UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

August 23, 2021

Bryan Bondy
Executive Director
Mound Basin Groundwater Sustainability Agency
P.O. Box 3544
Ventura, CA 93006-3544

Re: Preliminary Draft Mound Basin Groundwater Sustainability Plan (July 2021)

Dear Mr. Bondy:

Enclosed with this letter are NOAA National Marine Fisheries Service's (NMFS) comments on the Preliminary Draft Mound Basin Groundwater Sustainability Plan (Draft GSP) prepared by the Mound Basin Groundwater Sustainability Agency (MBGSA).

The Draft GSP was developed pursuant to, and intended to meet the requirements of the California Sustainable Groundwater Management Act (SGMA). The SMGA includes specific requirements to identify and consider adverse impacts on all recognized beneficial uses of groundwater and related interconnected surface waters, including Groundwater Dependent Ecosystems (GDE). (*See* Cal. Water Code §§ 10720.1, 10721, 10727.2.)

As explained more fully in the enclosure, the Draft GSP does not, but should, adequately address the recognized instream beneficial uses of the lower Santa Clara River and Santa Clara River Estuary (as well as other GDE), potentially affected by the management of groundwater within the Mound Groundwater Basin. Additionally, the Draft GSP should also recognize the important relationship between the extensive groundwater extractions and recharge program in the Fox Canyon Groundwater Basin (including the conjunctively operated Fillmore and Piru Groundwater Basins) and its potential adverse effects on the amount and extent of surface flows and other water dependent habitat features utilized by the federally listed endangered southern California steelhead (*Oncorhynchus mykiss*).

The revised Draft GSP should be re-circulated to give NMFS, and other interested parties, an opportunity to review the revisions before the Draft GSP is finalized.

NMFS appreciates the opportunity to comment on the Draft GSP. If you have a question regarding this letter or enclosure, please contact Mr. Mark H. Capelli in our Santa Barbara Office (805) 963-6478 or mark.capelli@noaa.gov, or Mr. Andres Ticlavilca in our Santa Rosa Office (707) 575-6-54 or andres.ticlavilca@noaa.gov.

Sincerely,

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**NOAA's National Marine Fisheries Service's Comments on Preliminary Draft Mound Basin Groundwater Sustainability Plan (2021)**

**August 23, 2021**

## Overview

NOAA's National Marine Fisheries Service (NMFS) provides the following comments on the Draft Mound Basin Groundwater Sustainability Plan (Draft GSP), with a focus on Area 11 (*i.e.,* the lower Santa Clara River and Santa Clara River Estuary). Prior to presenting the comments, NMFS first provides background information on the endangered steelhead (*Oncorhynchus mykiss*), which reside in the Santa Clara River watershed, including the reach of the mainstem of the Santa Clara River and Santa Clara River Estuary underlain by the Mound Groundwater Basin. That background information includes the status of the species, life history and habitat requirements, and actions that are essential for recovery of the species. That information is essential for understanding the potential implications of operating the Mound Basin in the Santa Clara River for the endangered Southern California Distinct Population Segment (DPS) of steelhead. Our general and specific comments on the Draft GSP are presented in subsequent sections.

## Status of Steelhead, Life History and Habitat Requirements, and Recovery Needs

*Status of steelhead and habitat for the species in the Santa River Watershed*

NMFS listed southern California steelhead, including the populations in the Santa Clara River watershed (which includes the Mound Groundwater Basin), as endangered in 1997 (62 FR 43937), and reaffirmed the endangered listing in 2006 (71 FR 5248).

NMFS designated critical habitat for southern California steelhead in 2005 (70 FR 52488). Within the Mound Basin, this designation includes the mainstem of the Santa Clara River and the Santa Clara River Estuary (*See* Figures 1 and 2).

Critical habitat for endangered steelhead includes: 1) freshwater spawning habitat with water quality and quantity conditions and substrate that support spawning, incubation, and larval development; 2) freshwater rearing sites with water quality and floodplain connectivity to form and maintain physical habitat conditions that support juvenile growth and mobility, and natural cover such as shade, submerged and overhanging vegetation that provide forage and refugia opportunities; and 3) freshwater migration corridors free of anthropogenic passage impediments that promote adult and juvenile mobility and survival.

Of particular relevance to the Draft GSP for the Mound Basin are the functions of the Santa Clara River Estuary. NMFS Southern California Steelhead Recovery Plan (2012) noted:

> "Each stream system terminates at the coast with some type of estuary-lagoon system. In southern California, seasonal lagoons currently tend to form each summer when decreased streamflows allow marine processes to build a sand berm at the mouth of each system. Juvenile steelhead over-summer in these lagoons, where they often grow so rapidly that they can undergo smoltification at age 1 and enter the ocean large enough to experience enhanced survival to adulthood (Hayes *et al*. 2008, Bond 2006)." P. 2-19.

NMFS Southern California Steelhead Recovery Plan further noted:

> "The timing of emigration is influenced by a variety of factors such as photoperiod, streamflow, temperature, and breaching of the sandbar at the river's mouth. These out-migrating juveniles, termed smolts [reference to Figure omitted]), live and grow to maturity in the ocean for two to four years before returning to freshwater to reproduce (citations omitted)." p. 2--2,

Steelhead populations in the SCS Recovery Planning area have not been extensively investigated; however, steelhead smolts have been documented in southern California estuaries, including the Santa Clara River Estuary *(e.g.,* Kelley 2008).

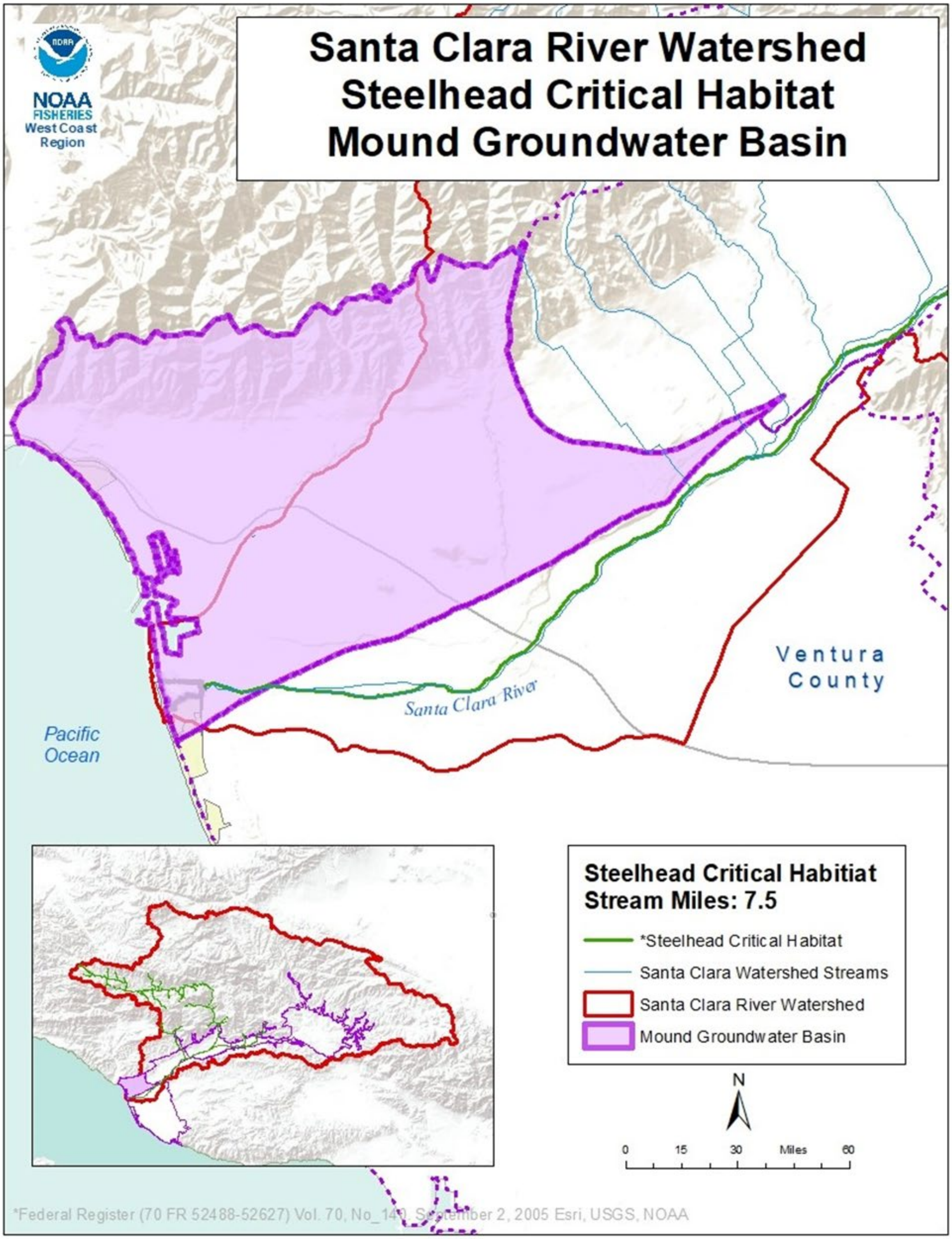


**Figure 1. Lower Santa Clara River and Santa Clara River Estuary Steelhead Critical Habitat within the Mound Groundwater Basin.**

