Managing Interconnected Surface Water (ISW) and Groundwater Dependent Ecosystems (GDEs) In the Napa Valley Subbasin

A Workplan for Addressing Data Gaps and Refining Groundwater Management Criteria

1. Introduction

a. Purpose

Implementing a recommendation from the GSP. Addressing data gaps and uncertainty and improving understanding of conditions related to ISWs and GDEs[1] *in the Napa Valley Subbasin. An initial effort that will evolve over time.*

b. Summary of Key Terms: SGMA terms (ISW, GDE, SMC, MT, MO, IM) Other Terms[2](…)

2. Previous Studies

a. Describe current understanding of groundwater-surface water interactions including spatial and temporal variability, as described in the GSP (includes various GDE-related studies in the Napa Valley Subbasin by Stillwater Sciences; also includes fisheries monitoring and related studies by the Napa Resource Conservation District [RCD])

b. Data (and other existing and available resources or publications) currently available to evaluate Subbasin conditions related to ISW and GDEs and potential impacts to these beneficial users (consideration of various life history stages of aquatic organisms (e.g., steelhead)

   i. Groundwater level data

   ii. Stream flow and stage data

   iii. Water quality data (including temperature)

   iv. Ecological data

   v. Other data

c. Summary of data gaps and uncertainties recognized in the Napa Valley Subbasin GSP

   i. Data gaps (summarized in a table)

   ii. Spatial and temporal data gaps (summarized in one or more maps)

3. Napa Valley Ecohydrologic Conceptual Model

a. Description of physical and ecological setting

   i. Geology

   ii. Summary of historical land and water use that relate to landscape and channel conditions

   iii. Current physical and ecological setting

b. Identify key ecologic attributes and corresponding hydrologic indicators

---

[1] GDEs include both aquatic and terrestrial GDEs.

[2] Rohde et al. (2020) includes others such as "ecologic threshold", "ecologic target", and "hydrologic indicator"

c. Characterize relationships between groundwater conditions, surface water conditions, GDEs, and ISW, including comparisons of timing, magnitude, and spatial distribution of conditions
    i. Groundwater elevations and groundwater extractions
    ii. Surface water flow and stage
    iii. Groundwater and surface water quality
    iv. Freshwater ecology

4. Potential Effects on GDEs and Other Beneficial Uses and Users

a. Aquatic GDEs
    i. Hydrologic thresholds (e.g., instream flow needs of aquatic GDEs and special status species) (includes specific needs for various lifestages using surface waters in the Subbasin will be developed to assess potential impacts to each life history stage.)
    ii. Ecologic and/or biologic thresholds (e.g., temperature, dissolved oxygen, turbidity) (The role of ISW in maintaining suitable temperatures for aquatic species will be compared with flow estimates and other water quality impacts.)
    iii. Consideration of both flow and water quality related impacts

b. Terrestrial GDEs
    i. Hydrologic thresholds (e.g., groundwater levels; for terrestrial species, this includes communities supported by springs)
    ii. Ecologic thresholds (e.g., remote sensing vegetation indices values or directly measured vegetation data)

5. Hydrologic Conditions, Land Use and Groundwater Management: Effects on Groundwater Conditions

This section will examine and summarize potential effect of different contributing factors (e.g., pumping, land use, and climate) related to effects on GDEs and other beneficial uses and users. This section would also include an assessment of the impacts of groundwater management on ecosystems and aquatic species and defining the degree to which uncertainty in groundwater elevation and ISW data impact the assessment of management of GDEs and environmental beneficial users of groundwater.

a. Discussion of range of hydrologic, land use, and groundwater management factors

b. Groundwater relationships in response to these factors
    i. Groundwater water levels in proximity to ISWs and GDEs
    ii. Groundwater quality in proximity to ISWs and GDEs
    iii. Depletion of ISWs due to groundwater extraction

c. Sources of uncertainty

6. Quantify Acceptable Ranges of Variation for Groundwater Indicators and Corresponding Thresholds[3]

Based on information presented or summarized in earlier sections, identify specific GDEs, ISW reaches, or other ISW where existing information enable establishing refined management criteria (examples may include Rector Cr, Milliken Cr, and the Oakville to Oak Knoll reach on the Napa River). Management criteria may include:

a. Groundwater elevations (quantify the range of groundwater elevations necessary to support GDEs)

b. Groundwater quality (e.g., temperature)

c. Depletion of ISW due to pumping

d. Other hydrologic or ecologic thresholds (e.g., remote sensing derived vegetation metrics, such as Normalized Difference Vegetation Index, and surface water quality)

7. Determine Monitoring Expansion or Refinement Needed for Successful Management

This section will include input from the Technical Advisory Group (TAG) to develop and prioritize additional data needed to characterize baseline conditions. These studies could include habitat mapping, information on streambed conductivity, or focused geophysical studies near important and/or sensitive GDEs.

