developing and evaluating a suite of ecosystem restoration alternatives. Other important project objectives include: improving habitat for waterfowl and wildlife; broadening recreational use; enhancing visitor education and wildlife interpretation; improve park aesthetics. Mr. Kamman evaluated a preferred park and ecosystem enhancement alternative that involves diverting high winter flows from an adjacent arroyo. This project demonstrates Greg's ability to characterize hydrologic conditions and quantify the relationship between groundwater, surface water and wetland habitat conditions, both under existing conditions and in predicting future hydrologic and ecologic conditions under an altered hydrologic regime (i.e., lower groundwater table).

Laguna Salada Marsh and Horse Stable Pond Restoration Project, San Mateo County, CA
Tetra Tech, 2007-2009

Mr. Kamman provided technical hydrology and hydraulics support to the planning and conceptual restoration design of Laguna Salada marsh and Horse Stable Pond, located adjacent to Sharp Park Golf Course in the town of Pacifica, California. The primary objectives of the project are: to reduce flood impacts within the project vicinity; improve sustainable ecological habitat for the endangered San Francisco garter snake and the threatened California red-legged frog; better understand and characterize the hydrologic and water quality conditions/processes affecting flood and ecological habitat conditions within the project vicinity; provide an effective pumping operation plan to meet ecological objectives; and develop appropriate hydrologic analytical approaches and models to assist Tetra Tech and the San Francisco Recreation and Park Department in the planning and design for marsh, pond, and creek restoration. The project is also a unique opportunity to connect this resource with the California Coastal Trail, the Bay Area Ridge Trail, and the surrounding GGNRA lands.

Mr. Kamman's work included completing a comprehensive review of available hydrologic and site information and implementing selected field investigations to develop and calibrate an integrated hydrology-flood routing-pond water operations model that will quantify the volume and depth of water moving through the project system. The investigation will also further characterize shallow groundwater conditions and water quality with respect to effects on Laguna Salada and Horse Stable Pond. Analytical and numerical modeling tools are being used to better characterize existing hydrologic and water quality conditions and to assist in identifying project opportunities and constraints as well as evaluate potential restoration design components - all necessary to inform a sustainable

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and successful restoration design.

Tolay Lake Restoration Feasibility Assessment, Sonoma County, CA
Sonoma County Agricultural Preservation and Open Space District, 2003

Mr. Kamman completed a detailed hydrologic feasibility analysis to evaluate a suite of potential freshwater lake and wetland restoration alternatives. Sites were evaluated under existing watershed land-use practices and under existing and forecasted water demands (in the form of existing water rights/applications). Analysis consisted of developing a detailed water budget model to simulate alternative restored lake inundation areas and depths under median and dry year conditions, as well as a 50-year historic period (1947-1997) displaying highly variable rainfall and runoff supplies. Three lake restoration alternatives were evaluated based on existing topography and likely historic lake configurations. The restoration alternatives include lakes with storage volumes equivalent to 136-, 1100-, and 2550-acre feet.

Haypress Pond Decommissioning and Riparian and Channel Restoration, Marin County, CA
Golden Gate National Recreation Area (GGNRA), 2001-2002

This project restored 170 meters of historic creek and riparian habitat through removal of Haypress Pond dam in Tennessee Valley within GGNRA. The goals of the project were to alleviate long-term maintenance needs and eliminate non-native bullfrog habitat threatening native California red-legged frog habitat in adjacent watersheds.

Working with the Park biologist, Mr. Kamman developed designs to decommission the dam and restore natural riparian and meadow habitat. This work included: characterization of existing topographic conditions; design of a channel profile through the proposed restoration project reach; preparation of a grading plan for the restoration project; and hydrologic and hydraulic analyses to evaluate the performance of the creek channel and flood plain below the former dam during a variety of flows. Challenges of this work included integrating sediment reuse into plans and construction phasing.

Damon Slough Site Seasonal Wetland Design, Alameda County, CA
Port of Oakland, 1999-2001

Working on behalf of the Port of Oakland, Mr. Kamman completed extensive surface and groundwater monitoring and data analyses to develop a detailed water budget to assist in the evaluation and design of a 7.5 acre seasonal freshwater wetland. Primary project objectives included a design that would provide shorebird/waterfowl roosting habitat, minimize impacts to existing seasonal wetland areas, and lengthen the duration of ponding through the end of April to promote use by migratory birds. In addition to developing hydrologic design criteria, responsibilities included development of grading plans to accommodate a local extension of the Bay Trail and wetland outlet works.

Water Quality Projects

Chicken Ranch Beach Soil and Groundwater Quality Investigation and Restoration Planning, Marin County, CA
Tomales Bay Watershed Council, 2007-present

Mr. Kamman is leading scientific and engineering efforts for a wetland and riparian corridor restoration project on Third Valley Creek and Chicken Ranch Beach in Inverness, California. The main project goals are to create a self-sustaining riparian and wetland system (requiring minimal operation and maintenance) and eliminate public exposure to high levels of bacteria that exist in a site drainage ditch discharging to the beach. The design will likely include establishing a blend of habitats, including: riparian stream corridor, seasonal/perennial freshwater marsh, and tidal/saltwater marsh.

Current efforts have included the development and implementation of a soil and groundwater quality investigation to delineate the source of elevated bacteria levels. This work includes: the collection and testing of depth-discrete soil samples; groundwater well installation, sampling and testing; and surface water sampling and testing; analysis of laboratory results; and reporting, including recommendations for further/expanded investigations. Mr. Kamman coordinated this time-sensitive sampling and analysis (six hour hold times) with Brulje and Race Laboratories in Santa Rosa.

Lower Miller Creek Channel Maintenance and Material Reuse Sampling Analysis Plan, Marin County, CA
Las Gallinas Valley Sanitary District, 2015

Mr. Kamman was commissioned to formulate and implement a plan for sediment removal and improved flood flow conveyance in the Lower Miller Creek channel. Accumulation of course sediment in the project reach had reduced discharge efficiencies at District outfalls. Miller Creek supports a population of federally listed Steelhead and adjacent wetland/marsh areas potentially support other state and federally listed special status species. Working with District Staff, Greg developed a suite of potential project alternatives and identified a preferred approach. Mr. Kamman completed all CEQA compliance (IS/MND), permitting and oversaw development of engineered plans and specifications.

In order to evaluate if reuse of excavated material from 2,655 feet of creek corridor in upland areas was feasible, Mr. Kamman developed and implemented a Sampling Analysis Plan (SAP) pursuant to U.S. Army Corps Guidance for Dredging Projects within the San Francisco District. Sample collection, sample handling, and analysis were performed in accordance with the SAP. Results for analytes were compared to a variety of screening criteria to determine the material's suitability for reuse in aquatic environments. A full suite of chemical and physical analyses were performed on soil samples collected from 16 locations, including: metals, PAHs, PCBs, pesticides, TOC, specific conductance, pH, sulfides, percent moisture and grain-size. Mr. Kamman managed all aspects of this effort including reporting and presentations/negotiations at multi-agency meetings through the Corps Dredge Materials Management Office (DMMO).

Lower Pitkin Marsh Hydrologic and Water Quality Monitoring, Sonoma County, CA
Sonoma Land Trust, 2008-2010

Mr. Kamman was retained to develop and implement a hydrologic and water quality monitoring program at Lower Pitkin Marsh outside of Forestville, California. The Pitkin Marsh area is one of the most valuable complexes of mixed riparian woodland and thicket, freshwater marsh, wet meadow, oak woodland and grassland in Sonoma County. The complex interaction of surface water, ground water, and scattered seeps and springs on the site creates unusual hydrologic conditions that promote a rare assemblage of plant species which includes several endemics. The primary objective of the hydrologic monitoring program was to understand the annual and season sources of both surface and ground water supplying wetlands. Hydrologic and water quality monitoring was

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initiated during the winter wet season of 2008/09 and will be conducted for a 12-month period through the ensuing summer dry-down and into the following wet season. Understanding how groundwater levels, spring flow and creek flow rates recede from winter wet to summer dry conditions will provide an important understanding and quantification of the seasonal variability in water supplies feeding selected wetland types. General water quality parameters (temperature, pH, specific conductance, and ORP) are measured at all monitoring locations during each visit. Nutrients (N and P) are measured in selected surface water and groundwater samples collected during at least three monitoring events, including a winter high flow, spring high base flow and summer low baseflow.

Pescadero Lagoon Restoration and Enhancement, San Mateo County, CA
California State Coastal Conservancy, 2005-2006

Mr. Kamman was retained to support restoration and water quality enhancement planning efforts in Pescadero Lagoon. In 2005-2006, he completed a synthesis of available hydrologic and water quality information in responding to requests for development of a hydrodynamic and water quality model of the lagoon. This model was considered as a means to identify causes for repeated fish-kills in the lagoon that occurred during initial breaching of the inlet. Mr. Kamman assisted in preparing a synthesis and model development feasibility report from this effort.

Water Temperature Simulations for Trinity River Fish and Wildlife Restoration Project, Trinity County, CA
Trinity County Planning Department, 1994-2004

For over a decade, Mr. Kamman completed a number of hydrology and water quality investigations in support of alternative feasibility studies on the Trinity River Fish and Wildlife Restoration Project in direct support of the Trinity River Restoration EIR/EIS. Studies involve assessing the effects of proposed flow alternatives on water temperature within and downstream of Lewiston Reservoir. Mr. Kamman was responsible for data collection, processing, and flow/temperature modeling of Lewiston Reservoir as part of a coordinated evaluation including other Trinity River system models. Another study included evaluating how project operations could be implemented or modified to optimize Lewiston Lake release temperatures to meet downstream temperature criteria and compensate for increased warming of the river associated with side channel and feather edge restoration activities. Mr. Kamman continues to evaluate how more recent water projects (raising Shasta Dam, Sites Reservoir, and the Waterfix tunnels) consider and integrate with the Trinity Restoration Project.

Upper Eel River Unimpaired Flow and Water Temperature Assessments, Humboldt County, CA
CalTrout, 1997-1999

Mr. Kamman evaluated changes in the natural flow regime of the upper Eel River, and developed an Upper Eel River proposed release schedule to enhance downstream Chinook and Steelhead spawning and rearing habitat. This work was triggered by proposals set forth by PG&E as part of their Potter Valley Project FERC relicensing process. Work consisted of two main investigations. The first included reviewing results of a ten year PG&E study and development of multivariate regression and stream reach (SSTEMP) temperature models to assess the effects proposed flow alternatives would have on downstream temperatures. The second investigation consisted of characterizing unimpaired flow conditions and developing a daily unimpaired flow record for use in project operation models.