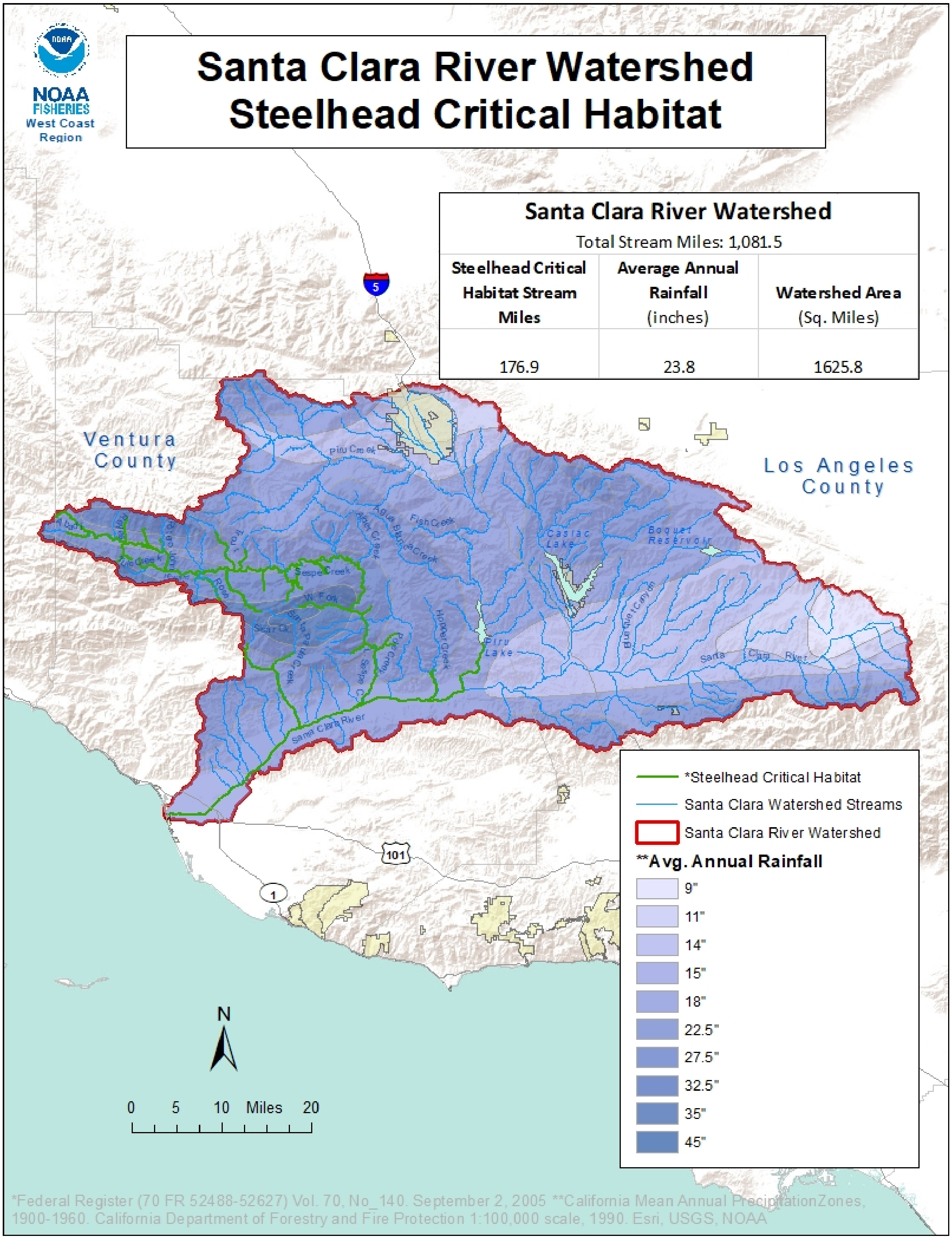


**Figure 2. Santa Clara River Watershed Steelhead Critical Habitat.**

Habitat for this species has been adversely affected by loss and modification of physical or biological features (substrate, water quality and quantity, water temperature channel morphology and complexity, passage conditions, riparian vegetation, introduction of non-native invasive species, etc.) through activities such as surface-water diversions and groundwater extractions (S*ee* "Current DPS-Level Threats Assessment", pp. 4-1 – 4-11, and "Threats and Threat Sources", pp. 9-14 – 9-17, in NMFS 2012). Additionally, estuaries in southern California have been reduced in size through filling and there habitat functions have been degraded through a variety of anthropogenic activities, such as water diversions and extractions and point and non-point waste discharges. The size of the pre-historic Santa Clara River Estuary is estimated to have been reduced by over half (U.S. Coast Survey 1855a, 1855b, Capelli 2007, Beller *et al*. 2011, Stein *et al.* 2014). Thus many of the physical and biological features of designated critical habitats have been significantly degraded (and in some cases lost) in ways detrimental to the biological needs of steelhead. These habitat modifications have hindered the ability of designated critical habitat to provide for the survival and ultimately recovery of this species.

NMFS has also modeled and mapped potential intrinsic potential spawning and rearing habitat in the Santa Clara watershed, using the "envelop method", as part of its recovery planning process for the endangered Southern California DPS of Steelhead (*See* Figure 3). This method uses observed associations between fish distribution and the quantitative values of environmental parameters such as stream gradient, summer mean discharge and air temperature, valley width to mean discharge, and the presence of alluvial deposits – habitat features that are critical to steelhead spawning and rearing (Boughton and Goslin 2006, Map 5, Santa Barbara to Point Dume, pp. 20-21).

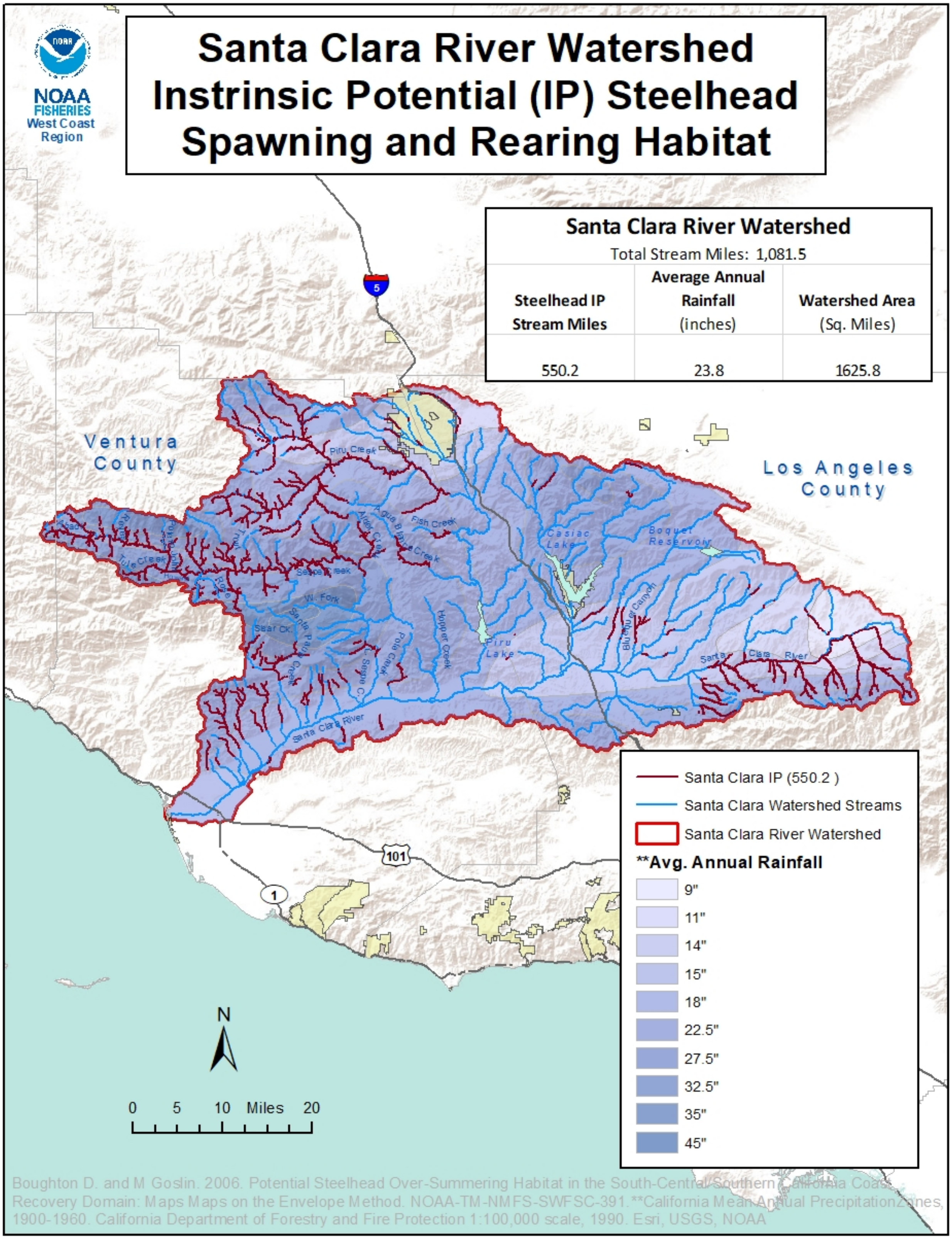


**Figure 3. Santa Clara River Watershed Intrinsic Potential Steelhead Spawning and Rearing Habitat.**

*Steelhead life history and habitat requirements*

Adult steelhead spend a majority of their adult life in the marine environment. However, the reproductive and early development stages of this species' life history occurs in the freshwater environment (migration to and from spawning areas, spawning, incubation of eggs and the rearing of juveniles), including in the main stem and tributaries such as those in the Santa Clara River watershed. Many of the natural variables (such as seasonal surface flow patterns, water quality, including water temperature) are significantly impacted by the artificial modification of these freshwater habitats. This includes both surface and sub-surface extractions that lower the water table and can, in turn, affect the timing, duration, and magnitude of surface flows essential for steelhead migration, spawning and rearing. In southern California, warm, dry summers require that juvenile steelhead have access to perennial stream reaches (including coastal estuaries) with tolerable water temperature (*See*, for example, Boughton *et al*. 2009). The over-summering period can be challenging to juvenile steelhead survival and growth. Surface diversions in combination with lowered groundwater tables during the dry season can *indirectly* affect rearing individuals by reducing vegetative cover, and *directly* by reducing or eliminating the summertime surface flows (or pool depths) in parts of the watershed. These conditions have been and are being exacerbated by global climate change (Beighley *et al*. 2008, Feng *et al*. 2019, Gudmundsson *et al*. 2021).

*Recovery needs of endangered steelhead*

Among other federally mandated responsibilities, NMFS is responsible for administering the U.S. Endangered Species Act for the protection and conservation of endangered steelhead utilizing the Santa Clara River Watershed. As part of this responsibility, NMFS developed the Southern California Steelhead Recovery Plan (NMFS 2012)[1]. Through a comprehensive analysis of systemic threats to this species, diversion of surface-flow and groundwater extractions were identified as "very high" threats to the long-term survival of endangered steelhead in the Santa Clara River (NMFS 2012, pp. 9-1 through 9-17).

To address the identified threats to endangered steelhead in the Santa Clara River Watershed, NMFS' Southern California Steelhead Recovery Plan identifies a number of recovery actions targeting surface diversions and groundwater extraction (NMFS 2012, p. 8-6, Table 9-7, p. 9-61). These include:

SCR-SCS-4.2 Develop and implement a water management plan to identify the appropriate diversion rates for all surface water diversions that will maintain surface flow necessary to support all *O. mykiss* life history stages, including adult and juvenile *O. mykiss* migration, and suitable spawning, incubation, and rearing habitat.

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[1] National Marine Fisheries Service. 2012. Southern California Coast Steelhead Recovery Plan. West Coast Region, California Coastal Area Office, Long Beach, California; *see* also, Keir Associates and National Marine Fisheries Service. 2008, Hunt & Associates Biological Consulting Services 2000.