a. Global recommendations

    i. Recommendations for further assessments as needed to characterize baseline conditions (e.g., habitat field survey(s), geomorphic and streambed conductivity assessments, focused geophysical studies pending field conditions and suitability)

b. Prioritization of parameters to be monitored (including tentative schedule for implementation)

c. Prioritization of monitoring network expansion (including tentative schedule)

d. Recommended frequency of data collection and periodic reporting

    i. Including consideration of areas where impacts to GDEs may occur more quickly and the ability of different monitoring approaches to detect changes

e. Design reporting process to inform SGMA implementation and adaptive management approach

8. Outreach, Collaboration Opportunities, and Potential Funding

a. Outreach (California Department of Fish and Wildlife, NOAA National Marine Fisheries Services, State Water Board, Department of Water Resources, The Nature Conservancy, California Environmental Flows Framework, stakeholders including individuals located in underrepresented communities and tribal interests)

b. Collaboration opportunities (continue collaboration with the Napa RCD and interbasin/adjoining region collaboration with Sonoma Water)

c. Potential funding sources

[3] May include multiple thresholds for a given groundwater parameter, for example thresholds to trigger PMAs prior to the occurrence of an undesirable result.

9. Schedule

   a. Monitoring and Special Studies

10. References (preliminary list of references in addition to other references noted in the 2022 Napa Valley Subbasin GSP)

Belin, A. 2018. *Guide to Compliance With California's Sustainable Groundwater Management Act: How to avoid the "undesirable result" of "significant and unreasonable adverse impacts on beneficial uses of surface waters."* https://stacks.stanford.edu/file/druid:kx058kk6484/Woods%20Groundwater%20Mgmt%20Act%20Report%20v06%20WEB.pdf.

California Environmental Flows Working Group (CEFWG). 2021. *California Environmental Flows Framework Version 1.0 1*. California Water Quality Monitoring Council Technical Report, 65 pp.

Independent Science Review Panel. No Date. *Conceptual Model of Watershed Hydrology, Surface Water and Groundwater Interactions and Stream Ecology for the Russian River Watershed*. www.russianriverisrp.org/Downloads/ISRP_FINAL_REPORT.pdf.

Kibel, P.S. and J. Gantenbein. 2018. *Rivers That Depend on Aquifers: Drafting GMA Groundwater Plans with Fisheries in Mind*. CUEL - Center for Urban Environmental Law. *7.* https://digitalcommons.law.ggu.edu/cuel/7/.

Koehler, J. and P. Blank. 2020. *Napa River Steelhead and Salmon Monitoring Program 2019-20 Report*. Napa Resource Conservation District. Watershed Assessments | Napa County RCD (naparcd.org).

Mariska Obedzinski,Sarah Nossaman Pierce, Gregg E. Horton,Mathew J. Deitch. 2018. Effects of Flow-*Related Variables on Oversummer Survival of Juvenile Coho Salmon in Intermittent Streams*. Transactions of the American Fisheries Society. https://afspubs.onlinelibrary.wiley.com/doi/abs/10.1002/tafs.10057.

Rohde MM, L. Saito, R. Smith. 2020. *Groundwater Thresholds for Ecosystems: A Guide for Practitioners*. Global Groundwater Group, The Nature Conservancy. https://www.scienceforconservation.org/products/groundwater-thresholds-for-ecosystems.

Rohde MM, S. Sweet, C. Ulrich, and J. Howard. 2019. *A Transdisciplinary Approach to Characterize Hydrological Controls on Groundwater-Dependent Ecosystem Health*. Front. Envrion. Sci. 7:175. https://doi.org/10.3389/fenvs.2019.00175.

Saito L, B. Christian, F. Diffley, H. Richter, M. Rohde, S. Morrison. 2021. *Managing Groundwater to Ensure Ecosystem Function*. Groundwater 59(3). https://doi.org/10.1111/gwat.13089.

Sarah M. Yarnell, Ann Willis, Alyssa Obester, Ryan A. Peek, Robert A. Lusardi, Julie Zimmerman, Theodore E. Grantham and Eric D. Stein. 2022. *Functional Flows in Groundwater-Influenced Streams: Application of the California Environmental Flows Framework to Determine Ecological Flow Needs*. Frontiers in Environmental Science.

Stillwater Sciences. 2002. Napa River Basin Limiting Factors Analysis, Final Technical Report. Prepared for San Francisco Bay Water Quality Control Board and California State Coastal Conservancy. https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plans/1995wqcp/exhibits/doi/doi-exh-45n.pdf

Stillwater Sciences. 2021. Rector Creek Water Year Type and Watershed Model Technical Memorandum.

Yarnell, S.M., E.D. Stein, J.A. Webb, T. Grantham, R.A. Lusardi, J. Zimmerman, R.A. Peek, B.A. Lane, J. Howard, S. Sandoval-Solis. 2019. *A Functional Flow Approach to Selecting Ecologically Relevant Flow Metrics for Environmental Flow Applications*. River Research and Applications. 2020, 1-7. DOI: 10.1002/rra.3575.