

<i>Myosurus apetalus</i>	Bristly Mousetail	Plants
<i>Myosurus minimus</i>	NA	Plants
<i>Myosurus sessilis</i>	Sessile Mousetail	Plants
<i>Myriophyllum aquaticum</i>	NA	Plants
<i>Myriophyllum hippuroides</i>	Western Water-milfoil	Plants
<i>Myriophyllum quitense</i>	Andean Water-milfoil	Plants
<i>Myriophyllum sibiricum</i>	Common Water-milfoil	Plants
<i>Myriophyllum verticillatum</i>	Whorled Water-milfoil	Plants
<i>Mysis diluviana</i>		Crustaceans
<i>Mystacides alafimbriatus</i>	A Caddisfly	Insects & other
<i>Mystacides interjecta</i>		Insects & other
<i>Mystacides sepulchralis</i>	A Caddisfly	Insects & other
<i>Najas flexilis</i>	Slender Naiad	Plants
<i>Najas gracillima</i>	NA	Plants
<i>Najas guadalupensis guadalupensis</i>	Southern Naiad	Plants
<i>Namamyia plutonis</i>	A Caddisfly	Insects & other
<i>Namanereis hawaiiensis</i>		Insects & other
<i>Nanocladius anderseni</i>		Insects & other
<i>Nanonemoura wahkeena</i>		Insects & other
<i>Narpus angustus</i>		Insects & other
<i>Narpus arizonicus</i>		Insects & other
<i>Narpus concolor</i>		Insects & other
<i>Narthecium californicum</i>	California Bog Asphodel	Plants
<i>Nasturtium gambelii</i>	NA	Plants
<i>Natarsia miripes</i>		Insects & other
<i>Navarretia cotulifolia</i>	Cotula Navarretia	Plants
<i>Navarretia fossalis</i>	Spreading Navarretia	Plants
<i>Navarretia heterandra</i>	Tehama Navarretia	Plants
<i>Navarretia intertexta</i>	Needleleaf Navarretia	Plants
<i>Navarretia leucocephala bakeri</i>	Baker's Navarretia	Plants
<i>Navarretia leucocephala leucocephala</i>	White-flower Navarretia	Plants
<i>Navarretia leucocephala minima</i>	Least Navarretia	Plants
<i>Navarretia leucocephala pauciflora</i>	Few-flower Navarretia	Plants
<i>Navarretia leucocephala plieantha</i>	Many-flower Navarretia	Plants
<i>Navarretia myersii deminuta</i>	Small Pincushion Navarretia	Plants
<i>Navarretia myersii myersii</i>	Pincushion Navarretia	Plants
<i>Navarretia prostrata</i>	Prostrate Navarretia	Plants
<i>Neanthes limnicola</i>		Insects & other

<i>Nectopsyche dorsalis</i>	A Caddisfly	Insects & other
<i>Nectopsyche gracilis</i>	A Caddisfly	Insects & other
<i>Nectopsyche lahontanensis</i>	A Caddisfly	Insects & other
<i>Nectopsyche minuta</i>	A Caddisfly	Insects & other
<i>Nectopsyche stigmatica</i>		Insects & other
<i>Nehalennia irene</i>	Sedge Sprite	Insects & other
<i>Nemotaulius hostilis</i>		Insects & other
<i>Nemoura spiniloba</i>	Spiny Forestfly	Insects & other
<i>Neochoroterpes kossi</i>		Insects & other
<i>Neochthebius vandykei</i>		Insects & other
<i>Neoclypeodytes amybethae</i>		Insects & other
<i>Neoclypeodytes cinctellus</i>		Insects & other
<i>Neoclypeodytes fryii</i>		Insects & other
<i>Neoclypeodytes haroldi</i>		Insects & other
<i>Neoclypeodytes leachi</i>		Insects & other
<i>Neoclypeodytes ornatellus</i>		Insects & other
<i>Neoclypeodytes pictodes</i>		Insects & other
<i>Neoclypeodytes plicipennis</i>		Insects & other
<i>Neoclypeodytes quadripustulatus</i>		Insects & other
<i>Neoclypeodytes roughleyi</i>		Insects & other
<i>Neocorixa snowi</i>		Insects & other
<i>Neohermes californicus</i>		Insects & other
<i>Neohermes filicornis</i>		Insects & other
<i>Neomideopsis siuslawensis</i>		Insects & other
<i>Neomysis kadiakensis</i>	A Mysid Shrimp	Crustaceans
<i>Neomysis mercedis</i>		Crustaceans
<i>Neophylax occidentis</i>	A Caddisfly	Insects & other
<i>Neophylax rickeri</i>	A Caddisfly	Insects & other
<i>Neophylax splendens</i>	A Caddisfly	Insects & other
<i>Neoplea striola</i>		Insects & other
<i>Neoporus arizonicus</i>		Insects & other
<i>Neoporus dimidiatus</i>		Insects & other
<i>Neoporus undulatus</i>		Insects & other
<i>Neostapfia colusana</i>	Colusa Grass	Plants
<i>Neothremma alicia</i>	A Caddisfly	Insects & other
<i>Neothremma andersoni</i>		Insects & other
<i>Neothremma didactyla</i>		Insects & other
<i>Neothremma genella</i>	Golden-horned Caddisfly	Insects & other
<i>Neothremma macronata</i>	A Caddisfly	Insects & other
<i>Neothremma siskiyou</i>	Siskiyou Caddisfly	Insects & other

<i>Neotrichia blinni</i>		Insects & other
<i>Neotrichia halia</i>	A Caddisfly	Insects & other
<i>Neotrichia okopa</i>	A Caddisfly	Insects & other
<i>Neotrichia olorino</i>		Insects & other
<i>Neotrichia osmena</i>		Insects & other
<i>Neotrichia sandya</i>		Insects & other
<i>Neotrichia sonora</i>		Insects & other
<i>Neovison vison</i>	American Mink	Mammals
<i>Nereis succinea</i>		Insects & other
<i>Nerophilus californicus</i>	A Caddisfly	Insects & other
<i>Nerthra manni</i>		Insects & other
<i>Nerthra martini</i>		Insects & other
<i>Nerthra mexicana</i>		Insects & other
<i>Nilotanytus fimbriatus</i>		Insects & other
<i>Nilothauma babi</i>		Insects & other
<i>Nilothauma mirabile</i>		Insects & other
<i>Nitrophila mohavensis</i>	Amargosa Niterwort	Plants
<i>Nixe kennedyi</i>	A Mayfly	Insects & other
<i>Nothotrichia shasta</i>		Insects & other
<i>Notonecta hoffmani</i>		Insects & other
<i>Notonecta indica</i>		Insects & other
<i>Notonecta irrorata</i>		Insects & other
<i>Notonecta kirbyi</i>		Insects & other
<i>Notonecta lobata</i>		Insects & other
<i>Notonecta repanda</i>		Insects & other
<i>Notonecta shooteri</i>		Insects & other
<i>Notonecta spinosa</i>		Insects & other
<i>Notonecta undulata</i>		Insects & other
<i>Notonecta unifasciata</i>		Insects & other
<i>Numenius americanus</i>	Long-billed Curlew	Birds
<i>Numenius phaeopus</i>	Whimbrel	Birds
<i>Nuphar polysepala</i>		Plants
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	Birds
<i>Nyctiophylax moestus</i>		Insects & other
<i>Nymphaea mexicana</i>	NA	Plants
<i>Ochlerotatus aboriginis</i>		Insects & other
<i>Ochlerotatus aloponotum</i>		Insects & other
<i>Ochlerotatus bicristatus</i>		Insects & other
<i>Ochlerotatus burgeri</i>		Insects & other
<i>Ochlerotatus campestris</i>		Insects & other
<i>Ochlerotatus cataphylla</i>		Insects & other

Ochlerotatus clivis		Insects & other
Ochlerotatus communis		Insects & other
Ochlerotatus deserticola		Insects & other
Ochlerotatus dorsalis		Insects & other
Ochlerotatus epactius		Insects & other
Ochlerotatus excrucians		Insects & other
Ochlerotatus fitchii		Insects & other
Ochlerotatus flavescens		Insects & other
Ochlerotatus hendersoni		Insects & other
Ochlerotatus hexodontus		Insects & other
Ochlerotatus impiger		Insects & other
Ochlerotatus implicatus		Insects & other
Ochlerotatus increpitus		Insects & other
Ochlerotatus intrudens		Insects & other
Ochlerotatus melanimon		Insects & other
Ochlerotatus monticola		Insects & other
Ochlerotatus muelleri		Insects & other
Ochlerotatus nevadensis		Insects & other
Ochlerotatus nigromaculatus		Insects & other
Ochlerotatus niphadopsis		Insects & other
Ochlerotatus papago		Insects & other
Ochlerotatus provocans		Insects & other
Ochlerotatus pullatus		Insects & other
Ochlerotatus purpureipes		Insects & other
Ochlerotatus schizopinax		Insects & other
Ochlerotatus sierrensis		Insects & other
Ochlerotatus sollicitans		Insects & other
Ochlerotatus squamiger		Insects & other
Ochlerotatus sticticus		Insects & other
Ochlerotatus taeniorhynchus		Insects & other
Ochlerotatus tahoensis		Insects & other
Ochlerotatus thelcter		Insects & other
Ochlerotatus trivittatus		Insects & other
Ochlerotatus varipalpus		Insects & other
Ochlerotatus ventrovittus		Insects & other
Ochlerotatus washinoi		Insects & other
Ochrotrichia alexanderi	A Caddisfly	Insects & other
Ochrotrichia alsea	Alsea Ochrotrichian Micro Caddisfly	Insects & other
Ochrotrichia argentea		Insects & other
Ochrotrichia arizonica	A Caddisfly	Insects & other
Ochrotrichia buccata	A Caddisfly	Insects & other