SCR-SCS-6.1 Conduct groundwater extraction analysis and assessment. Conduct hydrological analysis to identify groundwater extraction rates, effects on the natural stream pattern (timing, duration and magnitude) of surface flows in the mainstem and tributaries, *and the estuary*, and effects on all *O. mykiss* life history stages, including adult and juvenile *O. mykiss* migration, spawning, incubation, and rearing habitats. (emphasis added)

SAC-SCR-6.2 Develop and implement groundwater monitoring and management program. Develop and implement groundwater monitoring program to guide management of groundwater extractions to ensure surface flows provide essential support for all *O. mykiss* life history stages, including adult and juvenile *O. mykiss* spawning, incubation and rearing habitats.

SAC-SCR-12.1 Develop and implement an estuary restoration and management plan.

GSPs developed under SGMA provide an important mechanism for implementing these recovery actions for the Santa Clara River watershed. The GSP for the Mound Basin is an essential mechanism for the implementation specific recovery actions for the lower Santa Clara River and the Santa Clara River Estuary.

**General Comments on the Draft GSP**

Impacting the natural process of groundwater inputs to surface flows and water surface elevations is of concern because the inputs can buffer daily water temperature fluctuations (Heath 1983, Brunke *et al.* 1996, Barlow and Leake 2012, Hebert 2016). Artificially reducing the groundwater inputs can expand or shrink the amount of fish habitat and feeding opportunities for rearing juvenile steelhead (Fetter 1997, Sophocleous 2002, Glasser *et al.* 2007, Croyle 2009,), and reduce opportunities for juveniles to successfully emigrate to the estuary and the ocean (Bond 2006, Hayes *et al.* 2008). Low summer baseflow, likely caused by both surface water diversions and pumping hydraulically connected groundwater, is noted as a significant stress to steelhead survival in the Santa Clara River and tributaries (*See*, for example, Table 9-2, p. 9-15 in NMFS 2012).

Management of the groundwater resources within the Santa Clara River watershed has affected the water resources and other related natural resources throughout the Santa Clara River watershed. For example, extraction of groundwater from these basins has lowered groundwater levels  causing the elimination of artesian springs that formerly supported a wide variety of plant and animal species, and affected surface flows that support the migrations of endangered steelhead, as well as other aquatic species in the Santa Clara River watershed (Stillwater Sciences 2005. 2007a, 2007b, 2011a, 2011b, 2017).

The development and operation of surface water supply facilities throughout the Santa Clara River are integral in the management of the groundwater resources associated with the Santa Clara River. Facilities such as Pyramid Reservoir, Santa Felicia Dam, Piru Creek Diversion and spreading basins, and the Vern Freeman Diversion Dam and spreading basin have profoundly altered the natural surface flow and groundwater recharge patterns in the Santa Clara River watershed, from the headwaters to the Pacific Ocean (*e.g*., NMFS 2008a, 2008b, 2016, 2020, 2021). Unless the Draft GSP is revised to reflect the operation of these integral components of the groundwater management program for the Santa Clara River, the future adopted GSP will be unable to meet the requirement of SGMA to effectively provide for the protection of habitats, including those recognized instream beneficial uses that are dependent on groundwater such as fish migration, spawning and rearing, as well as other GDE within the Mound Basin.

When analyzing impacts on steelhead or other aquatic organisms resulting from groundwater and related streamflow diversions, identifying flow levels that effectively support essential life functions of this organism is critical (Barlow and Leake 2012). Specifically, it is essential to determine what flows adequately supports steelhead migration during the winter and spring, and juvenile rearing year round. Without an understanding of these hydrologic/biotic relationships, a GSP cannot ensure that significant and unreasonable adverse impacts from groundwater depletion (and in the case of the Santa Clara River, the integrally related surface water diversion/groundwater recharge program) are avoided (Heath 1983, California Department of Water Resources 2016).

**Specific Comments on the Draft GSP**

The following comments on the Executive Summary of the Draft GSP are arranged by page and paragraph number; additional comments on individual Draft GSP elements are presented subsequently.

**Executive Summary**

**ES-1 Plan Area, Land Use, and Water Sources**

Pages ES-ii-iii

The Draft Plan states:

> "The beneficial uses of groundwater extracted from the principal aquifers of Mound Basin include municipal, industrial, and agricultural water supply corresponding to the land use categories above." p. ES-ii

The listed beneficial uses within the boundaries of the Mound Groundwater Basin include only out-of-stream beneficial uses, and largely ignores the instream beneficial uses, including those linked to with GDE, including, but not limited to Area 11 (*i.e*., the lower Santa Clara River and Santa Clara River Estuary). The Draft GSP should be revised to explicitly acknowledge the instream beneficial uses supported by the groundwater basin, including the GDE associated with the lower Santa Clara River and Santa Clara River Estuary. The recognized instream beneficial uses for the portion of the lower Santa Clara

River within the Mound Basin include: warm freshwater habitat, cold freshwater habitat, wildlife habitat, habitat for rare, threatened and endangered species, fish migration, and wetland habitat. Santa Clara River Estuary instream beneficial uses include: estuarine habitat, marine habitat, wildlife habitat, habitat for rare, threatened and endangered species, fish migration, spawning habitat, and wetland habitat.[2]

**ES-2 Basin Setting and Groundwater Conditions**

Pages ES-iii-vi

The Draft GSP asserts that:

> "Despite the interconnection with shallow groundwater, there is no depletion of interconnected surface water in the Basin because there are no groundwater extractions from the shallow groundwater units and groundwater in the principal aquifers is physically separated from the surface water bodies by several hundred feet of fine-grained materials. No groundwater dependent ecosystems (GDEs) have been identified in the Basin that appear to be relying on groundwater from a principal aquifer."
> P. ES-vi

The regulations governing SGMA do not stipulate that the provisions of SGMA cover only "principal aquifers" as the Draft GSP appears to presume. The regulations define interconnected surface water as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water . . ." (23 CCR Section 351(0). Significantly, "continuous" refers specifically to hydrologic connection, not a continuous temporal connection.

The Draft GSP does not adequately recognize the potential role of groundwater in the lower reaches of the Santa Clara River or the Santa Clara River Estuary, or the role of groundwater elevations in ensuring surface flows water surface elevations and supporting the life-cycle of steelhead, including their migratory, spawning and rearing phases (S*ee* additional comments on Appendix A to the Draft Mound Basin GSP below.). Both the Santa Clara River estuary and the portion of the Santa Clara River upstream of Harbor Boulevard within the boundaries of the Oxnard Subbasin should be fully addressed in the revised Draft GSP. Further, because groundwater-management activities within the Santa Clara River watershed involve the United Water Conservation District's (UWCD) diversion operations at the Vern Freeman Diversion, the relationship between these diversion activities and groundwater elevations along the affected portion of the Santa Clara River (and estuary) should be addressed in the revised Draft GSP.

*See* additional comments below on interconnected groundwater and surface flows water surface elevations in Area 11 (*i.e.*, the lower Santa Clara River and Santa Clara River Estuary) of the Mound Basin.

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[2] Table 2. Beneficial Use of Inland Surface Waters, Los Angeles Regional Water Quality Control Board (2011). p. 2-7

## ES-3 Water Budget

Pages ES-vi-vii

The Draft GSP notes that:

> "The primary sources of recharge to the Mound Basin groundwater system are underflow from the Santa Paula Basin, areal recharge (the sum of infiltration of precipitation, M&I return flows, and agricultural irrigation return flows), and mountain-front recharge. Stream channel recharge is a minor component." p. ES-vi

The revised Draft GSP should acknowledge that both the direct surface flow and the underflow from the Santa Paula Basin are influenced by the upstream diversion of surface flows in the Santa Clara River watershed and the artificial recharge of ground water as a result of the Vern Freeman Diversion located approximately 10 miles upstream of the Mound Basin.

## ES-4 Sustainable Management Criteria

Pages ES-vii-x

The sustainable criteria are expressed explicitly and exclusively in terms of groundwater levels, water chemistry, and land subsidence, and do not explicitly recognize the important relationship between groundwater levels and the surface flows (particularly base flows) or water quality parameters (such as temperature, dissolved oxygen, *etc*.) that contribute to the maintenance of GDE within the Mound Basin (including, but not limited to, the lower Santa Clara River and the Santa Clara River Estuary).

There is no specific criterion in the Draft Criteria that deals with the GDE associated with the federally listed species (or the designated critical habitat) which utilize the Mount Basin[3]. In fact, the word "steelhead", "trout", or even "fish" do not appear in the Draft GSP. This is an important omission that should be corrected in the revised Draft GSP because GDE for the Mound Basin includes the use of surface flow by the federally listed endangered southern California steelhead for migration, spawning and rearing.

Specifically, the revised Draft GSP should include a description of the extent of designated critical habitat for endangered steelhead (as well as other listed or recognized sensitive species) that occur within the boundaries of the Mound Basin (*See* Figures 1 and 3).

## ES-5 Monitoring Networks

Pages x-xii

[3] For a discussion of the terrestrial and as well as aquatic listed species, see, Stillwater (2007a) and California Department of Fish and Wildlife (2021).

The monitoring is primarily aimed at addressing the limited Sustainable Management Criteria. There is little in the monitoring program that specifically addresses the potential effects of groundwater extractions on GDE, including, but not limited to, the lower Santa Clara River channel and the Santa Clara River Estuary. *See* additional comments below regarding the inadequacies of the proposed monitoring program for the Mound Basin GSP.

**Draft Mound Basin GSP**

**1.0 Introduction to Plan Contents [Article 5 §354]**

The following comments are addressed to the specific sections and provisions of the draft GSP, arranged by the GSP section headings.

**2.2.2.2 Existing Water Resource Management Programs [§354.8(c) and (d)]**

Pages 9-11.

One of the largest and most significant water-resource-management program within the Santa Clara River watershed, the UWCD's groundwater recharge program, consisting of the combined facilities of the Santa Felicia Dam, Piru Diversion, Vern Freeman Diversion and a series of groundwater settling basins. This program and its related facilities should be included in this section because it affects not only the artificial recharge to the Fox Canyon aquifer, but the natural recharge to the other groundwater basins on the Oxnard Plain, including the Mound and Santa Paula Basins; *see* NMFS comments on the Fox Canyon GSP (2020)

**2.2.2.3 Conjunctive Use Programs [§354.8(e)]**

Page 11

The City of Ventura's water supply includes groundwater extractions (as well as surface diversions) that are subject to a separate GSP, and this fact should be noted in the revised Draft Mound GSP.