Selected Litigation Support Projects

Kamman, G.R., 2019, Review of Deschutes Basin Habitat Conservation Plan (DBHCP) and Associated Draft Environmental Impact Statement (DEIS). Prepared for: Water Watch of Oregon, Center for Biological Diversity and Associates for the West, November 22, 55p.

Kamman, G.R., 2019, Review of Draft PEIR, California Vegetation Treatment Program (CalVTP). Prepared for: Shute, Mihaly & Weinberger LLP, August 2, 8p.

Kamman, G.R., 2019, Oral Testimony of Greg Kamman for Agricultural Order 4.0 requirements discussion, Public meeting before the Central Coast (Region 3) California Water Board, Watsonville City Council Chambers, Watsonville, CA, March 21.

Chartrand, A.B., and Kamman, G.R., 2019, Comments to Central Coast Regional Water Quality Control Board Ag. Order 4.0 regulatory requirement options and proposed Requirement Options Tables. Prepared for: The Otter Project and Monterey Coastkeeper, January 22, (8p.), 5 tables and Monitoring Reporting Plan (MRP; 26p.).

Kamman, G.R., 2019, Review of Draft Environmental Impact Report/Statement, Sites Reservoir Project. Prepared for: Pacific Coast Federation of Fisherman's Association (PCFFA) and Save California Salmon, January 21, 45p.

Kamman, G.R., 2018, Review of Amendments to the Sonoma County Cannabis Ordinance, California. Prepared for: Shute, Mihaly & Weinberger LLP, August 3, 10p.

Kamman, G.R., 2018, Written Testimony of Greg Kamman for Part 2 of the California Waterfix Change of Diversion Hearing before the State Water Resources Control Board, November 28, 10p.

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SELECTED EXPERIENCE *(CONTINUED)*

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Gualala River Main Stem 2021


Gualala River Main Stem 2021


© Craig Tooley

From:	Rosalind Girard
To:	PermitSonoma-Wells-PublicInput
Subject:	FW: Well Ordinance comments
Date:	Monday, March 6, 2023 1:10:23 PM
Attachments:	Well ordinance, CAFF 3-6-23.pdf

From: Wendy Krupnick <wlk@sonic.net>
Sent: Monday, March 6, 2023 11:43 AM
To: Gina@cbi.org; Robert Pennington <Robert.Pennington@sonoma-county.org>; Tennis Wick <Tennis.Wick@sonoma-county.org>
Subject: Well Ordinance comments

EXTERNAL

Dear Ms. Bartlett, Mr. Pennington and Director Wick,

Attached are comments from the Sonoma County Chapter of Community Alliance with Family Farmers (CAFF) regarding the Well Ordinance that that is currently being drafted.

We are aware that the proposals in this Ordinance are complex, controversial and evolving rapidly. Our recommendations are based on our understanding of local water issues, having closely followed our local GSP formations and other water-related topics, as well as outreach and input from local smaller scale farmers on these issues.

Thank you for considering out comments.

Wendy Krupnick

Vice president, CAFF Sonoma County

March 6, 2023

To: Gina Bartlett
Robert Pennington, Planner
Tennis Wick, Planning Director

Re: Sonoma County Well Ordinance

The Sonoma County chapter of Community Alliance with Family Farmers (CAFF) is supportive of the current moratorium on new wells in the county and the long overdue efforts to draft an updated Well Ordinance which protects Public Trust resources as well as groundwater throughout the county.

It is critical that the Ordinance **be based on current science and all available, relevant data** and that it **include a transparent and regularly scheduled process to incorporate the implications of new data as it becomes available**. There must be measurable and demonstrative conditions required as part of any permitting process – whether ministerial or discretionary - to ensure that water resources are maintained.

We support:

- Ministerial permitting for low water use permits of 0.5 acre-feet for any purpose, including small-scale agriculture
- We support discretionary permits for any use greater than 0.5 acre-feet in all regions. However, local food security should be considered as an important priority for water use along with health and safety of residents**.** Permit fees should be discounted for those producing food or with verifiable plans to do so
- Disallowing new wells in certain areas, if supported by data. There may be areas where groundwater is so scarce or depleted, impacts to streams so severe, and/or cumulative impacts have reached such a critical point that no new wells should be allowed
- Additional conservation measures, including efficient toilets and prohibition of non-functional turf, must be required for all permit types. For agriculture, there are ample data and technical resources available regarding irrigation water conservation, as well as soil management and farming practices that conserve water. All new and replacement wells serving agricultural operations must require conservation measures that are measurable, demonstrative, and verifiable
- Consideration should also be given during the discretionary review process to water reuse on ag parcels as well as practices that allow for infiltration. Support, including financial incentives, should be provided to encourage and measure the impacts of these practices in sites where their benefits would be likely
- To measure and verify water use, metering must be a basic requirement for all well types, no matter the permitting process. Real-time and/or regular reporting, must also

be required to ensure enforcement can be timely, and models updated in a timely manner. All use reports must be made publicly available in any easy manner. Landowners should be directed to grant opportunities to help pay for metering and reporting requirements

To ensure Ordinance intent and provisions are actually being carried out, there must be clear enforcement language to ensure that mitigations are actually in place and public trust resources are protected to extent feasible. Enforcement actions must be timely, actionable, and publicly available. Enforcement actions must also be sufficient to act as a deterrent against possible violation.

For the Ordinance to be effective as our climate and human patterns change, an adaptive management process must be included which requires staff to regularly review and update modeling in response to the gathering of new information and the closing of data gaps (e.g., via robust metering, monitoring, and reporting requirements). This will require regular technical review of all available information and the ordinance language so necessary amendments that are protective of public trust resources to fullest extent feasible are made. A regularly scheduled plan for this process must be included in the Ordinance.

With close collaboration among the GSAs, Permit and Planning departments, Sonoma Water and Regional water agencies as well as all stakeholders, we hope that comprehensive and coordinated policies and procedures will be developed. The goal must be to preserve Sonoma County's precious water resources upon which all life depends.

Thank you for considering our comments.

Wendy Krupnick
Vice President, CAFF Sonoma County

From: Nancy Feehan
To: PermitSonoma-Wells-PublicInput
Subject: The Well Ordinance
Date: Friday, March 10, 2023 7:59:00 PM

EXTERNAL

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March 14, 2023

TO: Sheryl Bratton
Clerk of the Board of Supervisors
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

Tennis Wick

Director, Permit Sonoma

2550 Ventura Avenue

Santa Rosa, CA 95403

Nathan Quarles
Deputy Director, Engineering and Construction
Permit Sonoma

Robert Pennington
Professional Geologist, Natural Resources
Permit Sonoma

Submitted via Email: PermitSonoma-Wells-PublicInput@sonoma-county.org; Nathan.Quarles@sonoma-county.org; Tennis.Wick@sonoma-county.org; Sheryl.Bratton@sonoma-county.org; Robert.Pennington@sonoma-county.org

SUBJECT: Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)

To Sonoma County Board of Supervisors and County Staff:

The above-listed organizations represent citizens in Sonoma County and statewide with a keen interest in ensuring groundwater is sustainably and equitably managed for the benefit of all Californians and the ecosystems we all depend on for our health and welfare. We thank you for the opportunity to comment on the ongoing process to amend
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the Sonoma County Well Ordinance to ensure public trust resources are protected when issuing groundwater well permits.

As a precedential act within the State of California, Sonoma County has the opportunity to set a strong example of how best to manage groundwater resources to protect our shared public trust resources from adverse impacts caused by unsustainable groundwater extraction. In addition to protecting the shared public trust resources that make Sonoma County a great place to live—including the fish, wildlife, and recreational opportunities provided by our rivers and streams—from the adverse impacts of groundwater extraction, this well ordinance update can help ensure long-term water security for all County residents and help make rural residents more resilient to a changing climate and increased drought.

It is well documented that groundwater resources throughout Sonoma County are oversubscribed, and that unsustainable groundwater extraction is not only threatening water security and human health of Sonoma County communities, but it is also negatively impacting the rich public trust resources valued by our diverse communities. Overuse of groundwater resources leads to the depletion of surface flows and reduced cold water flows that makes our rivers and creeks safe to recreate in and drink from, for locals and tourists alike, while also leading to the destruction of essential fish and riparian habitat that is essential to maintaining healthy fish and wildlife populations. These devastating losses have, and will continue to have, resounding impacts everywhere in our County including: the loss of tourism and our robust recreation economy, loss of our local salmon fishery, loss of habitats of cultural and historical importance, reduced groundwater quality, and dry wells.

We appreciate and recognize the tremendous work and effort committed by County staff to develop a robust and effective ordinance meant to fulfill its trustee duties and address the problems identified above. We have been following the County-convened technical and policy working groups' efforts—via limited publicly accessible meetings—and appreciate the hard work and long hours members of these groups have contributed. We also appreciate the County's recognition of its public trust duty to protect salmon and other species in Sonoma County's creeks and rivers, as well as confirmation of its duty to mitigate water extractions that harm public trust resources (including rejection when necessary).

The County must take measures to strengthen groundwater pumping protections and not allow the unsustainable status quo to continue. The County's duty is to identify and evaluate adverse impacts of groundwater extraction on public trust resources, and to mitigate those impacts to the extent feasible. To fulfill its obligations, the County must base groundwater extraction permitting decisions on reliable scientific information and robust modeling regarding the impacts of a proposed well, both individually and cumulatively with all other existing groundwater extractions. In addition, the County must develop and implement a program that provides continuing oversight on both existing and proposed water wells to ensure that all users take necessary steps to mitigate the impacts of groundwater extraction on public trust resources.

We remain concerned that the recommendations from the working groups do not address all aspects of the problem or ensure that any subsequent ordinance adopted by the County will effectively and adequately protect public trust resources now and into the future. For example, there appears to be outstanding ambiguity on the following key

questions: 1) what is reasonable residential consumption; 2) what is an adverse impact; 3) how will collected data be utilized to inform an adaptive management process; 4) what criteria will be used to evaluate impacts and any proposed mitigation when reviewing discretionary permits; and 5) what analysis has been done to identify and determine measures necessary to mitigate impacts of groundwater extraction that will be authorized with ministerial permits?