<i>Ochrotrichia burdicki</i>	A Caddisfly	Insects & other
<i>Ochrotrichia dactylophora</i>		Insects & other
<i>Ochrotrichia hadria</i>	A Caddisfly	Insects & other
<i>Ochrotrichia honeyi</i>	A Caddisfly	Insects & other
<i>Ochrotrichia ildria</i>		Insects & other
<i>Ochrotrichia logana</i>	A Caddisfly	Insects & other
<i>Ochrotrichia lometa</i>	A Caddisfly	Insects & other
<i>Ochrotrichia lucia</i>	A Caddisfly	Insects & other
<i>Ochrotrichia mono</i>	A Caddisfly	Insects & other
<i>Ochrotrichia nacora</i>	A Caddisfly	Insects & other
<i>Ochrotrichia okanoganensis</i>		Insects & other
<i>Ochrotrichia oregona</i>		Insects & other
<i>Ochrotrichia phenosa</i>	Deschutes Ochrotrichian Micro Caddisfly	Insects & other
<i>Ochrotrichia quadrispina</i>	A Caddisfly	Insects & other
<i>Ochrotrichia rothi</i>		Insects & other
<i>Ochrotrichia salaris</i>	A Caddisfly	Insects & other
<i>Ochrotrichia spinulata</i>		Insects & other
<i>Ochrotrichia stylata</i>	A Caddisfly	Insects & other
<i>Ochrotrichia tarsalis</i>		Insects & other
<i>Ochrotrichia tenuata</i>	A Caddisfly	Insects & other
<i>Ochrotrichia trapoiza</i>	A Caddisfly	Insects & other
<i>Ochrotrichia vertreesi</i>	Vertrees's Ochrotrichian Micro Caddisfly	Insects & other
<i>Ochterus barberi</i>		Insects & other
<i>Ochterus perbosci</i>		Insects & other
<i>Ochterus rotundus</i>		Insects & other
<i>Ochthebius apache</i>		Insects & other
<i>Ochthebius arenicolus</i>		Insects & other
<i>Ochthebius arizonicus</i>		Insects & other
<i>Ochthebius aztecus</i>		Insects & other
<i>Ochthebius biinicus</i>		Insects & other
<i>Ochthebius bisinuatus</i>		Insects & other
<i>Ochthebius borealis</i>		Insects & other
<i>Ochthebius brevipennis</i>		Insects & other
<i>Ochthebius californicus</i>		Insects & other
<i>Ochthebius costipennis</i>		Insects & other
<i>Ochthebius crassalus</i>	Wing-shoulder Minute Moss Beetle	Insects & other
<i>Ochthebius crenatus</i>		Insects & other
<i>Ochthebius cribricollis</i>		Insects & other
<i>Ochthebius discretus</i>		Insects & other
<i>Ochthebius gruwelli</i>		Insects & other
<i>Ochthebius interruptus</i>		Insects & other

<i>Ochthebius lecontei</i>		Insects & other
<i>Ochthebius leechi</i>		Insects & other
<i>Ochthebius lineatus</i>		Insects & other
<i>Ochthebius madrensis</i>		Insects & other
<i>Ochthebius marinus</i>		Insects & other
<i>Ochthebius martini</i>		Insects & other
<i>Ochthebius mimicus</i>		Insects & other
<i>Ochthebius orbus</i>		Insects & other
<i>Ochthebius pacificus</i>		Insects & other
<i>Ochthebius puncticollis</i>		Insects & other
<i>Ochthebius reticulatus</i>	Wilbur Springs Minute Moss Beetle	Insects & other
<i>Ochthebius rectus</i>		Insects & other
<i>Ochthebius rectusalis</i>		Insects & other
<i>Ochthebius richmondi</i>		Insects & other
<i>Ochthebius sculptoides</i>		Insects & other
<i>Ochthebius sculptus</i>		Insects & other
<i>Ochthebius sierrensis</i>		Insects & other
<i>Ochthebius similis</i>		Insects & other
<i>Ochthebius tubus</i>		Insects & other
<i>Ochthebius uniformis</i>		Insects & other
<i>Octogomphus specularis</i>	Grappletail	Insects & other
<i>Oecetis arizonica</i>		Insects & other
<i>Oecetis avara</i>	A Caddisfly	Insects & other
<i>Oecetis disjuncta</i>	A Caddisfly	Insects & other
<i>Oecetis inconspicua</i>	A Caddisfly	Insects & other
<i>Oecetis metlacensis</i>		Insects & other
<i>Oecetis ochracea</i>	A Caddisfly	Insects & other
<i>Oemopteryx leei</i>	A Stonefly	Insects & other
<i>Oemopteryx vanduzeei</i>	Alpine Willowfly	Insects & other
<i>Oenanthe sarmentosa</i>	Water-parsley	Plants
<i>Oenothera longissima</i>	Long-stem Evening-primrose	Plants
<i>Oligophlebodes minutus</i>		Insects & other
<i>Oligophlebodes mostbento</i>		Insects & other
<i>Oligophlebodes ruthae</i>		Insects & other
<i>Oligophlebodes sierra</i>	A Caddisfly	Insects & other
<i>Oligophlebodes sigma</i>		Insects & other
<i>Onconeura semifimbriata</i>		Insects & other
<i>Oncorhynchus clarki clarki</i>	Coastal cutthroat trout	Fishes
<i>Oncorhynchus clarki henshawi</i>	Lahontan cutthroat trout	Fishes
<i>Oncorhynchus clarki seleneris</i>	Paiute cutthroat trout	Fishes
<i>Oncorhynchus gorbuscha</i>	Pink salmon	Fishes

Oncorhynchus keta	Chum salmon	Fishes
Oncorhynchus kisutch - CCC	Central Coast coho salmon	Fishes
Oncorhynchus kisutch - SONCC	Southern Oregon Northern California coast coho salmon	Fishes
Oncorhynchus mykiss - CCC winter	Central California coast winter steelhead	Fishes
Oncorhynchus mykiss - CV	Central Valley steelhead	Fishes
Oncorhynchus mykiss - KMP summer	Klamath Mountains Province summer steelhead	Fishes
Oncorhynchus mykiss - KMP winter	Klamath Mountains Province winter steelhead	Fishes
Oncorhynchus mykiss - NC summer	Northern California coast summer steelhead	Fishes
Oncorhynchus mykiss - NC winter	Northern California coast winter steelhead	Fishes
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Fishes
Oncorhynchus mykiss - Southern CA	Southern California steelhead	Fishes
Oncorhynchus mykiss aguabonita	California golden trout	Fishes
Oncorhynchus mykiss aquilarum	Eagle Lake rainbow trout	Fishes
Oncorhynchus mykiss gilberti	Kern River rainbow trout	Fishes
Oncorhynchus mykiss irideus	Coastal rainbow trout	Fishes
Oncorhynchus mykiss ssp. 1	Goose Lake redband trout	Fishes
Oncorhynchus mykiss stonei	McCloud River redband trout	Fishes
Oncorhynchus mykiss whitei	Little Kern golden trout	Fishes
Oncorhynchus tshawytscha - CCC fall	California Coast fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - CV fall	Central Valley fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - CV late fall	Central Valley late fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - CV spring	Central Valley spring Chinook salmon	Fishes
Oncorhynchus tshawytscha - CV winter	Central Valley winter Chinook salmon	Fishes
Oncorhynchus tshawytscha - SONCC fall	Southern Oregon Northern California coast fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - UKT fall	Upper Klamath-Trinity fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - UKT spring	Upper Klamath-Trinity spring Chinook salmon	Fishes
Ondatra zibethicus	Common Muskrat	Mammals

<i>Onocosmoecus sequoiae</i>	A Caddisfly	Insects & other
<i>Onocosmoecus unicolor</i>	A Caddisfly	Insects & other
<i>Ophiogomphus arizonicus</i>		Insects & other
<i>Ophiogomphus bison</i>	Bison Snaketail	Insects & other
<i>Ophiogomphus morrisoni</i>	Great Basin Snaketail	Insects & other
<i>Ophiogomphus occidentis</i>	Sinuuous Snaketail	Insects & other
<i>Ophiogomphus severus</i>	Pale Snaketail	Insects & other
<i>Oplonaeschna armata</i>		Insects & other
<i>Optioservus canus</i>	Pinnacles Optioservus Riffle Beetle	Insects & other
<i>Optioservus divergens</i>		Insects & other
<i>Optioservus heteroclitus</i>		Insects & other
<i>Optioservus quadrimaculatus</i>		Insects & other
<i>Optioservus seriatus</i>		Insects & other
<i>Oravelia pege</i>	Dry Creek Cliff Strider Bug	Insects & other
<i>Orconectes neglectus neglectus</i>		Crustaceans
<i>Orcuttia californica</i>	California Orcutt Grass	Plants
<i>Orcuttia inaequalis</i>	San Joaquin Valley Orcutt Grass	Plants
<i>Orcuttia pilosa</i>	Hairy Orcutt Grass	Plants
<i>Orcuttia tenuis</i>	Slender Orcutt Grass	Plants
<i>Orcuttia viscida</i>	Sacramento Orcutt Grass	Plants
<i>Ordobrevia nubifera</i>		Insects & other
<i>Oregonasellus elliotti</i>		Crustaceans
<i>Oreodytes abbreviatus</i>		Insects & other
<i>Oreodytes angustior</i>		Insects & other
<i>Oreodytes congruus</i>		Insects & other
<i>Oreodytes crassulus</i>		Insects & other
<i>Oreodytes humboltensis</i>		Insects & other
<i>Oreodytes obesus cordillerensis</i>		Insects & other
<i>Oreodytes obesus obesus</i>		Insects & other
<i>Oreodytes picturatus</i>		Insects & other
<i>Oreodytes quadrimaculatus</i>		Insects & other
<i>Oreodytes rhyacophilus</i>		Insects & other
<i>Oreodytes scitulus bisulcatus</i>		Insects & other
<i>Oreodytes scitulus scitulus</i>		Insects & other
<i>Oreodytes sierrae</i>		Insects & other
<i>Oreodytes subrotundus</i>		Insects & other
<i>Oreoleptis torrenticola</i>		Insects & other
<i>Oreostemma alpigenum andersonii</i>	Anderson's Tundra Aster	Plants
<i>Oreostemma elatum</i>	Plumas Mountaintocrown	Plants
<i>Oreostemma peirsonii</i>	Peirson's Aster	Plants