**2.3 Notice and Communication [§354.10]**

Page 22-24

The Draft GSP is focused out-of-stream users of the Mound Basin and does not adequately recognize the public trust natural resources that may be affected by the extractions of groundwater from the Mound Basin, and therefore be of interest to state and federal natural resource regulatory agencies such as NMFS, U.,S. Fish and Wildlife Service, and the California Department of Fish and Wildlife, and the California Department of Parks and Recreation (which owns a portion of the Santa Clara River Estuary wetlands).

**2.3.1 Beneficial Uses and Users [§354.10(a)]**

Pages 23-24

We would note that the listed beneficial uses within the boundaries of the Mound Basin identify only out-of-stream beneficial uses, and largely ignore instream beneficial uses. The revised Draft GSP should be revised to explicitly acknowledge the instream beneficial uses supported by the groundwater basin, including, but not limited to, the GDE associated with the lower Santa Clara River and Santa Clara River Estuary. *See* comment above.

**3.0 Basin Setting [Article 5, SubArticle 2]**

**3.1.2 Regional Geology [§354.14(b)(1) and (d)(2)]**

Pages 32-43

> "Some clay-rich soils within the Holocene and Pleistocene alluvial deposits present in Mound Basin may be of sufficiently low vertical permeability to allow the formation of thin, discontinuous lenses or layers of shallow, "perched" groundwater above the primary saturated zone of the shallow alluvial aquifer (described in the next subsection of this GSP)." p. 34

The variable permeability also characterizes the shallow upper alluvial aquifer that lays above the Mound Basin and allows connectivity between the upper alluvial aquifer and portion of the Mound Basin. See additional comments below regarding the physical properties of the Mound Basin and its multiple-layered aquifers.

**3.1.4 Principal Aquifers and Aquitards [§354.14(b)(4)(A)]**

> "The SGMA defines "principal aquifers" as "aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." p. 35

While the shallow alluvial aquifer laying above the Mound Basin may be "rarely used for water supply", it does not follow that the provisions of the Draft GSP should only be limited to the Mound Basin. Because water in the overlying shallow alluvial aquifer can percolate to the aquifer below, reducing the groundwater level in the Mound Basin can result in lower groundwater levels in the shallow alluvial aquifer, thus affecting GDE associated with the shallow alluvial aquifer, including, but not limited to, surface water in the lower Santa Clara River, and the Santa Clara River Estuary. *See* additional comments below regarding the physical properties of the Mound Basin and the groundwater contribution the Santa Clara River Estuary.

**3.1.4.1 Physical Properties of Aquifers and Aquitards**

Pages 36-45

The Draft GSP notes:

> "At the time of writing of this GSP, no aquifer test results for hydraulic conductivity or storativity were found in available references. However, well information collected over the past several decades by United . . . is considered the best available information concerning aquifer and aquitard properties. . . However, it is recognized that on a local scale, hydraulic conductivity can vary by orders of magnitude over short distances, and there may be areas in Mound Basin where hydraulic conductivity is higher or lower than the values shown on Table 3.1-01." p. 39

The lack of specific information regarding hydraulic conductivity or storativity in the Mound Basin and the overlying shallow alluvial aquifer does not allow the categorical conclusions relied upon in the Draft GSP to eliminate consideration of GDE within the Mound Basin. The information and model used by United was focused on water conductivity and storativity that is more relevant to out-of-stream water supply and beneficial uses than the smaller values that may be relevant to support GDE.

We would also note that there are groundwater technologies that permits aquifer testing in individual layers of a multi-layered aquifers such as found in the Mound Basin. Pumping tests are essential for determining the hydrological conductivity and storativity of aquifer layers. Such tests must be at a fine enough scale to assess the significance for instream beneficial uses associated with GDE, including, but not limit to, those of the lower Santa Clara River and Santa Clara River Estuary, and not be limited to traditional out-of-stream beneficial uses such as domestic, municipal or agricultural water supply. Without these field-based measurements it is impossible to conduct credible aquifer simulations such as the one found in the Draft GSP dealing with groundwater levels driven by climate-change scenarios through 2070 (*See, e.g*., Figure 4.6-03 of the Draft GSP.)

The Draft GSP further notes:

> "Since 1979, when reporting of groundwater extraction from wells was mandated within United's service area, no pumping has been reported from the shallow alluvial aquifer for water supply in Mound Basin (pumping data for water-supply wells are included in the Mound Basin Data Management System [DMS]), likely due to insufficient saturated thickness and/or poor water quality. Because it is not used for water supply, the shallow alluvial aquifer is not considered a "principal aquifer" at this time for the purpose of groundwater sustainability planning." p. 40

However, the Draft GSP also acknowledges that:

> "Based on calibration of its regional groundwater flow model, United (2021a) estimated the horizontal hydraulic conductivity of the shallow alluvial aquifer to be 200 ft/d in Mound Basin, and the vertical hydraulic conductivity to be 20 ft/d. The specific yield of the shallow alluvial aquifer in the groundwater flow model is 15% (United, 2021a). p. 40

The Mound Basin is a series of layered aquifers with variable hydraulic properties within and across layers. This is clearly depicted in the longitudinal cross-section A-A' in Figure 3.1-05 of the Draft GSP) (Figures, Section 2) depicting the formations constituting the various aquifer layers of the Mound Basin. The "aquitards" have fault discontinuities, and there is hydraulic connection between aquifers and aquitards". The hydraulic head that prevails in the layered aquifer system, including those in the "aquitards", are all interconnected. The lowering of the hydraulic head in deep aquifers will induce a vertical downward movement of groundwater from the shallow aquifer, which in turn is hydraulically connected to the Santa Clara River and the Santa Clara River Estuary.

As noted above, because water in the shallow alluvial aquifer can percolate to the lower Mount Basin aquifers, reducing the groundwater level in the Mound Basin can result in lower groundwater levels in the shallow alluvial aquifer, thus affecting GDE associated with the overlying shallow alluvial aquifer, including surface water in the lower Santa Clara River, and the Santa Clara River Estuary. Consequently, while the shallow alluvial aquifer may not be considered a "principal aquifer", pumping from the Mound Basin can affect the GDE associated with the shallow aquifer, including the lower reaches of the Santa Clara River and the Santa Clara River Estuary, and therefore cannot be omitted from the analysis of the Draft GSP for the Mound Basin. *See* additional comments below regarding groundwater contribution the Santa Clara River Estuary.

**3.1.4.2 Groundwater Recharge and Discharge Areas [§354.14(d)(4)]**

Pages 44-45

The Draft GSP notes that:

> "The Santa Clara River is the only major stream in Mound Basin, and the reach of the Santa Clara River in [the] Mound Basin is considered to usually be the site of groundwater discharge, rather than recharge (Stillwater Sciences, 2011[b]; United, 2018). However, the lower Santa Clara River in the area of its estuary is reported to fluctuate from gaining to losing cycles as water levels rise and fall in response to breaching of the barrier sand at the mouth of the river (Stillwater Sciences, 2011[b[). When the elevation of surface water in the estuary rises (following closure of the barrier bar), some of the rising water infiltrates (recharges) the shallow deposits adjacent to the river. Then, typically in the following winter or spring, a large storm will produce sufficient flows in the river that it will breach the barrier bar and cause rapid decline of surface water levels in the estuary, causing groundwater in the adjacent shallow deposits to discharge back into the river over a sustained period." p. 45

This statement warrants several comments:

First, the distinction between discharge and recharge is misleading; the surface flows in the lower reaches of the Santa Clara River are in direct contact with the alluvial aquifer (which is described elsewhere in the draft GSP as being up to a 100 feet thick).

Second, river discharge (particularly base flows influence by underlying groundwater levels in the Mound Basin) support the GDE in this portion of the Mound Basin.

Third, recharge is not limited to periods when the water surface elevations in the estuary rises following the closure of the sand bar at the mouth of the Santa Clara River Estuary.

Lastly, the draft GSP does not accurately characterize the groundwater contribution to the Santa Clara River Estuary or the lower reaches of the Santa Clara River. According to a water balance assessment conducted by Stillwater Sciences (2011a, 2011b) for the fall/winter period of 2010, "groundwater was estimated to contribute approximately 15% of the inflow volume . . .". For the summer/spring 2010 period, "the groundwater contribution was estimated at 10 percent . . ." The Stillwater study also indicates that in the "Santa Clara River reach upstream of the estuary, groundwater provides the dry summer baseflow, if it exists, and is a quarter of the winter flow, based on the 2010 water year assessment." (TNC 2017, pp. 3-4).

**3.1.4.3 Groundwater Quality [§354.14(b)(4)(D)]**

Pages 45-50

The Draft GSP notes that:

> "SSP&A (2020) further concluded that there is no significant evidence for interactions between groundwater in the principal aquifers and shallow groundwater (CWP-510 is included here) or deeper, mineralized water. SSP&A (2020) also concluded that groundwater at the sample locations in the Basin is at least 1,000 years old. These conclusions together suggest that vertical movement of water percolating from land surface is not a major source of recharge to the principal aquifers, except where they are exposed at land surface in the northern portion of the basin." p. 46

The analysis and conclusion articulated here reflects a water supply for out-of-stream beneficial uses perspective that is pervasive throughout the Draft GSP. However, groundwater-surface interactions on smaller scale than would normally be considered in a traditional groundwater management program are relevant in considering the effects of groundwater management actions (including the timing, rate, and amount of groundwater extractions) on GDE such as the exist in the lower reaches of the Santa Clara River and the Santa Clara River Estuary.

**3.1.4.4 Primary Beneficial Uses [§354.14(b)(4)(E)]**

Pages 50-54

The Draft GSP recognizes that:

> "In addition to groundwater production from the principal aquifers, discharge of small quantities of groundwater from the shallow alluvial aquifer to the lower reach of the Santa Clara River and possibly one other

> area in Mound Basin may contribute to groundwater-dependent ecosystems (GDEs). This potential beneficial groundwater use is further described in Section 3.2.6." p. 51

Despite the acknowledgement of groundwater-surface water interconnections, the Draft GSP concludes that because the shallow alluvial aquifer overlaying the Mound Basin is "rarely used for water supply", and the "likely limited, connection between Mound Basin shallow groundwater" there are not impacts to the GDEs by principal aquifer pumping, and therefore potential adverse Impacts will not be considered in the development of sustainable management criteria for the principal aquifers within the Mound Basin. For the reasons indicated above, this conclusion is not supported by the data presented in the Draft GSP. *See* additional Comments below regarding Appendix A, "Area 11- Lower Santa Clara River and Estuary."