In addition to these ambiguities, we have identified a list of items that we believe need to be addressed and included before any ordinance the County adopts will adequately and effectively meet its Public Trust obligations:

A robust process to identify and mitigate the cumulative impacts, of both existing and new wells, to public trust resources, including a review of ongoing cumulative impacts and any potential cumulative impacts that may arise both within and outside of the Public Trust Review Area (PTRA). On its own, one single well may seem benign, but the more wells there are in an area, all those uses compound and can cause significant groundwater decline.

To qualify for a ministerial permit *(across-the-counter with no judgement by the county required)*, it is paramount that a "low water use" well not exceed 0.5 acre-feet in use each year. Any use greater than 0.5 acre-feet each year must be subject to discretionary permitting, as uses above this would equate to more than 111 gallons per day (GPD) per person in a family for four. In 2021, the average residential user used less than 91 GPD, including all outdoor uses. In contrast, 2.0 acre-feet would equate to almost 450 GPD per person for a family of four. Any additional groundwater use permitted by the County has the potential to impact public trust resources either now or in the future as cumulative impacts build. By choosing to not cap pumping volume anywhere, regardless of impacts, the County is allowing additional adverse impacts in perpetuity. We do not agree with this approach, but at the very least additional wells should be reasonably judicious with water use.

Conservation measures must be required for all groundwater uses. To reduce adverse impacts to the extent feasible, all groundwater must be used more conservatively with reductions quantified. Strong conservation measures are necessary to ensure that ongoing impacts, cumulative impacts, and future impacts are reduced. Many of the proposed conservation measures under the ordinance are simple things that many properties already have in place, which means future permit decisions will continue, not mitigate, the current situation.

Mitigation measures that go beyond simply requiring conservation must be evaluated and required, as necessary, to address ongoing and potential new adverse impacts. The current status quo—of unmitigated and oversubscribed use—must be addressed so that groundwater supplies can recover, and public trust resources are preserved for all County residents. Conservation measures alone will not offset or address the timing of existing acute or cumulative impacts, and thus will not mitigate impacts on public trust resources.

A "replacement well" should be limited to those wells that are truly a replacement due to structural failures or when an existing well is mechanically inoperable. These wells must be conditioned with metering and reporting requirements. Wells that change type of use, depth, and/or pump rate (or potential pumping rate) is a new well, and should be evaluated and permitted as such, subject to well permitting processes, including any

ministerial or discretionary public trust review elements. If "replacement wells" are excluded from the ministerial or discretionary public trust review elements of any adopted ordinance, then existing and ongoing adverse impacts will be allowed to continue indefinitely in dereliction of the County's duties.

Metering must be a basic requirement for all well types, including a true "replacement well," as part of the permitting process. Real-time and/or regular reporting, must be required to ensure prompt correction of overuse, timely enforcement, and effective model updates. All use reports must be made publicly available without unnecessary privacy violations. There are numerous grant opportunities to help pay for metering and reporting requirements for low-income and disadvantaged communities, as well as to improve broadband access throughout the County.

Lastly, we would like to note the significant lack of public transparency throughout this process. It is understood that County Staff and consultants were working under an extremely tight timeline; however, with such an important and lasting impact to our public resources being discussed for recommendation, more could and should have been done. In addition to the few public meetings, the County could and should have been sharing meeting notes, modeling proposals, and other documents with the public on its website. By instead placing the onus on those in the working groups, important information was siloed, and not broadly shared with the greater community. This is a significant issue and resulted in key stakeholder groups, many that will be directly impacted, being excluded, their input omitted and vital information excluded from this process.

The county should implement the measures identified above to restore public trust resources and ensure their sustainability. We therefore urge Staff and the Board to address all of these issues by adopting strong, protective measures that are designed for timely adaptation as crucial information is gathered, analyzed and available for use. The stakes could not be higher.

Sincerely,

Nancy Feehan

Timber Cove

From:	Teresa Barrett
To:	Christina Rivera
Cc:	Tennis Wick; Tennis Wick; nathan.quarels@sonoma-county.org; Robert Pennington; PermitSonoma-Wells-PublicInput
Subject:	Fwd: URGENT_Well Ordinance Comment Letter for your consideration/support
Date:	Sunday, March 12, 2023 1:14:08 PM

EXTERNAL

March 12, 2023

TO: Christina Rivera
Clerk of the Board of Supervisors
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

Tennis Wick

Director, Permit Sonoma

2550 Ventura Avenue

Santa Rosa, CA 95403

Nathan Quarles
Deputy Director, Engineering and Construction
Permit Sonoma

Robert Pennington
Professional Geologist, Natural Resources
Permit Sonoma

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SUBJECT: Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)

To Sonoma County Board of Supervisors and County Staff:

The above-listed organizations represent citizens in Sonoma County and statewide with a keen interest in ensuring groundwater is sustainably and equitably managed for the benefit of all Californians and the ecosystems we all depend on for our health and welfare. We thank you for the opportunity to

comment on the ongoing process to amend the Sonoma County Well Ordinance to ensure public trust resources are protected when issuing groundwater well permits.

As a precedential act within the State of California, Sonoma County has the opportunity to set a strong example of how best to manage groundwater resources to protect our shared public trust resources from adverse impacts caused by unsustainable groundwater extraction. In addition to protecting the shared public trust resources that make Sonoma County a great place to live—including the fish, wildlife, and recreational opportunities provided by our rivers and streams—from the adverse impacts of groundwater extraction, this well ordinance update can help ensure long-term water security for all County residents and help make rural residents more resilient to a changing climate and increased drought.

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We appreciate and recognize the tremendous work and effort committed by County staff to develop a robust and effective ordinance meant to fulfill its trustee duties and address the problems identified above. We have been following the County-convened technical and policy working groups' efforts —via limited publicly accessible meetings—and appreciate the hard work and long hours members of these groups have contributed. We also appreciate the County's recognition of its public trust duty to protect salmon and other species in Sonoma County's creeks and rivers, as well as confirmation of its duty to mitigate water extractions that harm public trust resources (including rejection when necessary).

The County must take measures to strengthen groundwater pumping protections and not allow the unsustainable status quo to continue. The County's duty is to identify and evaluate adverse impacts of groundwater extraction on public trust resources, and to mitigate those impacts to the extent feasible. To fulfill its obligations, the County must base groundwater extraction permitting decisions on reliable scientific information and robust modeling regarding the impacts of a proposed well, both individually and cumulatively with all other existing groundwater extractions. In addition, the County must develop and implement a program that provides continuing oversight on both existing and proposed water wells to ensure that all users take necessary steps to mitigate the impacts of groundwater extraction on

public trust resources.

We remain concerned that the recommendations from the working groups do not address all aspects of the problem or ensure that any subsequent ordinance adopted by the County will effectively and adequately protect public trust resources now and into the future. For example, there appears to be outstanding ambiguity on the following key questions: 1) what is reasonable residential consumption; 2) what is an adverse impact; 3) how will collected data be utilized to inform an adaptive management process; 4) what criteria will be used to evaluate impacts and any proposed mitigation when reviewing discretionary permits; and 5) what analysis has been done to identify and determine measures necessary to mitigate impacts of groundwater extraction that will be authorized with ministerial permits?

In addition to these ambiguities, we have identified a list of items that we believe need to be addressed and included before any ordinance the County adopts will adequately and effectively meet its Public Trust obligations:

<!--[if !supportLists]-->1. <!--[endif]-->A robust process to identify and mitigate the cumulative impacts, of both existing and new wells, to public trust resources, including a review of ongoing cumulative impacts and any potential cumulative impacts that may arise both within and outside of the Public Trust Review Area (PTRA). On its own, one single well may seem benign, but the more wells there are in an area, all those uses compound and can cause significant groundwater decline.

<!--[if !supportLists]-->2. <!--[endif]-->To qualify for a ministerial permit *(across-the-counter with no judgement by the county required)*, it is paramount that a "low water use" well not exceed 0.5 acre-feet in use each year. Any use greater than 0.5 acre-feet each year must be subject to discretionary permitting, as uses above this would equate to more than 111 gallons per day (GPD) per person in a family for four. In 2021, the average residential user used less than 91 GPD, including all outdoor uses. In contrast, 2.0 acre-feet would equate to almost 450 GPD per person for a family of four. Any additional groundwater use permitted by the County has the potential to impact public trust resources either now or in the future as cumulative impacts build. By choosing to not cap pumping volume anywhere, regardless of impacts, the County is allowing additional adverse impacts in perpetuity. We do not agree with this approach, but at the very least additional wells should be reasonably judicious with water use.

<!--[if !supportLists]-->3. <!--[endif]-->Conservation measures must be required for all groundwater uses. To reduce adverse impacts to the extent feasible, all groundwater must be used more conservatively with reductions quantified. Strong conservation measures are necessary to ensure that ongoing impacts, cumulative impacts, and future impacts are reduced. Many of the proposed conservation measures under the ordinance are simple things that many properties already have in place, which means future permit decisions will continue, not mitigate, the current situation.

<!--[if !supportLists]-->4. <!--[endif]-->Mitigation measures that go beyond simply requiring conservation must be evaluated and required, as necessary, to address ongoing and potential new adverse impacts. The current status quo—of unmitigated and oversubscribed use—must be addressed so that groundwater supplies can recover, and public trust resources are preserved for all County residents. Conservation measures alone will not offset or address the timing of existing acute or cumulative impacts, and thus will not mitigate impacts on public trust resources.

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Sincerely,

Teresa Barrett, former Mayor of Petaluma

From:	Leona Judson
To:	PermitSonoma-Wells-PublicInput; Nathan Quarles; Tennis Wick; Robert Pennington; Sheryl Bratton
Subject:	The Well Ordinance Amendment Process
Date:	Sunday, March 12, 2023 8:04:35 PM

EXTERNAL

Sonoma County has an opportunity to set the bar for how best to manage groundwater resources to protect our shared public trust resources from adverse impacts caused by unsustainable groundwater extraction. By protecting this shared public trust resource that make Sonoma County a great place to live from the adverse impacts of groundwater extraction, this well ordinance update can help ensure long-term water security for all County residents and help make rural residents more resilient to a changing climate and increased drought.