<i>Oreothlypis luciae</i>	Lucy's Warbler	Birds
<i>Orohermes crepusculus</i>		Insects & other
<i>Oroperla barbara</i>	Gilltail Springfly	Insects & other
<i>Orthemis discolor</i>		Insects & other
<i>Orthemis ferruginea</i>	Roseate Skimmer	Insects & other
<i>Orthilia secunda</i>	One-side Wintergreen	Plants
<i>Orthocladius appersoni</i>		Insects & other
<i>Orthocladius carlatus</i>		Insects & other
<i>Orthocladius dentifer</i>		Insects & other
<i>Orthocladius doreus</i>		Insects & other
<i>Orthocladius dubitatus</i>		Insects & other
<i>Orthocladius frigidus</i>		Insects & other
<i>Orthocladius hellenthali</i>		Insects & other
<i>Orthocladius lignicola</i>		Insects & other
<i>Orthocladius luteipes</i>		Insects & other
<i>Orthocladius mallochi</i>		Insects & other
<i>Orthocladius obumbratus</i>		Insects & other
<i>Orthocladius oliveri</i>		Insects & other
<i>Orthocladius rivicola</i>		Insects & other
<i>Orthocladius rubicundus</i>		Insects & other
<i>Orthocladius subletti</i>		Insects & other
<i>Orthodon microlepidotus</i>	Sacramento blackfish	Fishes
<i>Orthopodomyia kummi</i>		Insects & other
<i>Orthopodomyia signifera</i>		Insects & other
<i>Osobenus yakimae</i>	Yakima Springfly	Insects & other
<i>Ostrocera dimicki</i>		Insects & other
<i>Ostrocera foersteri</i>		Insects & other
<i>Oxyethira aculea</i>		Insects & other
<i>Oxyethira aeola</i>		Insects & other
<i>Oxyethira arizona</i>	A Caddisfly	Insects & other
<i>Oxyethira dualis</i>	A Caddisfly	Insects & other
<i>Oxyethira pallida</i>	A Caddisfly	Insects & other
<i>Oxypolis occidentalis</i>	Western Cowbane	Plants
<i>Oxyura jamaicensis</i>	Ruddy Duck	Birds
<i>Pachydiplax longipennis</i>	Blue Dasher	Insects & other
<i>Pacifastacus connectens</i>		Crustaceans
<i>Pacifastacus fortis</i>	Shasta Crayfish	Crustaceans
<i>Pacifastacus gambelii</i>	Pilose Crayfish	Crustaceans
<i>Pacifastacus leniusculus klamathensis</i>	Klamath Signal Crayfish	Crustaceans
<i>Pacifastacus leniusculus leniusculus</i>	Signal Crayfish	Crustaceans

<i>Pacifastacus leniusculus trowbridgii</i>	Columbia River Signal Crayfish	Crustaceans
<i>Pacifastacus nigrescens</i>	Sooty Crayfish	Crustaceans
<i>Palaeagapetus guppyi</i>		Insects & other
<i>Palaeagapetus nearcticus</i>	A Caddisfly	Insects & other
<i>Palaemnema domina</i>		Insects & other
<i>Palaemon macrodactylus</i>		Crustaceans
<i>Palmarixia buenoi</i>		Insects & other
<i>Paltothermis lineatipes</i>	Red Rock Skimmer	Insects & other
<i>Pandion haliaetus</i>	Osprey	Birds
<i>Panicum acuminatum acuminatum</i>		Plants
<i>Panicum acuminatum fasciculatum</i>		Plants
<i>Panicum acuminatum lindheimeri</i>		Plants
<i>Panicum acuminatum thermale</i>		Plants
<i>Panicum dichotomiflorum</i>	NA	Plants
<i>Pantala flavescens</i>	Wandering Glider	Insects & other
<i>Pantala hymenaea</i>	Spot-winged Glider	Insects & other
<i>Paracapnia baumanni</i>	A Stonefly	Insects & other
<i>Paracapnia boris</i>	A Stonefly	Insects & other
<i>Paracapnia disala</i>	Dirty Snowfly	Insects & other
<i>Paracapnia ensicala</i>		Insects & other
<i>Paracapnia humboldta</i>	A Stonefly	Insects & other
<i>Parachaetocladius imberbus</i>		Insects & other
<i>Parachironomus abortivus</i>		Insects & other
<i>Parachironomus chaetaolus</i>		Insects & other
<i>Parachironomus directus</i>		Insects & other
<i>Parachironomus frequens</i>		Insects & other
<i>Parachironomus hazelriggi</i>		Insects & other
<i>Parachironomus hirtalatus</i>		Insects & other
<i>Parachironomus tenuicaudatus</i>		Insects & other
<i>Paracladius conversus</i>		Insects & other
<i>Paracladopelma alpheus</i>		Insects & other
<i>Paracloeodes minutus</i>	A Small Minnow Mayfly	Insects & other
<i>Paracoenia calida</i>	Wilber Springs Shore Fly	Insects & other
<i>Paracymus communis</i>		Insects & other
<i>Paracymus confusus</i>		Insects & other
<i>Paracymus elegans</i>		Insects & other
<i>Paracymus ellipsis</i>		Insects & other
<i>Paracymus restrictus</i>		Insects & other

Paracymus subcupreus		Insects & other
Paracymus tarsalis		Insects & other
Parakiefferiella subaterrima		Insects & other
Paralauterborniella nigrohalteris		Insects & other
Paraleptophlebia altana	A Mayfly	Insects & other
Paraleptophlebia aquilina		Insects & other
Paraleptophlebia associata	A Mayfly	Insects & other
Paraleptophlebia bicornuta		Insects & other
Paraleptophlebia brunneipennis		Insects & other
Paraleptophlebia cachea	A Mayfly	Insects & other
Paraleptophlebia californica	A Mayfly	Insects & other
Paraleptophlebia clara	A Mayfly	Insects & other
Paraleptophlebia debilis	A Mayfly	Insects & other
Paraleptophlebia falcula		Insects & other
Paraleptophlebia gregalis	A Mayfly	Insects & other
Paraleptophlebia helena	A Mayfly	Insects & other
Paraleptophlebia heteronea	A Mayfly	Insects & other
Paraleptophlebia memorialis	A Mayfly	Insects & other
Paraleptophlebia packii	A Mayfly	Insects & other
Paraleptophlebia placheri	A Mayfly	Insects & other
Paraleptophlebia quisquilia	A Mayfly	Insects & other
Paraleptophlebia rufivenosa	A Mayfly	Insects & other
Paraleptophlebia sculleni		Insects & other
Paraleptophlebia temporalis	A Mayfly	Insects & other
Paraleptophlebia vaciva	A Mayfly	Insects & other
Paraleptophlebia zayante	A Mayfly	Insects & other
Paraleuctra divisa	California Needlefly	Insects & other
Paraleuctra forcipata	Bullshorn Needlefly	Insects & other
Paraleuctra occidentalis	Western Needlefly	Insects & other
Paraleuctra projecta		Insects & other
Paraleuctra vershina	Summit Needlefly	Insects & other
Paramerina fragilis		Insects & other
Paramerina smithae		Insects & other
Parametriocnemus lundbeckii		Insects & other
Paraperla frontalis	Hyporheic Sallfly	Insects & other
Paraperla wilsoni	Chilliwack Sallfly	Insects & other
Paraphaenocladus exagitans		Insects & other
Paraphaenocladus innasus		Insects & other
Parapholis strigosa	NA	Plants
Parapsyche almota	A Caddisfly	Insects & other
Parapsyche elsis	A Caddisfly	Insects & other

Parapsyche extensa	King's Creek Parapsyche Caddisfly	Insects & other
Parapsyche spinata	A Caddisfly	Insects & other
Parapsyche turbinata	A Caddisfly	Insects & other
Parasimulium crosskeyi		Insects & other
Parasimulium furcatum		Insects & other
Parasimulium species		Insects & other
Parasimulium stonei		Insects & other
Paratanytarsus grimmii		Insects & other
Paratendipes albimanus		Insects & other
Paratendipes basidens		Insects & other
Paratendipes fuscitibia		Insects & other
Paratendipes subaequalis		Insects & other
Paratendipes thermophilus		Insects & other
Paratrichocladius rufiventris		Insects & other
Parnassia cirrata cirrata	Fringed Grass-of-Parnassus	Plants
Parnassia cirrata intermedia		Plants
Parnassia fimbriata fimbriata	Fringed Grass-of-Parnassus	Plants
Parnassia palustris	Marsh Grass-of-Parnassus	Plants
Parnassia parviflora	Small-flower Grass-of-parnassus	Plants
Parochlus kiefferi		Insects & other
Parthina linea	A Caddisfly	Insects & other
Parthina vierra	A Caddisfly	Insects & other
Paspalum distichum	Joint Paspalum	Plants
Patapius spinosus		Insects & other
Pectiantia ovalis	NA	Plants
Pectiantia pentandra		Plants
Pedicularis attollens	NA	Plants
Pedicularis groenlandica	NA	Plants
Pedomoecus sierra	A Caddisfly	Insects & other
Pelecanus erythrorhynchos	American White Pelican	Birds
Pelocoris biimpressus		Insects & other
Peltodytes callosus		Insects & other
Peltodytes dispersus		Insects & other
Peltodytes mexicanus		Insects & other
Peltodytes simplex		Insects & other
Pentacora saratogae		Insects & other
Pentacora signoreti		Insects & other
Pentacora sphacelata		Insects & other
Pentaneura inconspicua		Insects & other
Pentaneura inyoensis		Insects & other
Perideridia bacigalupii	Bacigalupi's Perideridia	Plants

Perideridia bolanderi bolanderi	Bolander's Yampah	Plants
Perideridia bolanderi involucrata	Bolander's Yampah	Plants
Perideridia californica	California Yampah	Plants
Perideridia gairdneri borealis	Gairdner's Yampah	Plants
Perideridia gairdneri gairdneri	Gairdner's Yampah	Plants
Perideridia howellii	Howell's False Caraway	Plants
Perideridia kelloggii	Kellogg's Yampah	Plants
Perideridia lemmonii	Lemmon's Yampah	Plants
Perideridia leptocarpa	Narrow-seeded Yampah	Plants
Perideridia oregana	Oregon Yampah	Plants
Perideridia parishii latifolia	Parish's Yampah	Plants
Perideridia parishii parishii	Parish's Yampah	Plants
Perideridia pringlei	Pringle's Yampah	Plants
Perithemis domitia		Insects & other
Perithemis intensa	Mexican Amberwing	Insects & other
Perithemis tenera		Insects & other
Perlinodes aurea	Longgill Springfly	Insects & other
Perlomyia collaris	Black Needlefly	Insects & other
Perlomyia utahensis	Utah Needlefly	Insects & other
Persicaria amphibia		Plants
Persicaria hydropiper	NA	Plants
Persicaria hydropiperoides		Plants
Persicaria lapathifolia		Plants
Persicaria maculosa	NA	Plants
Persicaria orientalis	NA	Plants
Persicaria pensylvanica	NA	Plants
Persicaria punctata	NA	Plants
Persicaria wallichii	NA	Plants
Petrophila confusalis		Insects & other
Petrophila jaliscalis		Insects & other
Petrophila kearfottalis		Insects & other
Phacelia distans	NA	Plants
Phaenopsectra dyari		Insects & other
Phaenopsectra flavipes		Insects & other
Phaenopsectra mortensoni		Insects & other
Phaenopsectra pilicellata		Insects & other
Phaenopsectra profusa		Insects & other
Phalacrocorax auritus	Double-crested Cormorant	Birds
Phalacroseris bolanderi	NA	Plants
Phalaris arundinacea	Reed Canarygrass	Plants
Phalaropus tricolor	Wilson's Phalarope	Birds