The Draft GSP asserts:

"No data gaps or significant uncertainties were identified." p. 54

This claim is contradicted by the acknowledgement that "no aquifer test results for hydraulic conductivity or storativity were found in available references." p.39 *See* additional comments bellow on Monitoring Networks.

**3.2 Groundwater Conditions [§354.16]**

Pages 54-69

The Draft GSP notes that:

> "Groundwater elevation data are available for nearly 60 wells located within Mound Basin. However, not all of these wells are being monitored at present. The distribution of wells is heavily skewed towards the southern half of the Basin, with relatively few wells existing in the northern half of the Basin (north of Highway 126)." p. 54

The Draft GSP does not provide details regarding the well construction showing the intervals of the well through which groundwater enters the wells. Also, it is unclear if there are "sanitary plugs" installed in the wells that retard or prevent flow through shallow and deep aquifers. *See* comment above regarding the assertion that "No data gaps or significant uncertainties were identified."

**3.2.1 Groundwater Elevations [§354.16(a)]**

Page 54

The Draft GSP acknowledges that:

> "The contouring of groundwater levels in Mound Basin is complicated by the sparse data, particularly in the northern portion of the Basin." p. 54

*See* comment above regarding the assertion that "No data gaps or significant uncertainties were identified."

**3.2.2 Change in Storage [§354.16(b)]**

> "Similar to contouring of groundwater levels in Mound Basin (as described above), estimation of historical changes in groundwater stored in the Basin is complicated by sparse groundwater elevation data, particularly in the northern portion of the Basin and in HSUs with few monitoring points. Due to these limitations, annual and cumulative changes in groundwater in storage were estimated using United's (2018 and 2021a, 2021b) groundwater flow model, which is generally well calibrated on a regional scale to groundwater elevation measurements." p. 60

Groundwater models that are aimed at a "regional scale" are not likely to adequately describe changes in groundwater and surface water elevations (particularly base flows) that support localized GDE such as those associated with the lower Santa Clara River and the Santa Clara River Estuary, as well as other GDE within the Mound Basin identified by the California Department of Fish and Wildlife (2021). *See* comment above regarding the assertion that "No data gaps or significant uncertainties were identified."

**3.2.3 Seawater Intrusion [§354.16(c)]**

Pages 61-62

The Draft GSP notes that:

> "Due to the lack of evidence of seawater intrusion in onshore portions of the Basin and lack of data concerning the location of any offshore seawater intrusion front in the principal aquifers, the maps and cross-sections of the seawater intrusion front required pursuant to §354.16(c) cannot be prepared." p. 62

*See* comment above regarding the assertion that "No data gaps or significant uncertainties were identified."

**3.2.6 Interconnected Surface Water Systems [§354.16(f)]**

Pages 67-68

The Draft GSP notes that:

> "Data are not available to characterize the interconnection of Santa Clara River surface water and groundwater. Although the frequent perennial baseflow conditions imply that surface and groundwater is interconnected, it is not known specifically which groundwater in which units are

> connected and where. Of importance for this GSP, it is unknown whether the water table of the shallow alluvial aquifer in Mound Basin extends beneath the stream terrace deposits and intersects surface water in the Santa Clara River channel within the limits of Mound Basin." p. 67

However, the Draft GSP concludes that:

> "Regardless of the questions and uncertainty surrounding interconnection of shallow aquifer and/or stream terrace groundwater with the Santa Clara River baseflow, it can be concluded that there is no depletion of interconnected surface water in this area because neither unit has any known groundwater extractions within Mound Basin." p. 68.

As noted above, while the shallow alluvial aquifer laying about the Mound Basin may be "rarely used for water supply", it does not follow that there is "no depletion of interconnected surface water within the boundaries of the Mound Basin." Because water in the shallow alluvial aquifer can percolate to the aquifer below, reducing the groundwater level in the Mound Basin can result in lower groundwater levels in the shallow alluvial aquifer, thus affecting GDE associated with the shallow alluvial aquifer, including surface water in the lower Santa Clara River, and the Santa Clara River Estuary. *See* additional comments above regarding the physical properties of the Mound Basin, as well as those below regarding groundwater contribution the Santa Clara River Estuary.

**3.2.7 Groundwater-Dependent Ecosystems [§354.16(g)]**

Pages 68-69

The Draft GSP states that:

> " . . .it is noted that there is no known shallow groundwater extraction within Mound Basin. . . . Given the lack of potential for significant impacts to the GDEs by principal aquifer pumping, Area 11 [*i.e.*, lower Santa Clara River and Santa Clara River Estuary] will not be considered further in the development of sustainable management criteria for the principal aquifers." p. 69

As noted above the data presented in the Draft GSP does not support this assessment and conclusion. *See* additional comment above regarding the physical properties of the Mound Basin and those below regarding Appendix A, "Area 11- Lower Santa Clara River and Estuary."

**3.3 Water Budget [§354.18]**

Pages 70-97

*See* comments below regarding individual sub-sections of the Water Budget.

**3.3.1 Historical Water Budget [§354.18(c)(2)(B)]**

Pages 79-82

The Draft GSP notes that:

"The SGMA Regulations require that the historical surface water and groundwater budget be based on a minimum of 10 years of historical data." p. 79

The GSP does not refer to or account for the effects of the operation of the UWCD Vern Freeman Diversion on the lower Santa Clara River, which diverts, on average, over 62,000 acre-feet per year (AFY) from the main stem of the Santa Clara River (NMFS 2018). This diversion operation affects recharge to all of the lower Santa Clara River groundwater basins, not just the Fox Canyon Basin, including the shallow alluvial aquifer and the other deeper aquifers in within the Mound Basin. These operations have the potential to impact endangered adult and juvenile steelhead in the lower Santa Clara River and Santa Clara River Estuary (NMFS 2008a, 2018). The Draft GSP should therefore include as part of its water-budget analysis the operations of the Vern Freeman Diversion. Specifically, the relationship of groundwater management activities (including both recharge and groundwater extraction activities) and the effects of the related Vern Freeman Diversion on surface flows below the diversion and the maintenance of surface flows supported by groundwater should be explicitly addressed and disclosed in the revised GSP.

**3.3.1.3 Impact of Historical Conditions on Basin Operations [§354.18(c)(2)(C)]**

Pages 83-84

*See* comments above regarding Historical Water Budget.

**3.3.2 Current Water Budget [§354.18(c)(1)]**

Pages 84-86

As noted above, the GSP does not refer to or account for the effects of the operation of the UWCD Vern Freeman Diversion on the Lower Santa Clara River, but should as part of its current water budget. See comments above regarding the UWCD Vern Freeman Diversion.

**3.3.3 Projected Water Budget**

Pages 86-94

As noted above, the GSP does not refer to or account for the effects of the operation of the Vern Freeman Diversion on the Lower Santa Clara River, but should as part of its projected water budget. See comments above regarding the UWCD Vern Freeman Diversion.

### 3.3.4.1 Overdraft Assessment

Pages 95-96

The Draft GSP notes that:

> "Review of the historical, current and projected groundwater budgets indicate small amounts of declining groundwater storage over time (469 and 147 for the historical and current periods, respectively), as shown in Table 3.3-03. These results suggest a minor amount of overdraft may have occurred during the historical and current period of 6.3% and 2.3%, respectively, of the groundwater pumping during that timeframe." p. 96

While the Draft GSP does not identify any significant impacts to out-of-stream water supply beneficial uses of the Mound Basin (and in fact projects a slight increase of 68 to 84 AF/yr) between 2022 and 2096, under the assumed future-precipitation rates modeled), the implications from this slight overdraft or increase in storage for any of the GDE associated with the Mount Basin, including the lower Santa Clara River and Santa Clara River Estuary, are unclear

### 3.4 Management Areas [§354.20]

Page 97

The Draft GSP indicates that:

"No management areas were established for this GSP". p. 97.

This decision appears to be the result, in part, of not recognizing any significant interconnected surface water or GDE within the boundaries of the Mound Basin. However, as noted above, the Mound Basin contains interconnected water and GDE. Additionally, the analysis in the Draft GSP is largely from a water supply perspective, with an emphasis on out-of-stream beneficial uses, and does not recognized water conductivity and storativity that is more relevant to instream beneficial uses associated with GDE, including but not limited to those in Area 11 (*i.e.*, the lower Santa Clara River and Santa Clara River Estuary) .*See* comments above regarding the physical properties of the Mound Basin.

### 4.0 Sustainable Management Criteria [Article 5, SubArticle 3]

Pages 98-148 *See* comments below on individual sub-sections.

### 4.2 Sustainability Goal [§354.24]

Pages 90-100

The Draft GSP states, in part, that:

> "The goal of this Groundwater Sustainability Plan (GSP) is to sustainably manage the groundwater resources of the Mound Basin for the benefit of current and anticipated future beneficial users of groundwater and the welfare of the general public who rely directly or indirectly on groundwater. Sustainable groundwater management will ensure the long-term reliability of the Mound Basin groundwater resources by avoiding undesirable results pursuant to the Sustainable Groundwater Management Act (SGMA) no later than 20 years from GSP adoption through implementation of a data-driven and performance-based adaptive management framework." P. 100

Nothing in the language of the goals specifically refers to the protection of instream beneficial uses associated with GDE of the Mount Basin, such as the lower Santa Clara River or the Santa Clara River Estuary. This appears to be the result, in part, of not recognizing any interconnected surface waters or GDE within the boundaries of the Mound Basin. However, as noted above, the Mound Basin contains interconnected surface water and GDE. *See* comments above regarding the physical properties of the Mound Basin.

**4.3 Process for Establishing Sustainable Management Criteria [§354.26(a), §354.34(g)(3)]**

Pages 101-102

*See* comments above regarding the interest of state and federal natural resource regulatory agencies such as NMFS, U.S. Fish and Wildlife Service, and the California Department of Fish and Wildlife, and the California Department of Parks and Recreation (which owns a portion of the Santa Clara River Estuary wetlands).

**Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]**

Pages 103-104

The discussion in this section is focused on out-of-stream beneficial uses of the groundwater resources of the Mount Basin, and does not directly address the instream beneficial uses of interest to state and federal natural resource regulatory agencies such as NMFS, U.S. Fish and Wildlife Service, and the California Department of Fish and Wildlife, and the California Department of Parks and Recreation. These would include, but are not limited to, the GDE associated with the lower Santa Clara River and the Santa Clara River Estuary.

**Cause of Groundwater Conditions That Could Lead to Undesirable Results [§354.26(b)(1)]**

Pages 104-105

The causes that could lead to undesirable results should include the operations of UWCD Vern Freeman Diversion on the lower Santa Clara River. *See* comments above, particularly regarding GDE.