It is well documented that groundwater resources throughout Sonoma County are oversubscribed, and that unsustainable groundwater extraction is not only threatening water security and human health of Sonoma County communities, but it is also negatively impacting the rich public trust resources valued by our diverse communities.

I have been following the County-convened technical and policy working groups' efforts —via limited publicly accessible meetings—and appreciate the hard work and long hours members of these groups have contributed. However, I remain concerned that the recommendations from the working groups do not address all aspects of the problem or ensure that any subsequent ordinance adopted by the County will effectively and adequately protect public trust resources now and into the future. The following key questions need more clarity:

<!--[if !supportLists]-->1. <!--[endif]-->what is reasonable residential consumption.

<!--[if !supportLists]-->2. <!--[endif]-->what is an adverse impact.

<!--[if !supportLists]-->3. <!--[endif]-->how will collected data be utilized to inform an adaptive management process.

<!--[if !supportLists]-->4. <!--[endif]-->what criteria will be used to evaluate impacts and any proposed mitigation when reviewing discretionary permits.

<!--[if !supportLists]-->5. <!--[endif]-->what analysis has been done to identify and determine measures necessary to mitigate impacts of groundwater extraction that will be authorized with ministerial permits?

It has been noted that the lack of transparency for the public and even between the working groups, has had a negative impact. Key information between the working groups, the county and the public was not readily shared thus compromising this valuable work and leading to potential mistrust. We therefore urge Staff and the Board to address these issues by adopting strong, protective measures that are designed for timely adaptation as crucial information is gathered, analyzed and available for use. The stakes could not be higher.

Sincerely,

Leona Judson

From:	Robert Pennington
To:	PermitSonoma-Wells-PublicInput
Subject:	FW: The Well Ordinance Amendment
Date:	Monday, March 13, 2023 9:05:54 AM

From: rick.luttmann@sonoma.edu <rick.luttmann@sonoma.edu>
Sent: Sunday, March 12, 2023 8:57 PM
To: Tennis Wick <Tennis.Wick@sonoma-county.org>; Robert Pennington <Robert.Pennington@sonoma-county.org>; Sheryl Bratton <Sheryl.Bratton@sonoma-county.org>; Nathan Quarles <Nathan.Quarles@sonoma-county.org>
Subject: The Well Ordinance Amendment

EXTERNAL

To: Sheryl Bratton, Clear of the Board of Supervisors
Tennis Wick, Director, Permit Sonoma
Nathan Quarles, Deputy Director, Engineering & Construction
Robert Pennington, Professional Geologist, Natural Resources Permit Sonoma

Subject: The Well Ordinance Amendment Process

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The following key questions need more clarity:
1. what is reasonable residential consumption.
2. what is an adverse impact.

3. how will collected data be utilized to inform an adaptive management process.
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5. what analysis has been done to identify and determine measures necessary to mitigate impacts of groundwater extraction that will be authorized with ministerial permits?

It has been noted that the lack of transparency for the public and even between the working groups, has had a negative impact. Key information between the working groups, the county and the public was not readily shared thus compromising this valuable work and leading to potential mistrust. We therefore urge Staff and the Board to address these issues by adopting strong, protective measures that are designed for timely adaptation as crucial information is gathered, analyzed and available for use. The stakes could not be higher.

-- Rick Luttmann, Rohnert Park

From: Jim Masters
To: Sheryl Bratton; PermitSonoma-Wells-PublicInput
Subject: water from wells
Date: Monday, March 13, 2023 9:37:46 AM

EXTERNAL

It looks to me like the well project answers a few questions, leaves some old questions unanswered -- and raises some new questions. We still do not know what the big picture is in terms of the total amount of water that is available and the total uses. It is a challenge to develop rational policy when the totals of sources and uses are unknown.

I hope (1) the well project and (2) the EIR that includes cannabis water and (3) the groundwater and aquifer analysis and (4) the idea of getting some of the rainwater it back into the aquifers is vectoring the county/state/nation toward more rational policies.

Other nations do a better job of managing natural resources like petroleum, natural gas, and coal. I think that in the U.S. governments should buy out all those people who got "rights" when water was unlimited and put all water into a public trust. The current hodge-podge is ripe for a "do-over."

Jim Masters, Spring Lake Village, 5555 Montgomery Drive, Santa Rosa, CA 95409

From:	Jean Redus
To:	PermitSonoma-Wells-PublicInput; Nathan Quarles; Tennis Wick; Sheryl Bratton; Robert Pennington
Cc:	AGVWC; district5
Subject:	Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well,Ordinance) from Atascadero / Green Valley Watershed Council
Date:	Monday, March 13, 2023 8:05:11 PM
Attachments:	uu4Zu0oDD0t5TTI8.png AGVWC comments on Well Ordinance Update.pdf

EXTERNAL

March 13, 2023

TO: Christina Rivera
CAO of the Board of Supervisors
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

Tennis Wick
Director, Permit Sonoma
2550 Ventura Avenue
Santa Rosa, CA 95403

Nathan Quarles
Deputy Director, Engineering and Construction
Permit Sonoma

Robert Pennington
Professional Geologist, Natural Resources
Permit Sonoma

Submitted via Email: PermitSonoma-Wells-PublicInput@sonoma-county.org; Nathan.Quarles@sonoma-

county.org; Tennis.Wick@sonoma-county.org; Sheryl.Bratton@sonoma-county.org; Robert.Pennington@sonoma-county.org

SUBJECT: Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)

To Sonoma County Board of Supervisors and County Staff:

The Atascadero /Green Valley Watershed Council is comprised of a group of people who live, own property or work in the watershed of the Atascadero Creek and Green Valley Creek who work to help each other in taking responsibility for our impact on the watershed through protection, restoration and education. We respectfully submit that most of the revisions in Version (9–9–2022) of the proposed County ordinance to the water well construction standards are based on a logical fallacy. The fallacy is:

A. Navigable waters are public trust resources. (True.)

B. Non-navigable waters are not navigable waters. (True.) Therefore,

C. Non-navigable waters are not public trust resources. (False.)

This fallacy taints much of what follows in the revisions. For example, the Public Trust Review Area is defined as an area where “the underlying aquifer is likely to be interconnected with a navigable water.” This results in areas underlying aquifers that are unlikely to be interconnected with a navigable water excluded from the Public Trust Review Area. The fallacy is comparable:

A. Aquifers connected with navigable waters are public trust resources. (True.)

B. Aquifers not connected with navigable waters are not aquifers connected with navigable waters. (True.) Therefore,

C. Aquifers not connected with navigable waters are not public trust resources. (False.)

This foundational fallacy, like most fallacies, leads to revisions that are misleading. The revisions state that “California courts have found that the public trust doctrine is applicable to extraction of groundwater that adversely affects a navigable waterway.” That is true, but it is a gratuitous and misleading statement because California courts have not found the public trust doctrine is not applicable to the extraction of groundwater that does not adversely affect a navigable waterway.

The revisions in Section 25B-3 define public trust resources as “waterways the government is obligated to hold in trust ...” Why, in an ordinance regulating groundwater, limit the meaning of public resources to “waterways”? By common meaning “waterways” are limited to surface waters, while the focus of an ordinance regulating wells is necessarily groundwater. The appropriate definition would be “water” or “waters” the government is obligated to hold in trust. Section 25B-2 (a) of the ordinance itself states: “The purpose of this chapter is to protect the groundwater resource of the county.” It is Orwellian to define, in the immediately following section of the ordinance, public trust resources as “waterways,” or surface water.

All living things require water, and the human occupants of the County get most of their water from groundwater. While the distinction between navigable and non-navigable waters is necessary in some contexts, it has no relevance to an ordinance proposed to regulate wells drawing groundwater. All groundwater is an essential public resource. Not only the groundwater likely to be interconnected with navigable waters, not only the groundwater west of Highway 101, nor only the groundwater east of Highway 101, rather, “the groundwater resource of the county,” as properly stated in Section 25B-2. But the revisions unnecessarily add a second sentence reading: “It is the further purpose of this chapter to address the County’s public trust obligation.” This addition does not clarify the proposed ordinance; it confuses it.

It is not necessary for the proposed ordinance to address the public trust <u>obligation</u> or the public trust <u>doctrine</u>. The public trust doctrine is a

common law concept used by courts when addressing a situation not covered by legislation. Rather, the ordinance should focus on public trust resources, as it did before the revisions. The County's General Plan states that the primary purpose of the Water Resources Element of the Plan is to "ensure that Sonoma County's water resources are sustained and protected." If the proposed ordinance is to address the public trust doctrine, it should begin by referring to this pronouncement by the California Court of Appeal: "The [public trust] doctrine is expansive. (*Colberg, Inc. v. State of California ex rel. Dept. Pub. Wks.* (1967) 67 Cal.2d 408, 416-417.) 'The range of public trust uses is broad, encompassing not just navigation, commerce, and fishing, but also the public right to hunt, bathe or swim. Furthermore, the concept of a public use is flexible, accommodating changing public needs. For example, an increasingly important public use is the preservation of trust lands in their natural state, so that they may serve as ecological units for scientific study, as open space, and as environments which provide food and habitat for birds and marine life, and which favorably affect the scenery and climate of the area.'" Environmental Law Foundation v. State Water Resources Control Board, C083229 (Super. Ct. No. 34201080000583)

Respectfully submitted,

Jean Redus, President

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March 13, 2023

TO: Christina Rivera
CAO of the Board of Supervisors
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

Tennis Wick
Director, Permit Sonoma
2550 Ventura Avenue
Santa Rosa, CA 95403

Nathan Quarles
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Submitted via Email: PermitSonoma-Wells-PublicInput@sonoma-county.org; Nathan.Quarles@sonoma-county.org; Tennis.Wick@sonoma-county.org; Sheryl.Bratton@sonoma-county.org; Robert.Pennington@sonoma-county.org

SUBJECT: Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)
To Sonoma County Board of Supervisors and County Staff:

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Respectfully submitted,

Jean Redus, President

From: Paul-Andre Schabracq
To: PermitSonoma-Wells-PublicInput; Nathan Quarles; Tennis Wick; Sheryl Bratton; Robert Pennington
Cc: district5
Subject: Well Ordinance
Date: Monday, March 13, 2023 4:49:48 PM

EXTERNAL

SUBJECT: Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)

To Sonoma County Board of Supervisors and County Staff:

The above-listed organizations represent citizens in Sonoma County and statewide with a keen interest in ensuring groundwater is sustainably and equitably managed for the benefit of all Californians and the ecosystems we all depend on for our health and welfare. We thank you for the opportunity to comment on the ongoing process to amend the Sonoma County Well Ordinance to ensure public trust resources are protected when issuing groundwater well permits.