<i>Philarectus bergrothi</i>		Insects & other
<i>Philocasca demita</i>		Insects & other
<i>Philocasca oron</i>		Insects & other
<i>Philocasca rivularis</i>	A Caddisfly	Insects & other
<i>Philorus californica</i>	A Net-winged Midge	Insects & other
<i>Philorus jacinto</i>	A Net-winged Midge	Insects & other
<i>Philorus vanduzeei</i>	A Net-winged Midge	Insects & other
<i>Philorus yosemite</i>	A Net-winged Midge	Insects & other
<i>Phragmites australis australis</i>	Common Reed	Plants
<i>Phreatobrachypoda robusta</i>		Insects & other
<i>Phryganea cinerea</i>	A Caddisfly	Insects & other
<i>Phyla lanceolata</i>	Fog-fruit	Plants
<i>Phyla nodiflora</i>	Common Frog-fruit	Plants
<i>Phylloicus aeneus</i>		Insects & other
<i>Phylloicus mexicanus</i>		Insects & other
<i>Phyllospadix scouleri</i>	Scouler's Surf-grass	Plants
<i>Phyllospadix torreyi</i>	Torrey's Surf-grass	Plants
<i>Physa acuta</i>	Pewter Physa	Mollusks
<i>Physa gyrina</i>	Tadpole Physa	Mollusks
<i>Physella boucardi</i>	Desert Physa	Mollusks
<i>Physella cooperi</i>	Olive Physa	Mollusks
<i>Physella costata</i>	Ornate Physa	Mollusks
<i>Physella humerosa</i>	Corkscrew Physa	Mollusks
<i>Physella lordi</i>	Twisted Physa	Mollusks
<i>Physella osculans</i>	Cayuse Physa	Mollusks
<i>Physella propinqua</i>	Rocky Mountain Physa	Mollusks
<i>Physella traski</i>	Sculpted Physa	Mollusks
<i>Physella virgata</i>	Protean Physa	Mollusks
<i>Physella virginea</i>	Sunset Physa	Mollusks
<i>Physemus minutus</i>		Insects & other
<i>Pilularia americana</i>	NA	Plants
<i>Pinguicula macroceras</i>	NA	Plants
<i>Pipilo aberti</i>	Abert's Towhee	Birds
<i>Pipilo crissalis eremophilus</i>	Inyo California Towhee	Birds
<i>Piranga rubra</i>	Summer Tanager	Birds
<i>Pisidium casertanum</i>		Mollusks
<i>Pisidium compressum</i>		Mollusks
<i>Pisidium idahoense</i>		Mollusks
<i>Pisidium lilljeborgi</i>		Mollusks
<i>Pisidium nitidum</i>		Mollusks
<i>Pisidium subtruncatum</i>		Mollusks

<i>Pisidium ultramontanum</i>	Montane Peaclam	Mollusks
<i>Pisidium variabile</i>		Mollusks
<i>Pisidium walkeri</i>		Mollusks
<i>Plagiobothrys acanthocarpus</i>	Adobe Popcorn-flower	Plants
<i>Plagiobothrys austiniae</i>	Austin's Popcorn-flower	Plants
<i>Plagiobothrys chorisianus</i>	NA	Plants
<i>Plagiobothrys distantiflorus</i>	California Popcorn-flower	Plants
<i>Plagiobothrys glaber</i>	Hairless Allocarya	Plants
<i>Plagiobothrys greenei</i>	Greene's Popcorn-flower	Plants
<i>Plagiobothrys humistratus</i>	Dwarf Popcorn-flower	Plants
<i>Plagiobothrys leptocladus</i>	Alkali Popcorn-flower	Plants
<i>Plagiobothrys nitens</i>		Plants
<i>Plagiobothrys parishii</i>	Parish's Popcorn-flower	Plants
<i>Plagiobothrys reticulatus reticulatus</i>		Plants
<i>Plagiobothrys reticulatus rossianorum</i>		Plants
<i>Plagiobothrys tener</i>	NA	Plants
<i>Plagiobothrys undulatus</i>	NA	Plants
<i>Planorbella binneyi</i>	Coarse Rams-horn	Mollusks
<i>Planorbella occidentalis</i>	Fine-lined Rams-horn	Mollusks
<i>Planorbella subcrenata</i>	Rough Rams-horn	Mollusks
<i>Planorbella tenuis</i>	Mexican Rams-horn	Mollusks
<i>Planorbella traski</i>	Keeled Rams-horn	Mollusks
<i>Planorbella trivolvis</i>	Marsh Rams-horn	Mollusks
<i>Plantago elongata elongata</i>	Slender Plantain	Plants
<i>Platanthera dilatata leucostachys</i>		Plants
<i>Platanthera sparsiflora sparsiflora</i>	Canyon Bog Orchid	Plants
<i>Platanthera stricta</i>	Slender Bog Orchid	Plants
<i>Platanthera tescamnis</i>	NA	Plants
<i>Platanthera yosemitensis</i>	Yosemite Bog-Orchid	Plants
<i>Platanus racemosa</i>	California Sycamore	Plants
<i>Plathemis lydia</i>	Common Whitetail	Insects & other
<i>Plathemis subornata</i>	Desert Whitetail	Insects & other
<i>Platyhydracarus juliani</i>		Insects & other
<i>Platyhydracarus parvipalpis</i>		Insects & other
<i>Platyvelia beameri</i>		Insects & other
<i>Platyvelia brachialis</i>		Insects & other
<i>Platyvelia summersi</i>		Insects & other
<i>Plauditus punctiventris</i>		Insects & other
<i>Plegadis chihi</i>	White-faced Ibis	Birds

<i>Plethodon dunni</i>	Dunn's Salamander	Herps
<i>Pleuropogon californicus californicus</i>		Plants
<i>Pleuropogon californicus davyi</i>		Plants
<i>Pleuropogon hooverianus</i>	North Coast False Semaphore Grass	Plants
<i>Pleuropogon refractus</i>	Nodding False Semaphore Grass	Plants
<i>Pluchea odorata odorata</i>	Scented Conyza	Plants
<i>Pluchea sericea</i>	Arrow-weed	Plants
<i>Plumiperla diversa</i>	Margined Sallfly	Insects & other
<i>Plumiperla spinosa</i>	Spiny Sallfly	Insects & other
<i>Pluvialis squatarola</i>	Black-bellied Plover	Birds
<i>Podiceps nigricollis</i>	Eared Grebe	Birds
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Birds
<i>Podmosta decepta</i>		Insects & other
<i>Podmosta delicatula</i>	Delicate Forestfly	Insects & other
<i>Podmosta obscura</i>		Insects & other
<i>Pogogyne abramsii</i>	San Diego Mesamint	Plants
<i>Pogogyne douglasii</i>	NA	Plants
<i>Pogogyne floribunda</i>	Profuse-flowered Pogogyne	Plants
<i>Pogogyne nudiuscula</i>	Otay Mesamint	Plants
<i>Pogogyne zizyphoroides</i>		Plants
<i>Pogonichthys cisoides</i>	Clear Lake Splittail	Fishes
<i>Pogonichthys macrolepidotus</i>	Sacramento splittail	Fishes
<i>Polycentropus arizonensis</i>		Insects & other
<i>Polycentropus aztecus</i>		Insects & other
<i>Polycentropus cinereus</i>		Insects & other
<i>Polycentropus denningi</i>		Insects & other
<i>Polycentropus flavus</i>	A Caddisfly	Insects & other
<i>Polycentropus gertschi</i>		Insects & other
<i>Polycentropus halidus</i>	A Caddisfly	Insects & other
<i>Polycentropus variegatus</i>	A Caddisfly	Insects & other
<i>Polygonum marinense</i>	Marin Knotweed	Plants
<i>Polypedilum albicorne</i>		Insects & other
<i>Polypedilum albinodus</i>		Insects & other
<i>Polypedilum angustum</i>		Insects & other
<i>Polypedilum apicatum</i>		Insects & other
<i>Polypedilum artifer</i>		Insects & other
<i>Polypedilum aviceps</i>		Insects & other
<i>Polypedilum braseniae</i>		Insects & other
<i>Polypedilum californicum</i>		Insects & other
<i>Polypedilum cinctum</i>		Insects & other

Polypedilum cultellatum		Insects & other
Polypedilum digitifer		Insects & other
Polypedilum halterale		Insects & other
Polypedilum illinoense		Insects & other
Polypedilum isocerus		Insects & other
Polypedilum labeculosum		Insects & other
Polypedilum laetum		Insects & other
Polypedilum obelos		Insects & other
Polypedilum ophioides		Insects & other
Polypedilum parvum		Insects & other
Polypedilum pedatum		Insects & other
Polypedilum pterospilus		Insects & other
Polypedilum scalaenum		Insects & other
Polypedilum sulaceps		Insects & other
Polypedilum trigonus		Insects & other
Polypedilum tritum		Insects & other
Polypedilum vibex		Insects & other
Polypsectropus charlesi		Insects & other
Pomacea bridgesii		Mollusks
Pomacea paludosa		Mollusks
Pomatiopsis binneyi	Robust Walker	Mollusks
Pomatiopsis californica	Pacific Walker	Mollusks
Pomatiopsis chacei	Marsh Walker	Mollusks
Pomoleuctra andersoni	Oregon Needlefly	Insects & other
Pomoleuctra purcellana		Insects & other
Populus trichocarpa	NA	Plants
Porterella carnosula	Western Porterella	Plants
Porzana carolina	Sora	Birds
Postelichus confluentus		Insects & other
Postelichus immsi		Insects & other
Postelichus productus		Insects & other
Potamogeton alpinus	Northern Pondweed	Plants
Potamogeton amplifolius	Largeleaf Pondweed	Plants
Potamogeton berchtoldii	NA	Plants
Potamogeton diversifolius	Water-thread Pondweed	Plants
Potamogeton epihydrus	Nuttall's Pondweed	Plants
Potamogeton foliosus fibrillosus	Fibrous Pondweed	Plants
Potamogeton foliosus foliosus	Leafy Pondweed	Plants
Potamogeton gramineus	Grassy Pondweed	Plants
Potamogeton illinoensis	Illinois Pondweed	Plants
Potamogeton natans	Floating Pondweed	Plants