**4.4.2 Minimum Thresholds [§354.28]**

Pages 105-107

None of the minimum thresholds in the Draft GSP deal specifically with the GDE associated with the Mound Basin, which include the lower Santa Clara River and the Santa Clara River Estuary. This is a significant omission from the Draft GSP that should be addressed in the revised Draft GSP for the Mound Basin.

**4.4.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]**

Page 108

*See* general comment above regarding "Minimum Thresholds" and those below regarding "Criteria Used to Define Undesirable Results".

**4.4.2.3 Minimum Thresholds in Relation to Adjacent Basins [§354.28(b)(3)]**

Page 108

*See* general comment above regarding Minimum Thresholds and the operation of the UWCD Vern Freeman Diversion.

**4.4.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users [§354.28(b)(4)]**

Page 108

*See* general comment above regarding "Minimum Thresholds" and those below regarding Criteria Used to Define Undesirable Results" below.

**Groundwater Beneficial Users (All Types)**

Page 109

**Land Uses and Property Interests (All Types)**

Page 109

*See* comments above regarding the interest of state and federal natural resource regulatory agencies such as NMFS, U.S. Fish and Wildlife Service, and the California Department of Fish and Wildlife, and the California Department of Parks and Recreation (which owns a portion of the Santa Clara River Estuary wetlands).

**4.4.2.5 Potential Effects on other Sustainability Indicators [§354.28(c)(1)(B)]**

Pages 109-110

*See* general comment above regarding "Minimum Thresholds" and those below regarding Criteria Used to Define Undesirable Results".

**Depletion of Interconnected Surface Water**

Page 110

The Draft GSP states that:

> "This sustainability indicator is not applicable to the Mound Basin." (p. 110)

As noted above, while the shallow alluvial aquifer laying about the Mound Basin may be "rarely used for water supply", it does not follow that there is "no depletion of interconnected surface water within the boundaries of the Mound Basin." Because water in the shallow alluvial aquifer can percolate to the aquifer below, reducing the groundwater level in the Mound Basin can result in lower groundwater levels in the shallow alluvial aquifer, thus affecting GDE associated with the shallow alluvial aquifer, including surface water in the lower Santa Clara River, and the Santa Clara River Estuary. *See* additional comments above the physical properties of the Mound Basin and the groundwater contribution the Santa Clara River Estuary.

**4.4.2.6 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]**

Page 111

> "MBGSA [Mound Basin Groundwater Sustainability Agency] is unaware of any federal, state, or local standards for chronic lowering of groundwater levels." p. 110

While there is no general numeric standards for chronic lowering of groundwater levels, this statement fails to recognize the over-arching standards established by SGMA, particularly those intended to protect GDE.

**4.4.2.7 Measurement of Minimum Thresholds [§354.28(b)(6)]**

Page 111

> "Groundwater elevations will be directly measured to determine their relation to minimum thresholds. Groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Section 5." p. 111

The groundwater-monitoring plan only provides for annual monitoring. A more appropriate approach would be to monitor seasonally to account for the strong effect of seasonal changes in hydrologic and hydraulic conditions that are of significant to GDE, including, but not limited to, those associated with the lower Santa Clara River and the Santa Clara River Estuary. For example, monitoring towards the end of summer or beginning of fall, as well as the beginning of Spring each year could help inform groundwater and other natural resource managers of the effects of both recharge (natural and artificial) as well as groundwater pumping patterns on GDE within the Mound Basin such as the lower Santa Clara River and Santa Clara River Estuary.

Without shallow groundwater wells that would provide specific data on the relationship between groundwater levels and surface flows, a reliable assessment of the effects of extracting groundwater from these areas on GDE is not possible. This is a significant data gap that could be addressed by the installation of shallow groundwater wells (or piezometers) to better describe these relationships.

Additionally, data gathered from groundwater well monitoring should be correlated with stream flow in the lower Santa Clara River and surface water elevations in the Santa Clara River Estuary. This can and should be accomplished by added a stream flow gauges capable of monitoring base flows in the lower Santa Clara River between U.S. Highway 101 and the Harbor Boulevard Bridge, as well as one or more water surface elevation gauges within the Santa Clara River Estuary.

*See* general comment above regarding "Minimum Thresholds" and those below regarding "Criteria Used to Define Undesirable Results".

**4.4.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g)]**

Page 111

*See* general comment above regarding "Minimum Thresholds" and those below regarding "Criteria Used to Define Undesirable Results".

**4.4.3.1 Description of Measurable Objectives**
**Western Half of Basin**

Page 112

The Draft GSP notes that:

> "The chronic lowering of groundwater levels minimum thresholds in the western half of the Basin are superseded by the land subsidence proxy minimum thresholds. Therefore, the land subsidence proxy measurable objectives and interim milestones are adopted for the chronic lowering of groundwater levels measurable objectives in the western half of the Basin." p. 112

It is not clear how, or if, the land subsidence proxy for minimum thresholds is appropriate for instream beneficial uses associated by GDE supported by interconnected waters. *See* also, general comment above regarding Minimum Thresholds.

**Eastern Half of the Basin**

**4.4.3.2 Interim Milestones [§354.30(e)]**

Page 113

*See* general comment above regarding “Minimum Thresholds” and those below regarding “Criteria Used to Define Undesirable Results”.

**Western Half of Basin**

Page 113

*See* general comment above regarding “Minimum Thresholds” and those below regarding “Criteria Used to Define Undesirable Results”.

**Eastern Half of Basin**

Page 113

*See* general comment above regarding “Minimum Thresholds” and those below regarding “Criteria Used to Define Undesirable Results”.

**4.5 Reduction of Groundwater Storage**

**4.5.1 Undesirable Results [§354.26]**

Pages 114-116

*See* general comment above regarding Minimum Thresholds.

**Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]**

The Draft GSP states that:

> “The evaluation of potential effects on beneficial uses and users, land uses, and property interests for the reduction of groundwater storage sustainability indicator is the same as for the other sustainability indicators and is incorporated herein by reference to Sections 4.4.2.4, 4.6.2.4, and 4.7.2.4.

And,

> “Reduction of groundwater storage has the potential to impact the beneficial uses and users of groundwater in the Mound Basin by limiting the volume of groundwater available that can be economically extracted for agricultural, municipal, industrial, and domestic use. These impacts

> can affect all users of groundwater in the Mound Basin. Groundwater elevations are used to determine whether significant and unreasonable reduction of groundwater in storage is occurring." p. 115

As noted previously, the Draft GSP should be revised to explicitly acknowledge the instream beneficial uses supported by the Mound Basin and its individual aquifers, including, but not limited to, the GDE associated with the lower Santa Clara River and Santa Clara River Estuary. The recognized instream beneficial uses for the portion of the lower Santa Clara River within the Mound Basin include: warm freshwater habitat, cold freshwater habitat, wildlife habitat, habitat for rare, threatened and endangered species, fish migration, and wetland habitat. Santa Clara River Estuary instream beneficial uses include: estuarine habitat, marine habitat, wildlife habitat, habitat for rare, threatened and endangered species, fish migration, spawning habitat, and wetland habitat.

**Criteria Used to Define Undesirable Results [§354.26(b)(2)]**

The Draft GSP states that:

> "The criteria used to define undesirable results for the reduction of groundwater storage sustainability indicator are based on the qualitative description of undesirable results, which is causing other sustainability indicators to have undesirable results. As explained in Section 4.5.2, groundwater levels will be used as a proxy for the reduction of groundwater storage sustainability indicator minimum thresholds. Based on the foregoing, the combination of minimum threshold exceedances that is deemed to cause significant and unreasonable effects in the basin for the reduction of groundwater storage sustainability indicator is the same as the combinations deemed to cause undesirable results for the land subsidence sustainability indicator (western half of the Basin) and chronic lowering of groundwater levels sustainability indicator (eastern half of the Basin) (Table 4.1-01)." p. 116

While groundwater levels are important indicator of the general condition of the groundwater basin, such metrics are not a substitute for metrics that are specifically aimed at informing management of the Mound Basin for the purpose of protecting instream beneficial associated with GDE within Mound Basin, including the lower Santa Clara River and the Santa Clara River Estuary. Specifically, these criteria do not address whether there may be significant stream flow depletion or lowered water surface elevation (from a biological perspective) caused by groundwater pumping within the Mound Basin. *See* general comment above regarding "Minimum Thresholds" regarding GDE.

**4.5.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]**

> "The minimum thresholds for the reduction of groundwater storage sustainability indicator allow groundwater levels to decline below

historical low levels in the eastern half of the Basin. Deeper groundwater levels could potentially increase underflow into the Mound Basin from the Oxnard and/or Santa Paula Basins (or decrease underflow to the Oxnard Basin), which could potentially contribute to undesirable results in those Basins. However, as noted above and in Section 4.4.2.1, the length of time that groundwater levels could remain below historical lows would be limited in order to prevent undesirable results for land subsidence in the western half of the Mound Basin; therefore, the potential effect on the adjacent basins is considered small." p. 118

This approach and analysis may be appropriate when considering groundwater supplies for out-of-stream beneficial uses for which there may be alternatives. However, it does not take into account the adverse effects of periodic reduction of groundwater on GDE, including the use by migrating, spawning or rearing steelhead. The effects of periodic groundwater reductions on out-of-stream beneficial uses (*e.g*., domestic or agricultural water supplies) may be addressed with alternative water sources. However, instream uses such as GDE are more vulnerable to periodic groundwater reductions, because there is generally no alternative water source to sustain the GDE, and even a short-term depletion or limitation of stream flow or water surface elevation can be lethal to aquatic species.

**4.5.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users [§354.28(b)(4)]**

Page 119

> "The effects on beneficial users and land uses in the Basin are the same as analyzed for the land subsidence sustainability indicator (western half of Basin) and chronic lowering of groundwater levels sustainability indicator (eastern half of Basin) and are incorporated herein by reference to Sections 4.4.2.4 and 4.8.2.4." p. 119

*See* the comments above regarding "Criteria Used to Define Undesirable Results" and Relationship Between Minimum Thresholds and Sustainability Indicators".

**4.5.2.5 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]**

Page 119

"MBGSA is unaware of any federal, state, or local standards for reduction of groundwater storage." p. 119

As noted above, while there are no numeric standards, this statement does not appear to recognize the standards that that are established by SGMA, particularly regarding GDE.

**4.5.2.6 Measurement of Minimum Thresholds [§354.28(b)(6)]**

Page 119

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

**4.5.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g)]**

Page 120

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

**4.5.3.1 Description of Measurable Objectives**

Page 120

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

**Western Half of Basin**

*See* general comment above regarding "Minimum Thresholds" regarding GDE.