As a precedential act within the State of California, Sonoma County has the opportunity to set a strong example of how best to manage groundwater resources to protect our shared public trust resources from adverse impacts caused by unsustainable groundwater extraction. In addition to protecting the shared public trust resources that make Sonoma County a great place to live—including the

fish, wildlife, and recreational opportunities provided by our rivers and streams—from the adverse impacts of groundwater extraction, this well ordinance update can help ensure long-term water security for all County residents and help make rural residents more resilient to a changing climate and increased drought.

It is well documented that groundwater resources throughout Sonoma County are oversubscribed, and that unsustainable groundwater extraction is not only threatening water security and human health of Sonoma County communities, but it is also negatively impacting the rich public trust resources valued by our diverse communities. Overuse of groundwater resources leads to the depletion of surface flows and reduced cold water flows that makes our rivers and creeks safe to recreate in and drink from, for locals and tourists alike, while also leading to the destruction of essential fish and riparian habitat that is essential to maintaining healthy fish and wildlife populations. These devastating losses have, and will continue to have, resounding impacts everywhere in our County including: the loss of tourism and our robust recreation economy, loss of our local salmon fishery, loss of habitats of cultural and historical importance, reduced groundwater quality, and dry wells.

We appreciate and recognize the tremendous work and effort committed by County staff to develop a robust and effective ordinance meant to fulfill its trustee duties and address the problems identified above. We have been following the County-convened technical and policy working groups' efforts —via limited publicly accessible meetings—and appreciate the hard work and long hours members of these groups have contributed. We also appreciate the County's recognition of its public trust duty to protect salmon and other species in Sonoma County's creeks and rivers, as well as-confirmation of its duty to mitigate water extractions that harm public trust resources (including rejection when necessary).

The County must take measures to strengthen groundwater pumping protections and not allow the unsustainable status quo to continue. The County's duty is to identify and evaluate adverse impacts of groundwater extraction on public trust resources, and to mitigate those impacts to the extent feasible. To fulfill its obligations, the County must base groundwater extraction permitting decisions on reliable scientific information and robust modeling regarding the impacts of a proposed well, both individually and cumulatively with all other existing groundwater extractions. In addition, the County must

develop and implement a program that provides continuing oversight on both existing and proposed water wells to ensure that all users take necessary steps to mitigate the impacts of groundwater extraction on public trust resources.

We remain concerned that the recommendations from the working groups do not address all aspects of the problem or ensure that any subsequent ordinance adopted by the County will effectively and adequately protect public trust resources now and into the future. For example, there appears to be outstanding ambiguity on the following key questions: 1) what is reasonable residential consumption; 2) what is an adverse impact; 3) how will collected data be utilized to inform an adaptive management process; 4) what criteria will be used to evaluate impacts and any proposed mitigation when reviewing discretionary permits; and 5) what analysis has been done to identify and determine measures necessary to mitigate impacts of groundwater extraction that will be authorized with ministerial permits?

In addition to these ambiguities, we have identified a list of items that we believe need to be addressed and included before any ordinance the County adopts will adequately and effectively meet its Public Trust

obligations:

1. A robust process to identify and mitigate the cumulative impacts, of both existing and new wells, to public trust resources, including a review of ongoing cumulative impacts and any potential cumulative impacts that may arise both within and outside of the Public Trust Review Area (PTRA). On its own, one single well may seem benign, but the more wells there are in an area, all those uses compound and can cause significant groundwater decline.

2. To qualify for a ministerial permit *(across-the-counter with no judgement by the county required)*, it is paramount that a "low water use" well not exceed 0.5 acre-feet in use each year. Any use greater than 0.5 acre-feet each year must be subject to discretionary permitting, as uses above this would equate to more than 111 gallons per day (GPD) per person in a family for four. In 2021, the average residential user used less than 91 GPD, including all outdoor uses. In contrast, 2.0 acre-feet would equate to almost 450 GPD per person for a family of four. Any additional groundwater use permitted by the County has the potential to impact public trust resources either now or in the future as cumulative impacts build. By choosing to not cap pumping volume anywhere, regardless of impacts, the County is allowing additional adverse

impacts in perpetuity. We do not agree with this approach, but at the very least additional wells should be reasonably judicious with water use.

3. Conservation measures must be required for all groundwater uses. To reduce adverse impacts to the extent feasible, all groundwater must be used more conservatively with reductions quantified. Strong conservation measures are necessary to ensure that ongoing impacts, cumulative impacts, and future impacts are reduced. Many of the proposed conservation measures under the ordinance are simple things that many properties already have in place, which means future permit decisions will continue, not mitigate, the current situation.

4. Mitigation measures that go beyond simply requiring conservation must be evaluated and required, as necessary, to address ongoing and potential new adverse impacts. The current status quo—of unmitigated and oversubscribed use—must be addressed so that groundwater supplies can recover, and public trust resources are preserved for all County residents. Conservation measures alone will not offset or address the timing of existing acute or cumulative impacts, and thus will not mitigate impacts on public trust resources.

5. A "replacement well" should be limited to those

wells that are truly a replacement due to structural failures or when an existing well is mechanically inoperable. These wells must be conditioned with metering and reporting requirements. Wells that change type of use, depth, and/or pump rate (or potential pumping rate) is a new well, and should be evaluated and permitted as such, subject to well permitting processes, including any ministerial or discretionary public trust review elements. If "replacement wells" are excluded from the ministerial or discretionary public trust review elements of any adopted ordinance, then existing and ongoing adverse impacts will be allowed to continue indefinitely in dereliction of the County's duties.

6. Metering must be a basic requirement for all well types, including a true "replacement well," as part of the permitting process. Real-time and/or regular reporting, must be required to ensure prompt correction of overuse, timely enforcement, and effective model updates. All use reports must be made publicly available without unnecessary privacy violations. There are numerous grant opportunities to help pay for metering and reporting requirements for low-income and disadvantaged communities, as well as to improve broadband access throughout the County.

Lastly, we would like to note the significant lack of public

transparency throughout this process. It is understood that County Staff and consultants were working under an extremely tight timeline; however, with such an important and lasting impact to our public resources being discussed for recommendation, more could and should have been done. In addition to the few public meetings, the County could and should have been sharing meeting notes, modeling proposals, and other documents with the public on its website. By instead placing the onus on those in the working groups, important information was siloed, and not broadly shared with the greater community. This is a significant issue and resulted in key stakeholder groups, many that will be directly impacted, being excluded, their input omitted and vital information excluded from this process.

The county should implement the measures identified above to restore public trust resources and ensure their sustainability. We therefore urge Staff and the Board to address all of these issues by adopting strong, protective measures that are designed for timely adaptation as crucial information is gathered, analyzed and available for use. The stakes could not be higher.

Sincerely,

Paul-André Schabracq
Edmée Danan, MD
Deborah Sweitzer
P. O. 1414

Sebastopol, CA 95473
(District 5)

From:	Diana Badger
To:	PermitSonoma-Wells-PublicInput; Nathan Quarles; Tennis Wick; Sheryl Bratton; Robert Pennington
Subject:	Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)
Date:	Tuesday, March 14, 2023 10:04:05 AM

EXTERNAL

To Sonoma County Board of Supervisors and County Staff:

As a citizen of Sebastopol for the past 23 years, and a board member of our shareholder run, Fircrest Mutual Water Company, I am writing to voice my strong support for imposing significant measures to restrict and monitor the addition and use of private wells in our county. Development-creep is alive and well in our county, and with it, the thirst for the installation of more new private wells.

I myself was recently solicited by an engineering firm that told me I could make money by putting in an additional unit on my property. When I responded that within my private water company, we had a limit on installing new water hook-ups on any of our shareholders' properties, the engineer responded with *What's to stop a person from putting in a second, private well*? I feel we need to seriously nip this approach in the bud in order to protect our precious water resources and with it, the sustainability of our existing ecosystems and human systems.

To this end, I whole-heartedly endorse all the points made in the letter sent to you by Rue Furch, particularly:

- **It is paramount that a "low water use" well not exceed 0.5 acre-feet in use each year.** By choosing to not cap pumping volume anywhere, regardless of impacts, the County is allowing additional adverse impacts in perpetuity.
- **Conservation measures must be required for all groundwater uses**. To reduce adverse impacts to the extent feasible, all groundwater must be used more conservatively with reductions quantified. Strong conservation measures are necessary to ensure that ongoing impacts, cumulative impacts, and future impacts are reduced.
- **Mitigation measures that go beyond simply requiring conservation must be evaluated and required, as necessary, to address ongoing and potential new adverse impacts.** The current status quo—of unmitigated and oversubscribed use—must be addressed so that groundwater supplies can recover, and public trust resources are preserved for all County residents.
- **A "replacement well" should be limited to those wells that are truly a replacement** due to structural failures or when an existing well is mechanically inoperable.
- **Metering must be a basic requirement for all well types**, including a true "replacement well," as part of the permitting process. Real-time and/or regular reporting, must be required to ensure prompt correction of overuse, timely enforcement, and effective model updates

In addition, full public input needs to be allowed for in this very serious well ordinance matter, and the time and mechanism necessary to do so must be provided. As we know, our county is facing a significant long-term drought, and this measure will potentially impact the livability

of present and future county residents, not to mention our equally important habitat and the life forms we share it with, for decades to come.

Sincerely,

Diana Badger

7280 Lynch Rd.
Sebastopol

From: Paul-Andre Schabracq
To: PermitSonoma-Wells-PublicInput; Nathan Quarles; Tennis Wick; Sheryl Bratton; Robert Pennington
Cc: district5
Subject: Well Ordinance
Date: Monday, March 13, 2023 4:49:48 PM

EXTERNAL

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obligations:

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2. To qualify for a ministerial permit *(across-the-counter with no judgement by the county required)*, it is paramount that a "low water use" well not exceed 0.5 acre-feet in use each year. Any use greater than 0.5 acre-feet each year must be subject to discretionary permitting, as uses above this would equate to more than 111 gallons per day (GPD) per person in a family for four. In 2021, the average residential user used less than 91 GPD, including all outdoor uses. In contrast, 2.0 acre-feet would equate to almost 450 GPD per person for a family of four. Any additional groundwater use permitted by the County has the potential to impact public trust resources either now or in the future as cumulative impacts build. By choosing to not cap pumping volume anywhere, regardless of impacts, the County is allowing additional adverse

impacts in perpetuity. We do not agree with this approach, but at the very least additional wells should be reasonably judicious with water use.