Potamogeton nodosus	Longleaf Pondweed	Plants
Potamogeton praelongus	White-stem Pondweed	Plants
Potamogeton pusillus pusillus	Slender Pondweed	Plants
Potamogeton richardsonii	Richardson's Pondweed	Plants
Potamogeton robbinsii	Flatleaf Pondweed	Plants
Potamogeton zosteriformis	Flatstem Pondweed	Plants
Potentilla anserina anserina		Plants
Potentilla anserina pacifica		Plants
Potentilla multijuga	Ballona Cinquefoil	Plants
Potentilla newberryi	Newberry's Cinquefoil	Plants
Potentilla uliginosa	Cunningham Marsh cinquefoil	Plants
Primula jeffreyi		Plants
Primula pauciflora		Plants
Primula subalpina		Plants
Primula tetrandra	NA	Plants
Prionocera oregonica		Insects & other
Pristinicola hemphilli	Pristine Pyrg	Mollusks
Procladius barbatulus		Insects & other
Procladius bellus		Insects & other
Procladius culiciformis		Insects & other
Procladius denticulatus		Insects & other
Procladius freemani		Insects & other
Procladius sublettei		Insects & other
Procloeon pennulatum	A Mayfly	Insects & other
Procloeon rivulare	A Mayfly	Insects & other
Procloeon venosum	A Mayfly	Insects & other
Progomphus borealis	Gray Sanddragon	Insects & other
Promenetus exacuus	Sharp Sprite	Mollusks
Promenetus umbilicatellus	Umbilicate Sprite	Mollusks
Prosimulium caudatum		Insects & other
Prosimulium constrictistylum		Insects & other
Prosimulium davesi		Insects & other
Prosimulium dicentum		Insects & other
Prosimulium dicum		Insects & other
Prosimulium esselbaughi		Insects & other
Prosimulium exigens		Insects & other
Prosimulium flaviantennus		Insects & other
Prosimulium formosum		Insects & other
Prosimulium frohnei		Insects & other
Prosimulium fulvithorax		Insects & other
Prosimulium fulvum		Insects & other

Prosimulium idemai		Insects & other
Prosimulium imposter		Insects & other
Prosimulium longirostrum		Insects & other
Prosimulium minifulvum		Insects & other
Prosimulium rusticum		Insects & other
Prosimulium secretum		Insects & other
Prosimulium shewelli		Insects & other
Prosimulium travisi		Insects & other
Prosimulium uinta		Insects & other
Prosimulium unicum		Insects & other
Prosopium williamsoni	Mountain whitefish	Fishes
Prostoia besametsa	Bended Forestfly	Insects & other
Protanyderus margarita		Insects & other
Protanyderus vanduzeei		Insects & other
Protanyderus vipio		Insects & other
Protochauliodes aridus		Insects & other
Protochauliodes cascadius		Insects & other
Protochauliodes minimus		Insects & other
Protochauliodes montivagus		Insects & other
Protochauliodes simplus		Insects & other
Protochauliodes spenceri		Insects & other
Protoptila balmorhea		Insects & other
Protoptila coloma	A Caddisfly	Insects & other
Protoptila erotica		Insects & other
Psectrocladius barbimanus		Insects & other
Psectrocladius spinifer		Insects & other
Psectrocladius vernalis		Insects & other
Psectrotanypus dyari		Insects & other
Psephenus arizonensis		Insects & other
Psephenus falli		Insects & other
Psephenus minckleyi		Insects & other
Psephenus montanus		Insects & other
Psephenus murvoshi		Insects & other
Pseudacris cadaverina	California Treefrog	Herps
Pseudacris hypochondriaca	Baja California Treefrog	Herps
Pseudacris regilla	Northern Pacific Chorus Frog	Herps
Pseudacris sierra	Sierran Treefrog	Herps
Pseudiron centralis	White Sand-river Mayfly	Insects & other
Pseudochironomus richardsoni		Insects & other
Pseudocloeon apache		Insects & other
Pseudocloeon propinquum	A Mayfly	Insects & other

<i>Pseudocorixa beameri</i>		Insects & other
<i>Pseudodiamesa branickii</i>		Insects & other
<i>Pseudoleon superbus</i>		Insects & other
<i>Pseudorthocladius dumicaudus</i>		Insects & other
<i>Pseudorthocladius uniserratus</i>		Insects & other
<i>Pseudosmittia forcipata</i>		Insects & other
<i>Pseudosmittia nanseni</i>		Insects & other
<i>Pseudostenophylax edwardsi</i>	A Caddisfly	Insects & other
<i>Psilocarphus brevissimus</i> <i>brevissimus</i>	Dwarf Woolly-heads	Plants
<i>Psilocarphus brevissimus</i> <i>multiflorus</i>	Delta Woolly Marbles	Plants
<i>Psilocarphus oregonus</i>	Oregon Woolly-heads	Plants
<i>Psilocarphus tenellus</i>	NA	Plants
<i>Psorophora columbiae</i>		Insects & other
<i>Psorophora discolor</i>		Insects & other
<i>Psorophora howardii</i>		Insects & other
<i>Psorophora signipennis</i>		Insects & other
<i>Psychoglypha alascensis</i>		Insects & other
<i>Psychoglypha avigo</i>	A Caddisfly	Insects & other
<i>Psychoglypha bella</i>	A Caddisfly	Insects & other
<i>Psychoglypha browni</i>		Insects & other
<i>Psychoglypha klamathi</i>	A Caddisfly	Insects & other
<i>Psychoglypha leechi</i>	A Caddisfly	Insects & other
<i>Psychoglypha mazamae</i>	A Caddisfly	Insects & other
<i>Psychoglypha orniae</i>	A Caddisfly	Insects & other
<i>Psychoglypha prita</i>		Insects & other
<i>Psychoglypha schuhi</i>		Insects & other
<i>Psychoglypha subborealis</i>	A Caddisfly	Insects & other
<i>Psychomyia flavida</i>	A Caddisfly	Insects & other
<i>Psychomyia lumina</i>	A Caddisfly	Insects & other
<i>Psychomyia nomada</i>		Insects & other
<i>Pteronarcella badia</i>		Insects & other
<i>Pteronarcella regularis</i>	Dwarf Salmonfly	Insects & other
<i>Pteronarcys californica</i>	Giant Salmonfly	Insects & other
<i>Pteronarcys princeps</i>	Ebony Salmonfly	Insects & other
<i>Ptychocheilus grandis</i>	Sacramento pikeminnow	Fishes
<i>Ptychocheilus lucius</i>	Colorado Pikeminnow	Fishes
<i>Ptychoptera byersi</i>		Insects & other
<i>Ptychoptera lenis</i>		Insects & other
<i>Ptychoptera minor</i>		Insects & other
<i>Ptychoptera monoensis</i>		Insects & other

<i>Ptychoptera pendula</i>		Insects & other
<i>Ptychoptera sculleni</i>		Insects & other
<i>Ptychoptera townesi</i>		Insects & other
<i>Puccinellia howellii</i>	Trinity Mountains Alkali Grass	Plants
<i>Puccinellia nutkaensis</i>	Alaska Alkaligrass	Plants
<i>Puccinellia nuttalliana</i>	Nuttall's Alkali Grass	Plants
<i>Puccinellia parishii</i>	Parish's Alkali Grass	Plants
<i>Puccinellia pumila</i>		Plants
<i>Puccinellia simplex</i>	Little Alkali Grass	Plants
<i>Pyrgulopsis aardahli</i>	Benton Valley Springsnail	Mollusks
<i>Pyrgulopsis amargosae</i>	Amargosa Springsnail	Mollusks
<i>Pyrgulopsis archimedis</i>	Archimedes Pyrg	Mollusks
<i>Pyrgulopsis californiensis</i>	Laguna Mountain Springsnail	Mollusks
<i>Pyrgulopsis castaicensis</i>	A Freshwater Snail	Mollusks
<i>Pyrgulopsis cinerana</i>	Ash Valley Pyrg	Mollusks
<i>Pyrgulopsis diablensis</i>	Diablo Range Pyrg	Mollusks
<i>Pyrgulopsis eremica</i>	Smoke Creek Pyrg	Mollusks
<i>Pyrgulopsis falciglans</i>	Likely Pyrg	Mollusks
<i>Pyrgulopsis gibba</i>	Surprise Valley Pyrg	Mollusks
<i>Pyrgulopsis giuliani</i>	Southern Sierra Nevada Springsnail	Mollusks
<i>Pyrgulopsis greggi</i>	Kern River Pyrg	Mollusks
<i>Pyrgulopsis intermedia</i>	Crooked Creek Springsnail	Mollusks
<i>Pyrgulopsis lasseni</i>	Willow Creek Pyrg	Mollusks
<i>Pyrgulopsis licina</i>		Mollusks
<i>Pyrgulopsis longae</i>	Long Valley Pyrg	Mollusks
<i>Pyrgulopsis longinqua</i>	Salton Sea Springsnail	Mollusks
<i>Pyrgulopsis micrococcus</i>	Oasis Valley Springsnail	Mollusks
<i>Pyrgulopsis milleri</i>	A Freshwater Snail	Mollusks
<i>Pyrgulopsis owensensis</i>	Owens Valley Springsnail	Mollusks
<i>Pyrgulopsis perforata</i>		Mollusks
<i>Pyrgulopsis perturbata</i>	Fish Slough Springsnail	Mollusks
<i>Pyrgulopsis rupinicola</i>	Sucker Springs Pyrg	Mollusks
<i>Pyrgulopsis sanchezi</i>		Mollusks
<i>Pyrgulopsis stearnsiana</i>	Yaqui Springsnail	Mollusks
<i>Pyrgulopsis taylori</i>	San Luis Obispo Pyrg	Mollusks
<i>Pyrgulopsis turbatrix</i>	Southeast Nevada Pyrg	Mollusks
<i>Pyrgulopsis ventricosa</i>	Clear Lake Pyrg	Mollusks
<i>Pyrgulopsis wongi</i>	Wong's Springsnail	Mollusks
<i>Radotanytus submarginella</i>		Insects & other
<i>Rallus limicola</i>	Virginia Rail	Birds
<i>Rallus longirostris yumanensis</i>	Yuma Clapper Rail	Birds