**Eastern Half of Basin**

*See* general comment above regarding "Minimum Thresholds" regarding GDE.

**4.6 Seawater Intrusion**

Pages 120-121

*See* comment above regarding the assertion that "No data gaps or significant uncertainties were identified."

**4.6.1 Undesirable Results [§354.26]**

Pages 122-124

*See* comment above regarding the assertion that "No data gaps or significant uncertainties were identified."

**Process and Criteria for Defining Undesirable Results [§354.26(a)]**

Page 122

*See* comments above regarding the interest of state and federal natural resource regulatory agencies such as NMFS, U.S. Fish and Wildlife Service, and the California

Department of Fish and Wildlife, and the California Department of Parks and Recreation (which owns a portion of the Santa Clara River Estuary wetlands).

**Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]**

Page 122

As noted previously, the Draft GSP should be revised to explicitly acknowledge the instream beneficial uses supported by the groundwater basin, including the GDE associated with the lower Santa Clara River and Santa Clara River Estuary. *See* comment above regarding "Process and Criteria for Defining Undesirable Results".

## Criteria Used to Define Undesirable Results [§354.26(b)(2)]

Pages 123-124

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

## 4.6.2 Minimum Thresholds [§354.28]

### 4.6.2.1 Information and Criteria to Define Minimum Thresholds [§354.28(a), (b)(1),(c)(3)(A),(c)(3)(B), and (e)]

Page 124-125

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

### 4.6.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]

Pages 125-126

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

### 4.6.2.3 Minimum Thresholds in Relation to Adjacent Basins [§354.28(b)(3)]

Page 126

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results", "Relationship Between Minimum Thresholds and Sustainability Indicators", the UWCD Vern Freeman Diversion.

#### 4.6.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users [§354.28(b)(4)]

Pages 126-127

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

#### 4.6.2.5 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]

Page 127

> "MBGSA is unaware of any federal, state, or local standards for seawater intrusion other than the WQOs included in the RWQCB-LA Basin Plan (RWQCB-LA, 2019). The minimum threshold for seawater intrusion is equal to the RWQCB Basin Plan WQO for chloride." p. 127

This statement does not appear to recognize the broad standards that that are established by SGMA.

#### 4.6.2.6 Measurement of Minimum Thresholds [§354.28(b)(6)]

Page 127

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

#### 4.6.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g)]

Page 128

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

### 4.7 Degraded Water Quality

Pages 128-136

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

#### 4.7.1 Undesirable Results [§354.26]

Page 130

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

**Process and Criteria for Defining Undesirable Results [§354.26(a)]**

Page 130

*See* comments above regarding the interest of state and federal natural resource regulatory agencies such as NMFS, U.S. Fish and Wildlife Service, and the California Department of Fish and Wildlife, and the California Department of Parks and Recreation (which owns a portion of the Santa Clara River Estuary wetlands).

**Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]**

Page 130

As noted previously, the Draft GSP should be revised to explicitly acknowledge the instream beneficial uses supported by the groundwater basin, including the GDE associated with the lower Santa Clara River and Santa Clara River Estuary. *See* comment above regarding "Process and Criteria for Defining Undesirable Results."

**Cause of Groundwater Conditions That Could Lead to Undesirable Results [§354.26(b)(**

Page 131

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

**Criteria Used to Define Undesirable Results [§354.26(b)(2)]**

Page 131

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

**4.7.2 Minimum Thresholds [§354.28]**

Page 131

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

#### 4.7.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]

Page 133

*See* the comments above regarding “Minimum Thresholds”, “Criteria Used to Define Undesirable Results” and “Relationship Between Minimum Thresholds and Sustainability Indicators.”

#### 4.7.2.3 Minimum Thresholds in Relation to Adjacent Basins [§354.28(b)(3)]

Page 134

*See* the comments above regarding “Minimum Thresholds”, “Criteria Used to Define Undesirable Results” and “Relationship Between Minimum Thresholds and Sustainability Indicators.”

#### 4.7.2.5 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]

Page 135

As noted above, while there is are no numeric standard, this statement does not appear to recognize the standards that that are established by SGMA, particularly regarding GDE.

### 4.7.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g)]

Page 136

*See* the comments above regarding “Minimum Thresholds”, “Criteria Used to Define Undesirable Results” and “Relationship Between Minimum Thresholds and Sustainability Indicators.”

#### 4.7.3.1 Interim Milestones [§354.30(e)]

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*See* the comments above regarding “Minimum Thresholds”, “Criteria Used to Define Undesirable Results” and “Relationship Between Minimum Thresholds and Sustainability Indicators.”

## 4.8 Land Subsidence

Page 137-148

As noted above, it is not clear how, or if, the land subsidence proxy for minimum thresholds is appropriate for within-stream beneficial uses associated by GDE supported by interconnected waters. *See* also, general comment above regarding Minimum Thresholds.

**4.9 Depletions of Interconnected Surface Water**

Page 148

The Draft GSP asserts that:

> "Depletions of interconnected surface water is not an applicable indicator of groundwater sustainability in the Mound Basin and, therefore, no SMC [Sustainable Management Criteria] are set. Section 3.2.6 Interconnected Surface Water Systems provides the evidence for the inapplicability of this sustainability indicator.| p. 148

As noted in the comments above, this statement and the conclusion associated with it are not supported by either the evidence or the analysis presented in the Draft GSP. Rather, the Draft GSP either ignores or mis-interprets the physical properties of the Mound Basin, and applies an inappropriate standard for the evaluation of potential effects of groundwater extraction from the Mound Basin on GDE within the Mound Basin, including, but not limited to the Area 11 (i.e., the lower Santa Clara River and Santa Clara River Estuary). Further, the Draft GSP fails to acknowledge or take into account the effects of the operation of the UWCD Vern Freeman Diversion on the lower Santa Clara River, which diverts, on average, over 62,000 acre-feet per year (AFY) from the main stem of the Santa Clara River (NMFS 2018). This diversion operation affects recharge to all of the lower Santa Clara River groundwater basins, not just the Fox Canyon Basin, including the shallow alluvial aquifer and the other deeper aquifers in within the Mound Basin.

**4.10 Measurable Objectives and Interim Milestones for Additional Plan Elements [§354.30(f)]**

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> "No measurable objectives were developed for the additional plan elements included in the GSP." p. 148

See the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators"

**5.0 Monitoring Networks [Article 5, SubArticle 4]**

Pages 149-177

The Draft GSP notes:

> "Surface flows in the Santa Clara River are measured daily by the VCWPD [Ventura County Watershed Protection District] at flow-gaging station '723 - Santa Clara River at Victoria Ave' located outside of the Basin. Data from this station are available online and can be downloaded

annually to update this surface water component of the Mound Basin water budget (VCWPD, 2021). MBGSA intends to continue using data from these existing sources as input to United's model, which will in turn be used periodically to quantify changes in water-budget components. At present, this GSP does not contemplate development of a new monitoring network or modification of existing monitoring networks to obtain data regarding groundwater pumping, imported water, or recharge quantities because it is MBGSA's opinion that these water budget components are currently adequate for sustainable management of the Basin." p. 53

However, the Draft GSP earlier (p. 67) acknowledges that gauge 723 is poorly calibrated to measure low flows in the Santa Clara River. These lower flows, while of less importance from traditional water supply perspective, do provide important support for GDE such as those associated with the lower Santa Clara River and the Santa Clara River Estuary within the Mound Basin.

As noted above, the monitoring proposed is aimed at addressing the limited Sustainable Management Criteria. There is nothing identified in the monitoring program that addresses the potential effects of groundwater extractions on GDE, including the lower Santa Clara River channel and the Santa Clara River Estuary. Shallow groundwater wells within the alluvial overlaying the Mound Basin would provide specific data on relationship between groundwater levels and surface flows. This appears to be a significant data gap that should be addressed by the installation of shallow groundwater wells (or piezometers) to better described these relationships.

**6.0 Projects and Management Actions [Article 5, SubArticle 5]**

Pages 178-191

The Draft GSP indicates that"

> "No management areas were established for this GSP".

This decision appears to be the result, in part, on not recognizing any interconnected surface water or GDE within the boundaries of the Mound Basin. However, as noted above, the Mound Basin does contain interconnected water and GDE.

In addition to monitoring the effects of groundwater (and related surface water diversions) within the Mound Basin, the Draft GSP should recognized other management activities that affect both water supply for out-of-stream beneficial uses and GDE, including, but not limited to, the lower Santa Clara River and the Santa Clara River Estuary.

The introduction and spread of the non-native, invasive giant reed *Arundo donax* has degraded both terrestrial and aquatic habitats within the Mound Basin, including GDE associated with lower Santa Clara River and Santa Clara River Estuary. In addition to displacing native riparian habitat important to a number of terrestrial and aquatic species, including steelhead, *Arundo donax* draws heavily on groundwater, and can reduce stream flow (particularly bae flows) due to the interconnected nature of surface flows within the Mound Basin (The Nature Conservancy 2019, Stover *et al.* 2018, Dudley and Cole 2018). As part of its over-all groundwater management project, therefore, the MGBSA should include an aggressive Arundo donax removal program, coordinated with adjacent landowners, including the California Department of Parks and Recreation and the Ventura County Watershed Protection District.

*See* the comments above regarding "Minimum Thresholds", "Criteria Used to Define Undesirable Results" and "Relationship Between Minimum Thresholds and Sustainability Indicators."

**7.0 GSP Implementation**

Pages 192-198

*See* comment above regarding "Projects and Management Actions".

**Appendix A to Draft Mound Basin GSP**

Area 11 – Lower Santa Clara River and Estuary

Pages 7-8

The description of the lower reaches of the Santa Clara River and Santa Clara River Estuary is based almost entirely on Grossinger, *et al* (2011), which was largely limited to a description of the vegetative characteristics of the wetlands of the Southern California Coast. That study, while providing valuable information on the type and distribution of various vegetative communities, does not provide comparable information on aquatic species associated with the Santa Clara River or its Estuary. The habitats covered here are principally riparian and terrestrial, omitting coverage of various types of aquatic habitats. Also, the characterization did not reference the more focused historical investigation prepared by Beller *et al*. (2011), which provided additional information on the wetland resources of the lower Santa Clara River and Santa Clara River Estuary, though it also did not provide significant information on fish, wildlife, and other species associated with the GDEs within the Mount Basin.