3. Conservation measures must be required for all groundwater uses. To reduce adverse impacts to the extent feasible, all groundwater must be used more conservatively with reductions quantified. Strong conservation measures are necessary to ensure that ongoing impacts, cumulative impacts, and future impacts are reduced. Many of the proposed conservation measures under the ordinance are simple things that many properties already have in place, which means future permit decisions will continue, not mitigate, the current situation.

4. Mitigation measures that go beyond simply requiring conservation must be evaluated and required, as necessary, to address ongoing and potential new adverse impacts. The current status quo—of unmitigated and oversubscribed use—must be addressed so that groundwater supplies can recover, and public trust resources are preserved for all County residents. Conservation measures alone will not offset or address the timing of existing acute or cumulative impacts, and thus will not mitigate impacts on public trust resources.

5. A "replacement well" should be limited to those

wells that are truly a replacement due to structural failures or when an existing well is mechanically inoperable. These wells must be conditioned with metering and reporting requirements. Wells that change type of use, depth, and/or pump rate (or potential pumping rate) is a new well, and should be evaluated and permitted as such, subject to well permitting processes, including any ministerial or discretionary public trust review elements. If "replacement wells" are excluded from the ministerial or discretionary public trust review elements of any adopted ordinance, then existing and ongoing adverse impacts will be allowed to continue indefinitely in dereliction of the County's duties.

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Lastly, we would like to note the significant lack of public

transparency throughout this process. It is understood that County Staff and consultants were working under an extremely tight timeline; however, with such an important and lasting impact to our public resources being discussed for recommendation, more could and should have been done. In addition to the few public meetings, the County could and should have been sharing meeting notes, modeling proposals, and other documents with the public on its website. By instead placing the onus on those in the working groups, important information was siloed, and not broadly shared with the greater community. This is a significant issue and resulted in key stakeholder groups, many that will be directly impacted, being excluded, their input omitted and vital information excluded from this process.

The county should implement the measures identified above to restore public trust resources and ensure their sustainability. We therefore urge Staff and the Board to address all of these issues by adopting strong, protective measures that are designed for timely adaptation as crucial information is gathered, analyzed and available for use. The stakes could not be higher.

Sincerely,

Paul-André Schabracq
Edmée Danan, MD
Deborah Sweitzer
P. O. 1414

Sebastopol, CA 95473
(District 5)

From:	Diana Badger
To:	PermitSonoma-Wells-PublicInput; Nathan Quarles; Tennis Wick; Sheryl Bratton; Robert Pennington
Subject:	Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)
Date:	Tuesday, March 14, 2023 10:04:05 AM

EXTERNAL

To Sonoma County Board of Supervisors and County Staff:

As a citizen of Sebastopol for the past 23 years, and a board member of our shareholder run, Fircrest Mutual Water Company, I am writing to voice my strong support for imposing significant measures to restrict and monitor the addition and use of private wells in our county. Development-creep is alive and well in our county, and with it, the thirst for the installation of more new private wells.

I myself was recently solicited by an engineering firm that told me I could make money by putting in an additional unit on my property. When I responded that within my private water company, we had a limit on installing new water hook-ups on any of our shareholders' properties, the engineer responded with *What's to stop a person from putting in a second, private well*? I feel we need to seriously nip this approach in the bud in order to protect our precious water resources and with it, the sustainability of our existing ecosystems and human systems.

To this end, I whole-heartedly endorse all the points made in the letter sent to you by Rue Furch, particularly:

- **It is paramount that a "low water use" well not exceed 0.5 acre-feet in use each year.** By choosing to not cap pumping volume anywhere, regardless of impacts, the County is allowing additional adverse impacts in perpetuity.
- **Conservation measures must be required for all groundwater uses**. To reduce adverse impacts to the extent feasible, all groundwater must be used more conservatively with reductions quantified. Strong conservation measures are necessary to ensure that ongoing impacts, cumulative impacts, and future impacts are reduced.
- **Mitigation measures that go beyond simply requiring conservation must be evaluated and required, as necessary, to address ongoing and potential new adverse impacts.** The current status quo—of unmitigated and oversubscribed use—must be addressed so that groundwater supplies can recover, and public trust resources are preserved for all County residents.
- **A "replacement well" should be limited to those wells that are truly a replacement** due to structural failures or when an existing well is mechanically inoperable.
- **Metering must be a basic requirement for all well types**, including a true "replacement well," as part of the permitting process. Real-time and/or regular reporting, must be required to ensure prompt correction of overuse, timely enforcement, and effective model updates

In addition, full public input needs to be allowed for in this very serious well ordinance matter, and the time and mechanism necessary to do so must be provided. As we know, our county is facing a significant long-term drought, and this measure will potentially impact the livability

of present and future county residents, not to mention our equally important habitat and the life forms we share it with, for decades to come.

Sincerely,

Diana Badger

7280 Lynch Rd.
Sebastopol

From:	Jaime Neary
To:	PermitSonoma-Wells-PublicInput; Nathan Quarles; Tennis Wick; Christina Rivera; Robert Pennington
Subject:	Community Comment Letter Re: Amendment to Sonoma County Well Ordinance
Date:	Wednesday, March 15, 2023 11:52:47 AM
Attachments:	image001.png SoCo Well Ordinance_Community Letter (3.15.23).pdf

EXTERNAL

Good morning,

Please find attached a comment letter regarding the ongoing amendment process for the Sonoma County Well Ordinance as it relates to the Public Trust Doctrine. This letter is signed by multiple organizations and members of the community that are interested in protecting our public trust resources and will be impacted by the County's decision in this process. Please let us know if you have any questions.

Best,
Jaime

Jaime Neary || Staff Attorney
Russian Riverkeeper
707-723-7781

It's your River—we protect it!

RUSSIAN RIVERKEEPER

Belmont Terrace Mutual Water Company
Fircrest Mutual Water Company
NOW (Neighbors of West County)
Russian River Watershed Protection Committee

March 15, 2023

Christina Rivera
CAO, County of Sonoma
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

Nathan Quarles
Deputy Director, Engineering and Construction
Permit Sonoma

Tennis Wick
Director, Permit Sonoma
2550 Ventura Avenue
Santa Rosa, CA 95403

Robert Pennington
Professional Geologist, Natural Resources
Permit Sonoma

Submitted via Email: PermitSonoma-Wells-PublicInput@sonoma-county.org; Nathan.Quarles@sonoma-county.org; Tennis.Wick@sonoma-county.org; Christina.Rivera@sonoma-county.org; Robert.Pennington@sonoma-county.org

SUBJECT: Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)

To Sonoma County Board of Supervisors and County Staff:

The above-listed organizations represent citizens in Sonoma County and statewide with a keen interest in ensuring groundwater is sustainably and equitably managed for the benefit of all Californians and the ecosystems we all depend on for our health and welfare. We thank you for the opportunity to comment on the ongoing process to amend the Sonoma County Well Ordinance to ensure public trust resources are protected when issuing groundwater well permits.

As a precedential act within the State of California, Sonoma County has the opportunity to set a strong example of how best to manage groundwater resources to protect our shared public trust resources from adverse impacts caused by unsustainable groundwater extraction. In addition to protecting the shared public trust resources that make Sonoma County a great place to live—including the fish, wildlife, and recreational opportunities provided by our rivers and streams—from the adverse impacts of groundwater extraction, this well ordinance update can help ensure long-term water security for all County residents and help make rural residents more resilient to a changing climate and increased drought.

It is well documented that groundwater resources throughout Sonoma County are oversubscribed, and that unsustainable groundwater extraction is not only threatening water security and human health of Sonoma County communities, but it is also negatively impacting the rich public trust resources valued by our diverse communities. Overuse of groundwater resources leads to the depletion of surface flows and reduced cold water flows that makes our rivers and creeks safe to recreate in and drink from, for locals and tourists alike, while also leading to the destruction of essential fish and riparian habitat that is essential to maintaining healthy fish and wildlife populations. These devastating losses have, and will continue to have, resounding impacts everywhere in our County including: the loss of tourism and our robust recreation economy, loss of our local salmon fishery, loss of habitats of cultural and historical importance, reduced groundwater quality, and dry wells.

We appreciate and recognize the tremendous work and effort committed by County staff to develop a robust and effective ordinance meant to fulfill its trustee duties and address the problems identified above. We have been following the County-convened technical and policy working groups' efforts—via limited publicly accessible meetings—and appreciate the hard work and long hours members of these groups have contributed. We also appreciate the County's recognition of its public trust duty to protect salmon and other species in Sonoma County's creeks and rivers, as well as confirmation of its duty to mitigate water extractions that harm public trust resources (including rejection when necessary).

The County must take measures to strengthen groundwater pumping protections and not allow the unsustainable status quo to continue. The County's duty is to identify and evaluate adverse impacts of groundwater extraction on public trust resources, and to mitigate those impacts to the extent feasible. To fulfill its obligations, the County must base groundwater extraction permitting decisions on reliable scientific information and robust modeling regarding the impacts of a proposed well, both individually and cumulatively with all other existing groundwater extractions. In addition, the County must develop and implement a program that provides continuing oversight on both existing and proposed water wells to ensure that all users take necessary steps to mitigate the impacts of groundwater extraction on public trust resources.

We remain concerned that the recommendations from the working groups do not address all aspects of the problem or ensure that any subsequent ordinance adopted by the County will effectively and adequately protect public trust resources now and into the future. For example, there appears to be outstanding ambiguity on the following key questions: 1) what is reasonable residential consumption; 2) what is an adverse impact; 3) how will collected data be utilized to inform an adaptive management process; 4) what criteria will be used to evaluate impacts and

any proposed mitigation when reviewing discretionary permits; and 5) what analysis has been done to identify and determine measures necessary to mitigate impacts of groundwater extraction that will be authorized with ministerial permits?