Ramellogammarus californicus		Crustaceans
Ramellogammarus campestris		Crustaceans
Ramellogammarus columbianus		Crustaceans
Ramellogammarus littoralis		Crustaceans
Ramellogammarus oregonensis		Crustaceans
Ramellogammarus ramellus		Crustaceans
Ramellogammarus similimanus		Crustaceans
Ramphocorixa rotundocephala		Insects & other
Rana aurora	Northern Red-legged Frog	Herps
Rana boylei	Foothill Yellow-legged Frog	Herps
Rana cascadae	Cascades Frog	Herps
Rana draytonii	California Red-legged Frog	Herps
Rana muscosa	Southern Mountain Yellow-legged Frog	Herps
Rana pretiosa	Oregon Spotted Frog	Herps
Rana sierrae	Sierra Nevada Yellow-legged Frog	Herps
Ranatra brevicollis	A Water Scorpion	Insects & other
Ranatra fusca		Insects & other
Ranatra montezuma		Insects & other
Ranatra quadridentata		Insects & other
Ranunculus alismifolius alismellus	Water-plantain Buttercup	Plants
Ranunculus alismifolius alismifolius	Water-plantain Buttercup	Plants
Ranunculus alismifolius hartwegii		Plants
Ranunculus alismifolius lemmonii		Plants
Ranunculus andersonii andersonii	Anderson's Buttercup	Plants
Ranunculus aquatilis aquatilis	White Water Buttercup	Plants
Ranunculus aquatilis diffusus		Plants
Ranunculus bonariensis	NA	Plants
Ranunculus flabellaris	Yellow Water-crowfoot	Plants
Ranunculus flammula flammula	Lesser Spearwort	Plants
Ranunculus flammula ovalis		Plants
Ranunculus hydrocharoides	NA	Plants
Ranunculus hystriculus		Plants
Ranunculus lobbii	Lobb's Water Buttercup	Plants
Ranunculus macounii	Macoun's Buttercup	Plants
Ranunculus populago	Mountain Buttercup	Plants
Ranunculus pusillus pusillus	Pursh's Buttercup	Plants
Ranunculus repens	NA	Plants

<i>Ranunculus sardous</i>	NA	Plants
<i>Ranunculus sceleratus</i>	NA	Plants
<i>Recurvirostra americana</i>	American Avocet	Birds
<i>Remartinia luteipennis</i>		Insects & other
<i>Reomyia wartinbei</i>		Insects & other
<i>Rhagovelia becki</i>		Insects & other
<i>Rhagovelia choreutes</i>		Insects & other
<i>Rhagovelia distincta</i>		Insects & other
<i>Rhagovelia varipes</i>		Insects & other
<i>Rhamnus alnifolia</i>	Alderleaf Buckthorn	Plants
<i>Rhantus anisonychus</i>		Insects & other
<i>Rhantus atricolor</i>		Insects & other
<i>Rhantus binotatus</i>		Insects & other
<i>Rhantus consimilis</i>		Insects & other
<i>Rhantus gutticollis</i>		Insects & other
<i>Rhantus sericans</i>		Insects & other
<i>Rhantus wallisi</i>		Insects & other
<i>Rheotanytarsus hamatus</i>		Insects & other
<i>Rheumatobates hungerfordi</i>		Insects & other
<i>Rhinichthys osculus klamathensis</i>	Klamath speckled dace	Fishes
<i>Rhinichthys osculus nevadensis</i>	Amargosa Canyon speckled dace	Fishes
<i>Rhinichthys osculus robustus</i>	Lahontan speckled dace	Fishes
<i>Rhinichthys osculus</i> ssp. 1	Sacramento speckled dace	Fishes
<i>Rhinichthys osculus</i> ssp. 2	Owens speckled dace	Fishes
<i>Rhinichthys osculus</i> ssp. 3	Long Valley speckled dace	Fishes
<i>Rhinichthys osculus</i> ssp. 4	Santa Ana speckled dace	Fishes
<i>Rhionaeschna californica</i>	California Darner	Insects & other
<i>Rhionaeschna multicolor</i>	Blue-eyed Darner	Insects & other
<i>Rhionaeschna dugesi</i>		Insects & other
<i>Rhionaeschna psillus</i>		Insects & other
<i>Rhithrogena decora</i>	A Mayfly	Insects & other
<i>Rhithrogena flavianula</i>	A Mayfly	Insects & other
<i>Rhithrogena hageni</i>	A Mayfly	Insects & other
<i>Rhithrogena morrisoni</i>	A Mayfly	Insects & other
<i>Rhithrogena plana</i>	A Mayfly	Insects & other
<i>Rhithrogena robusta</i>	A Mayfly	Insects & other
<i>Rhithrogena undulata</i>	A Mayfly	Insects & other
<i>Rhithrogena virilis</i>		Insects & other
<i>Rhizelmis nigra</i>		Insects & other
<i>Rhododendron columbianum</i>		Plants

<i>Rhododendron occidentale</i>	Western Azalea	Plants
<i>Rhyacophila acuminata</i>	A Caddisfly	Insects & other
<i>Rhyacophila alberta</i>		Insects & other
<i>Rhyacophila amabilis</i>	Castle Lake Rhyacophilan Caddisfly	Insects & other
<i>Rhyacophila angelita</i>	A Caddisfly	Insects & other
<i>Rhyacophila arcella</i>	A Caddisfly	Insects & other
<i>Rhyacophila ardala</i>	A Caddisfly	Insects & other
<i>Rhyacophila arnaudi</i>	A Caddisfly	Insects & other
<i>Rhyacophila balosa</i>	A Caddisfly	Insects & other
<i>Rhyacophila basalis</i>	A Caddisfly	Insects & other
<i>Rhyacophila betteni</i>	A Caddisfly	Insects & other
<i>Rhyacophila bifila</i>	A Caddisfly	Insects & other
<i>Rhyacophila blarina</i>		Insects & other
<i>Rhyacophila californica</i>	A Caddisfly	Insects & other
<i>Rhyacophila cerita</i>	A Caddisfly	Insects & other
<i>Rhyacophila chandleri</i>	A Caddisfly	Insects & other
<i>Rhyacophila chilsia</i>		Insects & other
<i>Rhyacophila chordata</i>	A Caddisfly	Insects & other
<i>Rhyacophila colonus</i>	Obrien Rhyacophilan Caddisfly	Insects & other
<i>Rhyacophila coloradensis</i>	A Caddisfly	Insects & other
<i>Rhyacophila darbyi</i>	A Caddisfly	Insects & other
<i>Rhyacophila ebria</i>		Insects & other
<i>Rhyacophila ecosia</i>	A Caddisfly	Insects & other
<i>Rhyacophila fenderi</i>	Fender's Rhyacophilan Caddisfly	Insects & other
<i>Rhyacophila grandis</i>	A Caddisfly	Insects & other
<i>Rhyacophila haddocki</i>		Insects & other
<i>Rhyacophila harmstoni</i>	A Caddisfly	Insects & other
<i>Rhyacophila hyalinata</i>	A Caddisfly	Insects & other
<i>Rhyacophila inculta</i>	A Caddisfly	Insects & other
<i>Rhyacophila insularis</i>	A Caddisfly	Insects & other
<i>Rhyacophila iranda</i>		Insects & other
<i>Rhyacophila jenniferae</i>	A Caddisfly	Insects & other
<i>Rhyacophila jewetti</i>	A Caddisfly	Insects & other
<i>Rhyacophila karila</i>	A Caddisfly	Insects & other
<i>Rhyacophila kernada</i>	A Caddisfly	Insects & other
<i>Rhyacophila kincaidi</i>		Insects & other
<i>Rhyacophila leechi</i>	A Caddisfly	Insects & other
<i>Rhyacophila lineata</i>	Castle Crags Rhyacophilan Caddisfly	Insects & other
<i>Rhyacophila lurella</i>	A Caddisfly	Insects & other
<i>Rhyacophila malkini</i>		Insects & other

Rhyacophila mosana	Bilobed Rhyacophilan Caddisfly	Insects & other
Rhyacophila narvae	A Caddisfly	Insects & other
Rhyacophila neograndis	A Caddisfly	Insects & other
Rhyacophila nevadensis	A Caddisfly	Insects & other
Rhyacophila norcuta	A Caddisfly	Insects & other
Rhyacophila oreta	A Caddisfly	Insects & other
Rhyacophila pellisa	A Caddisfly	Insects & other
Rhyacophila perda		Insects & other
Rhyacophila perplana		Insects & other
Rhyacophila pichaca		Insects & other
Rhyacophila rayneri	A Caddisfly	Insects & other
Rhyacophila reyesi	A Caddisfly	Insects & other
Rhyacophila rotunda	A Caddisfly	Insects & other
Rhyacophila sequoia	A Caddisfly	Insects & other
Rhyacophila sierra	A Caddisfly	Insects & other
Rhyacophila siskiyou	A Caddisfly	Insects & other
Rhyacophila spinata	Spiny Rhyacophilan Caddisfly	Insects & other
Rhyacophila starki	A Caddisfly	Insects & other
Rhyacophila tamalpaisi	A Caddisfly	Insects & other
Rhyacophila tehama	A Caddisfly	Insects & other
Rhyacophila tralala		Insects & other
Rhyacophila tucula	A Caddisfly	Insects & other
Rhyacophila unipunctata		Insects & other
Rhyacophila vaccua	A Caddisfly	Insects & other
Rhyacophila vaefes	A Caddisfly	Insects & other
Rhyacophila vagrita		Insects & other
Rhyacophila valuma	A Caddisfly	Insects & other
Rhyacophila vao	A Caddisfly	Insects & other
Rhyacophila vedra	A Caddisfly	Insects & other
Rhyacophila velora	A Caddisfly	Insects & other
Rhyacophila vemna		Insects & other
Rhyacophila verrula	A Caddisfly	Insects & other
Rhyacophila vetina		Insects & other
Rhyacophila viquaea		Insects & other
Rhyacophila visor		Insects & other
Rhyacophila vobara		Insects & other
Rhyacophila vocala	A Caddisfly	Insects & other
Rhyacophila vuzana	A Caddisfly	Insects & other
Rhyacophila willametta		Insects & other
Rhyacotriton variegatus	Southern Torrent Salamander	Herps
Rhynchospora alba	White Beakrush	Plants