As a result, the characterization of the habitats and species associated with the lower Santa Clara River and Santa Clara River Estuary is incomplete and misleading. For example, while the pre-historic size and complexity of the Santa Clara River Estuary has been substantially reduced significant habitats and habitat functions remain. These have been described in various publications that were not cited, and apparently not consulted, in preparing the draft GSP for the Mound Basin. For an overview of the species that currently utilize the lower Santa Clara River and Santa Clara River Estuary, *see* Stillwater Sciences (2011a) Focal Species Analysis and Habitat Characterization for the Lower Santa Clara River and Major Tributaries. Additional habitat and species information on the Santa Clara River Estuary can be can be found in Stillwater Sciences (2011b) Geomorphic Assessment of the Santa Clara River Watershed: Synthesis of the Lower and Upper Watershed Studies and CBEC (2015), Santa Clara River Estuary Habitat Restoration and Enhancement and Feasibility Study: Existing Conditions Technical Report, and Kelley (2004), Information synthesis and priorities regarding steelhead (*Oncorhynchus mykiss)* on the Santa Clara River." p. 148

**Figure 5. Lower Santa Clara River – Looking northwest from Harbor Boulevard 11-4-04**

The Santa Clara Estuary is known to support rearing juvenile steelhead (Kelley 2008). Steelhead that rear with in estuary have the potential for accelerated growth because of the abundance of food sources in the estuary; this accelerated growth prior to entering the ocean has been shown to increase ocean survival and growth (Bond 2006, Hayes, *et al*. 2008,).

The necessity of addressing the estuary is corroborated through studies that indicate the Santa Clara River Estuary is hydrologically connected to the upper aquifers within the Oxnard Subbasin (whether semi-perched, or simply shallow groundwater aquifers). According to a water balance assessment conducted by Stillwater Sciences (2011a, 2011b) for the fall/winter period of 2010, "groundwater was estimated to contribute approximately 15% of the inflow volume . . ." For the summer/spring 2010 period, "the groundwater contribution was estimated at 10 percent . . .". The Stillwater study also indicates that in the "Santa Clara River reach upstream of the estuary, groundwater provides the dry summer baseflow, if it exists, and is a quarter of the winter flow, based on the 2010 water year assessment." (TNC 2017, pp. 3-4).

The current conditions described in the TNS study and reflected in the Draft GSP do not represent the unimpaired groundwater elevations or surface flow conditions with the boundaries of the Mound Basin. Groundwater (whether semi-perched, or simply shallow groundwater aquifers) can also contribute to surface flows, influencing in the timing, duration, and magnitude of surface flows, particularly base flows. Groundwater that only seasonally supports surface flows can also contribute to the life-cycle of migratory fishes, such as steelhead, that can make use of intermittent flows for both migration and rearing.

**Figure 6. Santa Clara River Estuary – Looking southwest from Harbor Boulevard 8-21-21**

The Draft GSP also relies heavily on the Nature Conservancy's guidance for GDE analysis (TNC 2018, 2019, 2020)   According to this guidance, GDE are defined on their dependence on groundwater for all or a portion of their water needs. This method involves mapping vegetation that can tap groundwater through their root systems, assessing where the depth of groundwater is within the rooting depth of that vegetation, and mapping the extent of surface water that is interconnected with groundwater. The method used by The Nature Conservancy in identifying GDE is based on statewide data on "vegetation known to use groundwater", and therefore does not adequately reflect the uses made of groundwater by other biological resources, such as seasonal migration of fishes, or other organisms such as invertebrates that have differing life-cycle than plants (TNC 2018, 2019, 2020). While changes to riparian or other aquatic vegetation is an important component in assessing the ecological health aquatic habitats (Capelli and Stanley 1984, Faber *et al*. 1989), as it is used in the Draft GSP, it essentially as a substitute for other metrics, *e.g.,* such as measured effects on surface flows, or depth or extent of pool habitat (including estuarine habitat) in response to artificial depletion of groundwater levels.

In addition to supplying water to the root zone of plants, groundwater can also contribute to surface flows, influencing the timing, duration, and magnitude of surface flows, particularly base flows. These baseflows provide essential support to aquatic invertebrates, avian fauna, and fish species, including native resident and anadromous fishes.[4] Groundwater that only seasonally supports surface flows can still contribute to the life-cycle of migratory fishes, such as steelhead, and other native aquatic species. We would note that the pattern of alternating perennial and intermittent/or ephemeral surface flows are known as an "interrupted" surface flow regime, and is common in southern California watersheds, particularly where groundwater play a role in maintaining surface flows. These surface flows are important for juvenile *O. mykiss* attempting to emigrate out of the Santa Clara River watershed. Interrupting the timing, magnitude, and duration of these flows as a result of groundwater extraction can be deleterious to juvenile *O. mykiss*, and this potential effect should be addressed in the revised Draft Memorandum.


**Figure 7. Santa Clara River Steelhead Smolts – From Santa Clara River Estuary 9-17-10**

[4] The Santa Clara River also supports the anadromous Pacific lamprey (*Entosphenus tridentatus*) which currently falls under the jurisdiction of the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife (Reid 2015, Booth 2015, 2017).

It should also be recognized that groundwater levels can be and often are exacerbated by groundwater extractions, as well as droughts. One of the primary purposes of SGMA is to identify these anthropogenic effects on groundwater levels (and the related GDE) so that groundwater resources may be managed in a way to protect all beneficial uses of groundwater, including fish and wildlife, such a southern California steelhead (as well as other native aquatic resources). Therefore, when revising the Draft GSP, every effort should be made to ensure that (1) all anthropogenic effects on the amount and extent of groundwater are properly and accurately cataloged, (2) practices are defined to remedy the cataloged effects on GDE, and (3) the practices are instituted and the effects adaptively managed to ensure GDE receive sufficient protection in accordance with the SGMA.

In addition to designating critical habitat for the federally listed endangered Southern California Steelhead DPS, NMFS identified intrinsic potential habitat in the watershed for this species as part of its recovery planning process (*See* Figure 3). As noted above, this habitat includes migration corridors to spawning and rearing habitat. Within the Mound Basin, NMFS identified intrinsic potential habitat in lower Santa Clara River and Santa Clara River Estuary. The ability of these habitats to provide a migratory corridor to spawning rearing opportunities (including within the Santa Clara River Estuary) has been negatively affected by surface water diversions and groundwater extractions. Reducing the connectivity between the mainstem of the Santa Clara River and the Santa Clara River Estuary impairs the intrinsic potential of these designated critical habitats. Restoring and maintaining surface hydrologic connectivity for steelhead attempting to migrate to or emigrate out of these major tributaries to the middle and lower reaches of the Santa Clara River is an important objective of NMFS's Southern California Steelhead Recovery Plan.

Ensuring groundwater recharge (and control of groundwater extraction for out-of-stream uses) can be an important mechanism for protecting base flows that are critical for the rearing phase of juvenile steelhead (as well as other native aquatic resources). Maintaining groundwater levels can serve as a buffer against projected climate change effects on stream flow. For a recent assessment of the effects of climate change of mean and extreme river flows, and effects of over pumping of groundwater basins on stream flow, *see* Burke *et al.* (2021), Gudmundsson *et al*. (2021), Jasechko (2021).

While groundwater-influenced flows by themselves may not be sufficient to support perennial flows in the lower Santa Clara River, or maintain appropriate water levels in the Santa Clara River Estuary, they can nevertheless support seasonal use of this reach of the Santa Clara River for migratory or rearing purposes, depending on the amount and timing of annual rainfall and runoff and the groundwater elevation. Recognition of these GDE should be explicit, and the GSP should ensure that these GDE are not unreasonably impacted by groundwater extraction from the Mound Basin.

The statements that "neither geologic units [*i.e.*, shallow alluvial aquifer and stream terrace deposits] has any know groundwater extractions within the Mound Basin" and "there is not significant evidence for interactions between the groundwater in the principal aquifers and shallow groundwater" is not supported by the analysis or the applicable regulations. As noted above, while there may be no regular withdrawals form the shallow alluvial aquifer, withdrawals from the deeper geologic units can, because of the fault discontinuities, create a hydraulic connection between aquifers and "aquitards". Lowering the hydraulic head in deep aquifers will induce a vertical downward movement of groundwater from the shallow aquifer, which in turn, is hydraulically connected to the Santa Clara River and the Santa Clara River Estuary.

The Draft GSP notes that:

> Given the possible, but likely limited, connection between Mound Basin shallow groundwater and the iGDEs, Area 11 is retained as a GDE pursuant to TNC's 'precautionary principle' (TNC 2018). However, given the lack of potential for significant impacts to the GDE by principle aquifer pumping, Area 11 will not be considered further in the development of sustainable management criteria for the principal aquifers. p. 8.

And adds:

> "However, the GSP will include a management action to monitor well permit applications for proposed uses of shallow groundwater in the vicinity of Area 11. If any shallow wells are proposed, MBGSA will require the applicant to evaluate impacts to the Area 11 GDEs pursuant to the California Environmental Quality Act prior to issuing a permit. Proposed uses that would have a significant impact to Area 11 GDEs would be required to mitigate those impacts as a condition of MBGSA permit approval" p. 8

These statements warrants several comments:

First, the TNS "precautionary principle" is focused, as is the general approach, on GDE that are defined largely by vegetative characteristics, and does not provide specific guidance for other types of GDE such as aquatic habitats that are dependent in or in part on groundwater inputs, such as the lower Santa Clara River and the Santa Clara Estuary;

Second, the conclusion that there is little potential for significant impacts to the Area 11 GDE (or the other 10 GDE within the Mound Basin) is not supported by the evidence presented in the Draft GSP, and in fact is inconsistent with the evidence (see, in particular, the longitudinal cross-section A-A' in Figure 3.1-05 of the Draft GSP); and

Third, the related proposal to limit consideration of impacts only to wells drawing directly from the shallow alluvial aquifer overlying the Mound Basin is not consistent with the requirements of SGMA. The proposal to rely on the procedures of the California Environmental Quality Act (CEQA) to identify and mitigate any impacts is also inappropriate. CEQA is not a substitute for SGMA (Belin 2018, Rohde *et al*. 2018, California Department of Fish and Wildlife 2019)

GSPs are required to: a) identify and consider impacts to GDE; b) consider all beneficial uses and users of groundwater; c) identify and consider potential effects on all beneficial uses and users of groundwater; d), establish sustainable management criteria that avoid undesirable results, including depletion of interconnected surface waters that have a significant and unreasonable adverse impact on the beneficial uses of surface waters (including instream beneficial uses), e) describe monitoring networks that can identify adverse impacts to beneficial uses of interconnected surface waters; and f).account for groundwater extraction for all uses or sectors, including wetlands such as those associated with the lower Santa Clara River and Santa Clara River Estuary. (23 CCR, Sections 354.10 et. Seq.)

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