In addition to these ambiguities, we have identified a list of items that we believe need to be addressed and included before any ordinance the County adopts will adequately and effectively meet its Public Trust obligations:

1. A robust process to identify and mitigate the cumulative impacts, of both existing and new wells, to public trust resources, including a review of ongoing cumulative impacts and any potential cumulative impacts that may arise both within and outside of the Public Trust Review Area (PTRA). On its own, one single well may seem benign, but the more wells there are in an area, all those uses compound and can cause significant groundwater decline.
2. To qualify for a ministerial permit *(across-the-counter with no judgement by the county required)*, it is paramount that a "low water use" well not exceed 0.5 acre-feet in use each year. Any use greater than 0.5 acre-feet each year must be subject to discretionary permitting, as uses above this would equate to more than 111 gallons per day (GPD) per person in a family for four. In 2021, the average residential user used less than 91 GPD, including all outdoor uses. In contrast, 2.0 acre-feet would equate to almost 450 GPD per person for a family of four. Any additional groundwater use permitted by the County has the potential to impact public trust resources either now or in the future as cumulative impacts build. By choosing to not cap pumping volume anywhere, regardless of impacts, the County is allowing additional adverse impacts in perpetuity. We do not agree with this approach, but at the very least additional wells should be reasonably judicious with water use.
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4. Mitigation measures that go beyond simply requiring conservation must be evaluated and required, as necessary, to address ongoing and potential new adverse impacts. The current status quo—of unmitigated and oversubscribed use—must be addressed so that groundwater supplies can recover, and public trust resources are preserved for all County residents. Conservation measures alone will not offset or address the timing of existing acute or cumulative impacts, and thus will not mitigate impacts on public trust resources.
5. A "replacement well" should be limited to those wells that are truly a replacement due to structural failures or when an existing well is mechanically inoperable. These wells must be conditioned with metering and reporting requirements. Wells that change type of use, depth, and/or pump rate (or potential pumping rate) is a new well, and should be evaluated and permitted as such, subject to well permitting processes, including any ministerial or discretionary public trust review elements. If "replacement wells" are excluded from the ministerial or discretionary public trust review elements of any

adopted ordinance, then existing and ongoing adverse impacts will be allowed to continue indefinitely in dereliction of the County's duties.

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The county should implement the measures identified above to restore public trust resources and ensure their sustainability. We therefore urge Staff and the Board to address all of these issues by adopting strong, protective measures that are designed for timely adaptation as crucial information is gathered, analyzed and available for use. The stakes could not be higher.

Sincerely,

Jennifer Clary, California Director
Clean Water Action

Harriet Buckwalter, Co-Chair
Friends of Mark West Watershed

Michelle K. Irwin, Jenner Resident &
Committee Chair
Friends of the Jenner Creek

Dave Henson, Executive Director
Occidental Arts & Ecology Center

Padi Selwyn, Co-chair
Preserve Rural Sonoma County

Brenda Adelman
Russian River Watershed Protection
Committee

Jaime Neary, Staff Attorney
Russian Riverkeeper

Reuben Weinzveg, Treasurer
Sonoma County Tomorrow

Laura Morgan, MD
Save Our Sonoma Coast

Arthur Dawson, Chair
Sonoma Mountain Preservation

Janus Matthes
Winewaterwatch.org

Atascadero/Green Valley Watershed Council

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Friends of the Mark West Watershed

Forest Unlimited

Neighborhood Coalition, Sonoma County

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Sonoma Ecology Center

We Advocate Through Environmental Review (W.A.T.E.R.)

Individuals:

Miriam Allison, Rancher
Jenner, CA

Christine Hoex, Sonoma County Resident & Well Owner
Santa Rosa, CA

Janis Watkins
Healdsburg, CA

From: Robert Pennington
To: PermitSonoma-Wells-PublicInput
Subject: FW: Sonoma County Well Ordinance Recommendations Letter & a request
Date: Thursday, March 16, 2023 1:40:48 PM
Attachments: SonCo Well Ordinance Community Letter (3.15.23).pdf

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From: Rue <rmf@sonic.net>
Sent: Thursday, March 16, 2023 1:35 PM
To: Susan Gorin <Susan.Gorin@sonoma-county.org>
Cc: Tennis Wick <Tennis.Wick@sonoma-county.org>; Robert Pennington <Robert.Pennington@sonoma-county.org>; Nathan Quarles <Nathan.Quarles@sonoma-county.org>; Jennifer Klein <Jennifer.Klein@sonoma-county.org>; Gina Bartlett <Gina@cbi.org>; Shivali@cbi.org; Matt O'Connor <mattoconnor@sonic.net>; Jeremy Kobor <jeremyk@oe-i.com>; Bradley Dunn <Bradley.Dunn@sonoma-county.org>
Subject: Sonoma County Well Ordinance Recommendations Letter & a request

EXTERNAL

Good afternoon,
I wanted you to see the letter sent yesterday to the County of Sonoma Permit Sonoma staff outlining a few necessary elements of an updated Well Ordinance (attached below). We all agree it is critically important to have a sustainable water supply with appropriate protections of the public trust - for all users. Life literally depends on clean and reliable water.

It was sent with the intent of highlighting recommendations for the next Draft Well Ordinance, currently being written. You have it for your records - and to see the breadth of support for getting this right.

I want to emphasize the caliber of work, the responsiveness, professionalism and commitment to the process demonstrated by Permit Sonoma staff and each of the consultants. Time and expertise contributed by the Working Groups should also be recognized. It has been noted with great appreciation.

Within four days (including a weekend), supporters of protection of the Public Trust and sustainable water supply lent their endorsements to this letter. When the new Draft Well Ordinance with staff recommendations is released for public review, it may be an even more compressed sign-on time - given the last legal date for staff's release of the draft (March 28th) and the date for the Board hearing (April 4th). That does not provide much time to read, review, write a letter, circulate it and compile a support letter - but we'll do the very best we can, and hope to count on your understanding and support.

The request: A *very small, focused group* would appreciate the opportunity to speak with you prior to the Board hearing on April 4th. This would be made up of individuals who represent scientific and

stakeholder perspectives - some who have been involved in the County's Well Ordinance since the last amendments in 2015 and before. Given the potential release date for the next Draft, we request a meeting after the last possible release date (3.28.23) and before the weekend of April 1st - so we will all be able to review the Draft in advance of our discussion. If this is not possible, could you suggest an alternate approach? This would be a Zoom meeting since some of us may be Agency scientists who are often out of county.

With appreciation for all you do every day - and your commitment to a sustainable future.
Rue

Belmont Terrace Mutual Water Company
Fircrest Mutual Water Company
NOW (Neighbors of West County)
Russian River Watershed Protection Committee

March 15, 2023

Christina Rivera
CAO, County of Sonoma
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

Nathan Quarles
Deputy Director, Engineering and Construction
Permit Sonoma

Tennis Wick
Director, Permit Sonoma
2550 Ventura Avenue
Santa Rosa, CA 95403

Robert Pennington
Professional Geologist, Natural Resources
Permit Sonoma

Submitted via Email: PermitSonoma-Wells-PublicInput@sonoma-county.org; Nathan.Quarles@sonoma-county.org; Tennis.Wick@sonoma-county.org; Christina.Rivera@sonoma-county.org; Robert.Pennington@sonoma-county.org

SUBJECT: Comments on the Ongoing Process to Amend Sonoma County Code Chapter 25B (the Well Ordinance)

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As a precedential act within the State of California, Sonoma County has the opportunity to set a strong example of how best to manage groundwater resources to protect our shared public trust resources from adverse impacts caused by unsustainable groundwater extraction. In addition to protecting the shared public trust resources that make Sonoma County a great place to live—including the fish, wildlife, and recreational opportunities provided by our rivers and streams—from the adverse impacts of groundwater extraction, this well ordinance update can help ensure long-term water security for all County residents and help make rural residents more resilient to a changing climate and increased drought.

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Sincerely,

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Committee Chair
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Brenda Adelman
Russian River Watershed Protection
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Jaime Neary, Staff Attorney
Russian Riverkeeper

Reuben Weinzveg, Treasurer
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Laura Morgan, MD
Save Our Sonoma Coast

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Janus Matthes
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California Native Plant Society, Milo Baker Chapter

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Individuals:

Miriam Allison, Rancher
Jenner, CA

Christine Hoex, Sonoma County Resident & Well Owner
Santa Rosa, CA

Janis Watkins
Healdsburg, CA

From: Mary Plimpton
To: Jennifer Klein; PermitSonoma-Wells-PublicInput
Cc: Tennis Wick; Christina Rivera; Nathan Quarles; Robert Pennington
Subject: Well Ordinance Amendments and Cannabis Permitting
Date: Thursday, March 16, 2023 6:31:30 PM

EXTERNAL

County Counsel Klein and Permit Sonoma Staff,

As you write the amendments to the well drilling ordinance, I hope you are also considering the following:

At what point will you link County permitting of cannabis to this issue? At what point might it be reasonable to point out to the Supervisors that aggressive pursuit of expansion of a very water-thirsty crop is contrary to the Public Interest, writ large.

I have property in Franz Valley near the county line with Napa County.
Franz Valley is designated Water Zone 3 (marginal groundwater).
Our area plan specifies 20-acre minimum parcel size.
A 30-acre parcel was allowed to be split into 3 10-acre parcels and sold to an entity (Creative Waves) affiliated with Cannacraft.
A consortium of tenant "pharmers" filed applications for 11 ministerial permits to plant cannabis.
A well was permitted on each of the 10-acre parcels.
The wells are in close proximity to a tiny tributary stream into Franz Creek which is part of the Russian River Watershed.
The ministerial permits for cultivation of cannabis were put on hold.
The property owner (and their consortium) have, reportedly, planted hemp which I understand to be equally water-thirsty.

This winter/spring's welcome rains notwithstanding, I am concerned that the cultivation of hemp (and eventually, perhaps, cannabis) may imperil not only our community's groundwater but also the riparian

habitat of Franz Creek.

If wells go dry, according to proposed language that I have read, property owners may not be permitted to drill deeper. What options would we have for water - and who would bear the costs?

Just wanted to be sure this is on your radar as you compose the amendments to the well drilling ordinance.