Rhynchospora californica	California Beakrush	Plants
Rhynchospora capitellata	Brownish Beakrush	Plants
Rhynchospora globularis	NA	Plants
Richardsonius egregius	Lahontan redbelly	Fishes
Rickeria sorpta	Palestripe Springfly	Insects & other
Riparia riparia	Bank Swallow	Birds
Robackia demeijeri		Insects & other
Rorippa columbiae	Columbia Yellowcress	Plants
Rorippa curvipes	Rocky Mountain Yellowcress	Plants
Rorippa curvisiliqua curvisiliqua	Curve-pod Yellowcress	Plants
Rorippa palustris palustris	Bog Yellowcress	Plants
Rorippa sphaerocarpa	Round-fruit Yellowcress	Plants
Rorippa subumbellata	Tahoe Yellowcress	Plants
Rotala ramosior	Toothcup	Plants
Rudbeckia klamathensis		Plants
Rumex britannica	NA	Plants
Rumex californicus		Plants
Rumex conglomeratus	NA	Plants
Rumex crassus		Plants
Rumex fueginus		Plants
Rumex kernerii	NA	Plants
Rumex lacustris		Plants
Rumex occidentalis		Plants
Rumex persicarioides		Plants
Rumex salicifolius salicifolius	Willow Dock	Plants
Rumex stenophyllus	NA	Plants
Rumex transitorius		Plants
Rumex triangulivalvis		Plants
Rumex utahensis		Plants
Rumex violascens	Violet Dock	Plants
Rupisalda dewsi		Insects & other
Rupisalda saxicola		Insects & other
Rupisalda teretis		Insects & other
Ruppia cirrhosa	Widgeon-grass	Plants
Ruppia maritima	Ditch-grass	Plants
Rynchops niger	Black Skimmer	Birds
Sagina saginoides	Arctic Pearlwort	Plants
Sagittaria cuneata	Wapatum Arrowhead	Plants
Sagittaria latifolia latifolia	Broadleaf Arrowhead	Plants
Sagittaria longiloba	Longbarb Arrowhead	Plants
Sagittaria montevidensis		Plants

calycina		
Sagittaria sanfordii	Sanford's Arrowhead	Plants
Salda buenoi		Insects & other
Salda littoralis		Insects & other
Salda lugubris		Insects & other
Salda obscura		Insects & other
Salda provancheri		Insects & other
Saldula andrei		Insects & other
Saldula balli		Insects & other
Saldula basingeri		Insects & other
Saldula comatula		Insects & other
Saldula dispersa		Insects & other
Saldula explanata		Insects & other
Saldula laticollis		Insects & other
Saldula lattini		Insects & other
Saldula luctuosa		Insects & other
Saldula nigrita		Insects & other
Saldula opacula		Insects & other
Saldula opiparia		Insects & other
Saldula orbiculata		Insects & other
Saldula pallipes		Insects & other
Saldula palustris		Insects & other
Saldula pexa		Insects & other
Saldula saltatoria		Insects & other
Saldula severini		Insects & other
Saldula sulcicollis		Insects & other
Saldula usingeri	Wilbur Springs Shorebug	Insects & other
Saldula villosa		Insects & other
Salicornia bigelovii	Dwarf Glasswort	Plants
Salicornia rubra	Western Glasswort	Plants
Salix babylonica	NA	Plants
Salix boothii	Booth's Willow	Plants
Salix breweri	Brewer's Willow	Plants
Salix delnortensis	Del Norte Willow	Plants
Salix drummondiana	Satiny Salix	Plants
Salix eastwoodiae	Eastwood's Willow	Plants
Salix exigua exigua	Narrowleaf Willow	Plants
Salix exigua hindsiana		Plants
Salix geyeriana	Geyer's Willow	Plants
Salix gooddingii	Goodding's Willow	Plants
Salix hookeriana	Hooker's Willow	Plants

<i>Salix jepsonii</i>	Jepson's Willow	Plants
<i>Salix laevigata</i>	Polished Willow	Plants
<i>Salix lasiandra caudata</i>		Plants
<i>Salix lasiandra lasiandra</i>		Plants
<i>Salix lasiolepis lasiolepis</i>	Arroyo Willow	Plants
<i>Salix lemmonii</i>	Lemmon's Willow	Plants
<i>Salix lutea</i>	Yellow Willow	Plants
<i>Salix melanopsis</i>	Dusky Willow	Plants
<i>Salix planifolia</i>	NA	Plants
<i>Salix prolixa</i>	Mackenzie's Willow	Plants
<i>Salix purpurea</i>	NA	Plants
<i>Salix sitchensis</i>	Sitka Willow	Plants
<i>Salix tracyi</i>		Plants
<i>Salmasellus howarthi</i>		Crustaceans
<i>Salmoperla sylvanica</i>	Bighead Springfly	Insects & other
<i>Salvelinus confluentus</i>	Bull Trout	Fishes
<i>Salvinia minima</i>	NA	Plants
<i>Salvinia oblongifolia</i>	NA	Plants
<i>Samolus parviflorus</i>	NA	Plants
<i>Sanfilippodytes adelardi</i>	A Predaceous Diving Beetle	Insects & other
<i>Sanfilippodytes barbarae</i>		Insects & other
<i>Sanfilippodytes barborensis</i>		Insects & other
<i>Sanfilippodytes belfragei</i>		Insects & other
<i>Sanfilippodytes bidessoides</i>	A Predaceous Diving Beetle	Insects & other
<i>Sanfilippodytes corvallis</i>		Insects & other
<i>Sanfilippodytes hardyi</i>		Insects & other
<i>Sanfilippodytes kingi</i>		Insects & other
<i>Sanfilippodytes latebrosus</i>		Insects & other
<i>Sanfilippodytes malkini</i>		Insects & other
<i>Sanfilippodytes palliatus</i>		Insects & other
<i>Sanfilippodytes rossi</i>		Insects & other
<i>Sanfilippodytes setifer</i>	A Predaceous Diving Beetle	Insects & other
<i>Sanfilippodytes terminalis</i>		Insects & other
<i>Sanfilippodytes veronicae</i>		Insects & other
<i>Sanfilippodytes vilis</i>		Insects & other
<i>Sanfilippodytes williamsi</i>		Insects & other
<i>Sarracenia purpurea</i>	NA	Plants
<i>Sasquaperla hoopa</i>	A Stonefly	Insects & other
<i>Scaphiopus couchii</i>	Couch's Spadefoot	Herps
<i>Scheuchzeria palustris</i>	Pod Grass	Plants
<i>Schoenoplectus acutus acutus</i>	NA	Plants

<i>Schoenoplectus acutus occidentalis</i>	Hardstem Bulrush	Plants
<i>Schoenoplectus americanus</i>	Three-square Bulrush	Plants
<i>Schoenoplectus californicus</i>	California Bulrush	Plants
<i>Schoenoplectus heterochaetus</i>	Slender Bulrush	Plants
<i>Schoenoplectus mucronatus</i>	NA	Plants
<i>Schoenoplectus pungens longispicatus</i>	Three-square Bulrush	Plants
<i>Schoenoplectus pungens pungens</i>	NA	Plants
<i>Schoenoplectus saximontanus</i>	Rocky Mountain Bulrush	Plants
<i>Schoenoplectus subterminalis</i>	Water Bulrush	Plants
<i>Schoenoplectus tabernaemontani</i>	Softstem Bulrush	Plants
<i>Schoenoplectus triqueter</i>	NA	Plants
<i>Schoenus nigricans</i>	Blacksedge	Plants
<i>Scirpus congdonii</i>	Congdon's Bulrush	Plants
<i>Scirpus cyperinus</i>	NA	Plants
<i>Scirpus diffusus</i>	Umbrella Bulrush	Plants
<i>Scirpus microcarpus</i>	Small-fruit Bulrush	Plants
<i>Scirpus pendulus</i>	Pendulous Bulrush	Plants
<i>Scirtes californicus</i>		Insects & other
<i>Scirtes orbiculatus</i>		Insects & other
<i>Scirtes plagiatus</i>		Insects & other
<i>Scutellaria galericulata</i>	Hooded Skullcap	Plants
<i>Sedella leiocarpa</i>	Lake County Mock Stonecrop	Plants
<i>Senecio hydrophiloides</i>	Sweet Marsh Ragwort	Plants
<i>Senecio hydrophilus</i>	Great Swamp Ragwort	Plants
<i>Senecio triangularis</i>	Arrow-leaf Groundsel	Plants
<i>Sequoia sempervirens</i>		Plants
<i>Sergentia albescens</i>		Insects & other
<i>Serratella levis</i>	A Mayfly	Insects & other
<i>Serratella micheneri</i>	A Mayfly	Insects & other
<i>Sesbania herbacea</i>		Plants
<i>Setophaga petechia</i>	Yellow Warbler	Birds
<i>Setophaga petechia brewsteri</i>	A Yellow Warbler	Birds
<i>Setophaga petechia sonorana</i>	Sonoran Yellow Warbler	Birds
<i>Setvena tibialis</i>		Insects & other
<i>Setvena wahkeena</i>		Insects & other
<i>Sialis arvalis</i>		Insects & other
<i>Sialis bilobata</i>		Insects & other
<i>Sialis californica</i>		Insects & other