Thank you for your consideration
Mary Plimpton
8425 Franz Valley School Road

From:	Robert Pennington
To:	PermitSonoma-Wells-PublicInput
Subject:	FW: West County mutual water companies" comments on new well ordinance
Date:	Monday, March 20, 2023 8:17:40 AM
Attachments:	LetterNewWellOrdinance23.pdf

From: roseenveng@sbcglobal.net <roseenveng@sbcglobal.net>
Sent: Saturday, March 18, 2023 10:26 AM
To: Sheryl Bratton <Sheryl.Bratton@sonoma-county.org>; PermitSonma-Wells-PublicInput@sonoma-county.org; Nathan Quarles <Nathan.Quarles@sonoma-county.org>; Tennis Wick <Tennis.Wick@sonoma-county.org>; Christina Rivera <Christina.Rivera@sonoma-county.org>; Robert Pennington <Robert.Pennington@sonoma-county.org>
Cc: district5 <district5@sonoma-county.org>; 'Belmont Terrace BOD' <board@belmontterrace.org>; Sarah Davis <losd9777@yahoo.com>; 'Rue' <rmf@sonic.net>
Subject: West County mutual water companies' comments on new well ordinance

EXTERNAL

Attached comments

John R
John Rosenblum, PhD
Rosenblum Environmental Engineering
900 Dorthel St, Sebastopol CA 95472
(707) 824-8070

Sheryl Bratton
Clerk of the Board of Supervisors
575 Administration Drive, Room 102A
Santa Rosa, CA 95403
Email: Sheryl.Bratton@sonoma-county.org

Nathan Quarles
Deputy Director, Engineering and Construction
Permit and Resource Management Department
County of Sonoma
Email: Nathan.Quarles@sonoma-county.org

Well Ordinance Public Comments Email: PermitSonma-Wells-PublicInput@sonoma-county.org

18 March 2023

COMMENTS ON THE PROPOSED AMENDMENT TO THE SONOMA COUNTY CODE CHAPTER 25B (WELL ORDINANCE)

To Sonoma County Board of Supervisors:

Belmont Terrace Mutual Water Company and Fircrest Mutual Water Company are located in Sebastopol with wells upstream and above the City of Sebastopol's wells. Together we supply 135 homes.

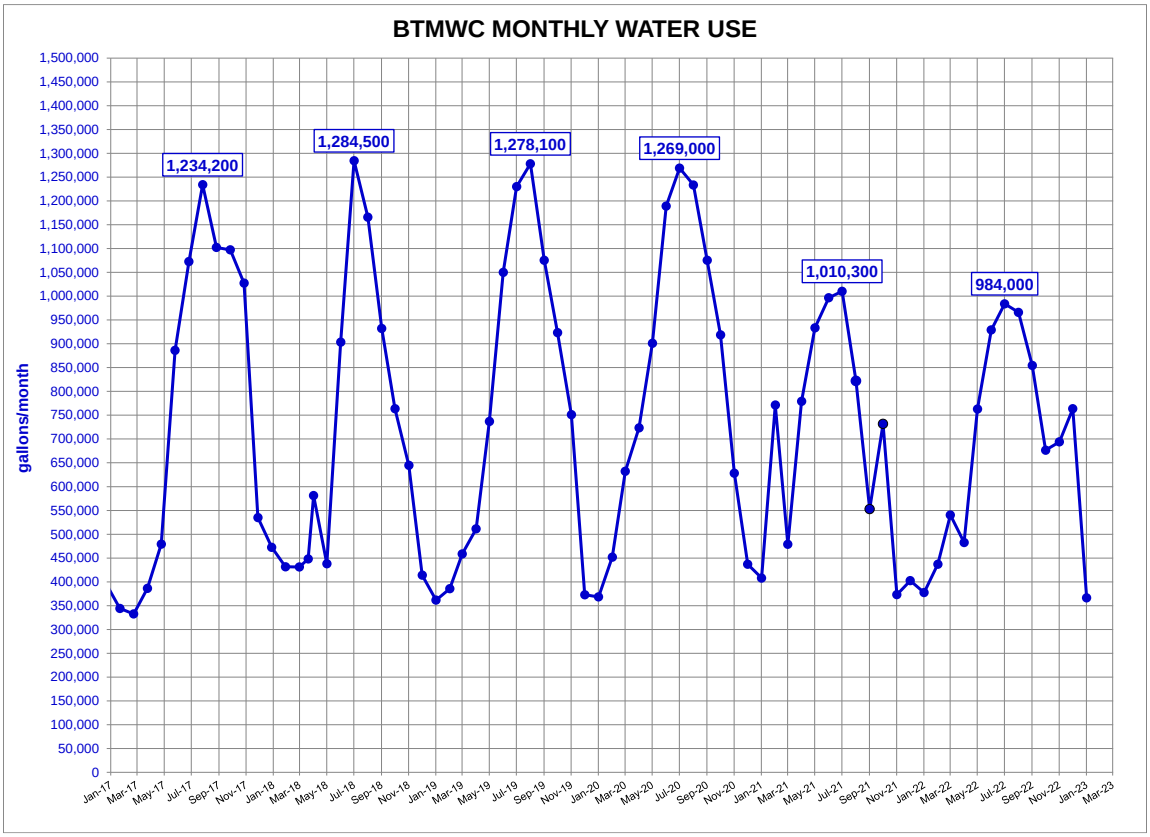
We understand that the County does not want to include existing wells. However, the critical issue for us is that the on-going drought and increasing groundwater extractions by vineyard wells in our recharge area have had discernable impact on our wells (see Figure 1 for data from Belmont Terrace). We have meters on our wells and provide regular reports to State agencies (volume and depth), but although many vineyard wells have meters for agronomic purposes, their reporting is haphazard and County enforcement non-existent. For that reason, we demand inclusion of existing agricultural and commercial wells in the new ordinance.

Our wells and the vineyards' are deep and not currently at risk, but the declining trend in groundwater levels is clear. We know that existing shallow private well levels in our vicinity are running dry for longer periods each year. They are likely the "canaries in the coal mine" for impending environmental Public Trust impacts on creeks that GSA/County staff have deemed "not impacted" by groundwater. For that reason, we again demand inclusion of existing agricultural and commercial wells in the new ordinance.

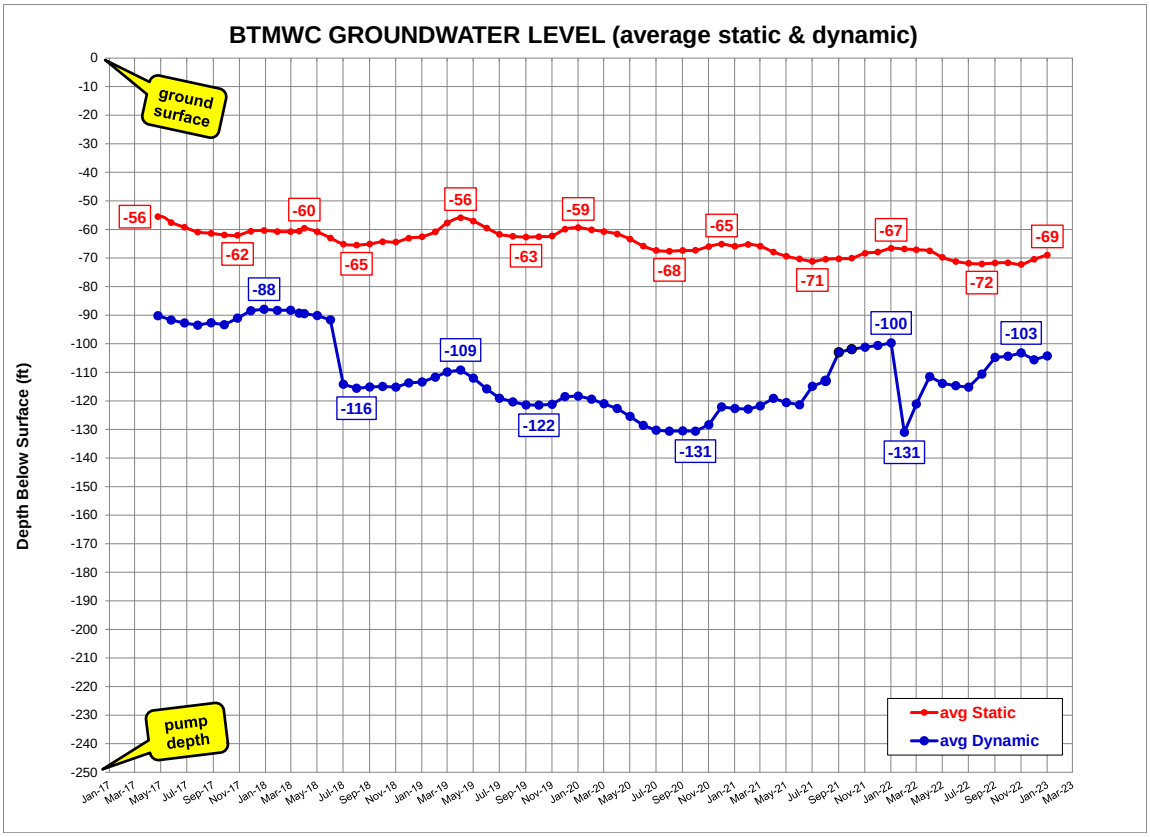
The Sebastopol area mutual water companies joined the Santa Rosa Plain GSA as members of the Independent Water Suppliers group in 2019 after DWR adjusted boundaries to include the City of Sebastopol and its sphere-of-influence. Even before that, we voiced concern about the GSA's lack of concern about our recharge area in the Wilson Grove Highlands formation to our west. We have documented our concerns many times through our representative on the GSA's Advisory Committee and to West County Supervisor Lynda Hopkins – to no avail.

So far, we have made detailed technical comments to staff and made the GSA Board Members aware of our misgivings (we would be happy to provide a Power Point summary of the technical background and correspondence with GSA staff and consultants about the GSP's inadequacies). We now believe that the County's willingness to address Public Trust resources might strengthen our most basic request: that the GSA/GSP's analysis and monitoring be extended to the Wilson Grove Highlands to provide forewarning of impending impacts long before SGMA's 2042 deadline for implementation.

Jean Tillinghast, President Belmont Terrace Mutual Water Company (pickle@sonic.net)
Sarah Davis, President Fircrest Mutual Water Company (sarahbdavis9777@gmail.com)



Landscape irrigation was reduced 27% since 2019, translating to 33,800 gallons per dry season per home (87 homes).



- BTMWC members' 2021 and 2022 reductions in landscape irrigation have so far held cumulative (static) groundwater losses to 12 ft since 2019.
- BTMWC operators adjust pump speed to avoid deeper dynamic drawdown while balancing time to top off tank.