<i>Sialis cornuta</i>		Insects & other
<i>Sialis hamata</i>		Insects & other
<i>Sialis nevadensis</i>		Insects & other
<i>Sialis occidens</i>		Insects & other
<i>Sialis rotunda</i>		Insects & other
<i>Sidalcea calycosa calycosa</i>	Annual Checker-mallow	Plants
<i>Sidalcea calycosa rhizomata</i>	Point Reyes Checkerbloom	Plants
<i>Sidalcea gigantea</i>		Plants
<i>Sidalcea hirsuta</i>	Hairy Checker-mallow	Plants
<i>Sidalcea neomexicana</i>	Rocky Mountain Checker-mallow	Plants
<i>Sidalcea oregana hydrophila</i>	Water-loving Checker-mallow	Plants
<i>Sidalcea oregana oregana</i>	Oregon Checker-mallow	Plants
<i>Sidalcea oregana valida</i>	Kenwood Marsh Checker-mallow	Plants
<i>Sidalcea pedata</i>	Pedate Checker-mallow	Plants
<i>Sidalcea ranunculacea</i>	Marsh Checker-mallow	Plants
<i>Sidalcea reptans</i>	Creeping Checker-mallow	Plants
<i>Sierraperla cora</i>	Giant Roachfly	Insects & other
<i>Sigara alternata</i>		Insects & other
<i>Sigara grossolineata</i>		Insects & other
<i>Sigara krafti</i>		Insects & other
<i>Sigara mckinstrii</i>	A Water Boatman	Insects & other
<i>Sigara nevadensis</i>		Insects & other
<i>Sigara omani</i>		Insects & other
<i>Sigara vallis</i>	A Water Boatman	Insects & other
<i>Sigara vandykei</i>		Insects & other
<i>Sigara washingtonensis</i>		Insects & other
<i>Simulium anduzei</i>		Insects & other
<i>Simulium apricarium</i>		Insects & other
<i>Simulium argus</i>		Insects & other
<i>Simulium balteatum</i>		Insects & other
<i>Simulium bivittatum</i>		Insects & other
<i>Simulium brevicercum</i>		Insects & other
<i>Simulium bricenoi</i>		Insects & other
<i>Simulium canadensis</i>		Insects & other
<i>Simulium canonicolum</i>		Insects & other
<i>Simulium carbunculum</i>		Insects & other
<i>Simulium chromatinum</i>		Insects & other
<i>Simulium chromocentrum</i>		Insects & other
<i>Simulium clarum</i>		Insects & other
<i>Simulium conicum</i>		Insects & other
<i>Simulium craigi</i>		Insects & other

Simulium curiei		Insects & other
Simulium decorum		Insects & other
Simulium defoliarti		Insects & other
Simulium donovani		Insects & other
Simulium enciso		Insects & other
Simulium exculatum		Insects & other
Simulium freemani		Insects & other
Simulium griseum		Insects & other
Simulium hechti		Insects & other
Simulium hippovorum		Insects & other
Simulium hunteri		Insects & other
Simulium infernale		Insects & other
Simulium iriartei		Insects & other
Simulium jacumbae		Insects & other
Simulium jocular		Insects & other
Simulium longithallum		Insects & other
Simulium meridionale		Insects & other
Simulium modicum		Insects & other
Simulium mysterium		Insects & other
Simulium nebulosum		Insects & other
Simulium negativum		Insects & other
Simulium notatum		Insects & other
Simulium paynei		Insects & other
Simulium petersoni		Insects & other
Simulium pilosum		Insects & other
Simulium piperi		Insects & other
Simulium pugetense		Insects & other
Simulium quadratum		Insects & other
Simulium rostratum		Insects & other
Simulium saxosum		Insects & other
Simulium silvestre		Insects & other
Simulium tescorum		Insects & other
Simulium tribulatum		Insects & other
Simulium twinni		Insects & other
Simulium vandalicum		Insects & other
Simulium venator		Insects & other
Simulium venustum		Insects & other
Simulium virgatum		Insects & other
Simulium vittatum		Insects & other
Simulium wyomingense		Insects & other
Simulium zephyrus		Insects & other

<i>Sinapis alba</i>	NA	Plants
<i>Siphatales bicolor bicolor</i>	Klamath tui chub	Fishes
<i>Siphatales bicolor obesus</i>	Lahontan stream tui chub	Fishes
<i>Siphatales bicolor pectinifer</i>	Lahontan lake tui chub	Fishes
<i>Siphatales bicolor snyderi</i>	Owens tui chub	Fishes
<i>Siphatales bicolor ssp. 1</i>	Eagle Lake tui chub	Fishes
<i>Siphatales bicolor ssp. 11</i>	High Rock Spring Tui Chub	Fishes
<i>Siphatales mohavensis</i>	Mojave tui chub	Fishes
<i>Siphatales thalassinus ssp. 1</i>	Pit River tui chub	Fishes
<i>Siphatales thalassinus thalassinus</i>	Goose Lake tui chub	Fishes
<i>Siphatales thalassinus vaccaceps</i>	Cow Head tui chub	Fishes
<i>Siphonurus columbianus</i>	A Mayfly	Insects & other
<i>Siphonurus occidentalis</i>	A Mayfly	Insects & other
<i>Siphonurus spectabilis</i>	A Mayfly	Insects & other
<i>Sisko oregona</i>		Insects & other
<i>Sisko sisko</i>		Insects & other
<i>Sisyra vicaria</i>		Insects & other
<i>Sisyrinchium californicum</i>	Golden Blue-eyed-grass	Plants
<i>Sisyrinchium elmeri</i>	Elmer's Blue-eyed-grass	Plants
<i>Sisyrinchium longipes</i>	Timberland Blue-eyed-grass	Plants
<i>Sium suave</i>	Hemlock Water-parsnip	Plants
<i>Skwala americana</i>	American Springfly	Insects & other
<i>Skwala curvata</i>	Curved Springfly	Insects & other
<i>Smicridea arizonensis</i>	A Caddisfly	Insects & other
<i>Smicridea dispar</i>	A Caddisfly	Insects & other
<i>Smicridea fasciatella</i>	A Caddisfly	Insects & other
<i>Smicridea signata</i>		Insects & other
<i>Solidago elongata</i>		Plants
<i>Solidago guiradonis</i>	Guirado's Goldenrod	Plants
<i>Solidago lepida salebrosa</i>		Plants
<i>Solidago spectabilis</i>	Nevada Goldenrod	Plants
<i>Soliperla campanula</i>		Insects & other
<i>Soliperla quadrispinula</i>	Four-spined Roachfly	Insects & other
<i>Soliperla sierra</i>	Sierra Roachfly	Insects & other
<i>Soliperla thyra</i>	California Roachfly	Insects & other
<i>Soliperla tillamook</i>		Insects & other
<i>Somatochlora albicincta</i>	Ringed Emerald	Insects & other
<i>Somatochlora minor</i>		Insects & other
<i>Somatochlora semicircularis</i>	Mountain Emerald	Insects & other
<i>Sorex palustris</i>	American Water Shrew	Mammals

Soyedina interrupta		Insects & other
Soyedina nevadensis	Nevada Forestfly	Insects & other
Soyedina producta	Knobbed Forestfly	Insects & other
Sparganium angustifolium	Narrowleaf Bur-reed	Plants
Sparganium emersum		Plants
Sparganium eurycarpum eurycarpum		Plants
Sparganium eurycarpum greenei		Plants
Sparganium natans	Small Bur-reed	Plants
Spartina densiflora	NA	Plants
Spartina foliosa	California Cordgrass	Plants
Spartina gracilis	Alkali Cordgrass	Plants
Spea hammondii	Western Spadefoot	Herps
Spea intermontana	Great Basin Spadefoot	Herps
Sperchon stellata		Insects & other
Sphaerium occidentale		Mollusks
Sphaerium patella	Rocky Mountain Fingernailclam	Mollusks
Sphaerium striatum		Mollusks
Sphenosciadium capitellatum	Swamp Whiteheads	Plants
Spiranthes romanzoffiana	Hooded Ladies'-tresses	Plants
Spirinchus thaleichthys	Longfin smelt	Fishes
Spirodela polyrhiza	NA	Plants
Stachys ajugoides	Bugle Hedge-nettle	Plants
Stachys albens	White-stem Hedge-nettle	Plants
Stachys chamissonis chamissonis	Coast Hedge-nettle	Plants
Stachys pycnantha	Short-spike Hedge-nettle	Plants
Stachys rigida quercetorum		Plants
Stachys stricta	Sonoma Hedge-nettle	Plants
Stactobiella brustia		Insects & other
Stactobiella delira	A Caddisfly	Insects & other
Stactobiella palmata		Insects & other
Stagnicola caperata	Wrinkled Marshsnail	Mollusks
Stagnicola elodes	Marsh Pondsnaill	Mollusks
Stagnicola gabbi	Striate Pondsnaill	Mollusks
Stagnicola traski	Widelip Pondsnaill	Mollusks
Stegopterna acra		Insects & other
Stegopterna permutata		Insects & other
Stegopterna xantha		Insects & other
Stellaria littoralis	Beach Starwort	Plants
Stemodia durantifolia	White-woolly Stemodia	Plants
Stenelmis calida calida	Devil's Hole Warm Spring Riffle Beetle	Insects & other

<i>Stenelmis lariversi</i>		Insects & other
<i>Stenelmis moapa</i>		Insects & other
<i>Stenelmis occidentalis</i>		Insects & other
<i>Stenochironomus colei</i>		Insects & other
<i>Stenochironomus fuscipatellus</i>		Insects & other
<i>Stenochironomus hilaris</i>		Insects & other
<i>Stenochironomus totifuscus</i>		Insects & other
<i>Stenocolus scutellaris</i>		Insects & other
<i>Stenocypris archoplites</i>	An Ostracod	Crustaceans
<i>Stictochironomus naevus</i>		Insects & other
<i>Stictochironomus quagga</i>		Insects & other
<i>Stictotarsus aequinoctialis</i>		Insects & other
<i>Stictotarsus coelamboides</i>		Insects & other
<i>Stictotarsus corvinus</i>		Insects & other
<i>Stictotarsus decemsignatus</i>		Insects & other
<i>Stictotarsus deceptus</i>		Insects & other
<i>Stictotarsus dolerosus</i>		Insects & other
<i>Stictotarsus eximius</i>		Insects & other
<i>Stictotarsus expositus</i>		Insects & other
<i>Stictotarsus funereus</i>		Insects & other
<i>Stictotarsus griseostriatus</i>		Insects & other
<i>Stictotarsus panaminti</i>		Insects & other
<i>Stictotarsus roffi</i>		Insects & other
<i>Stictotarsus spectabilis</i>		Insects & other
<i>Stictotarsus striatellus</i>		Insects & other
<i>Streptocephalus dorotheae</i>	New Mexico Fairy Shrimp	Crustaceans
<i>Streptocephalus mackini</i>		Crustaceans
<i>Streptocephalus sealii</i>	Spinytail Fairy Shrimp	Crustaceans
<i>Streptocephalus texanus</i>	Greater Plains Fairy Shrimp	Crustaceans
<i>Streptocephalus woottoni</i>	Riverside Fairy Shrimp	Crustaceans
<i>Streptopus amplexifolius americanus</i>		Plants
<i>Strix nebulosa</i>	Great Gray Owl	Birds
<i>Stuckenia filiformis alpina</i>		Plants
<i>Stuckenia pectinata</i>		Plants
<i>Stuckenia striata</i>		Plants
<i>Stygaldiella affinis</i>		Insects & other
<i>Stygaldiella arizonica</i>		Insects & other
<i>Stygobromus cherylae</i>	Barr's Amphipod	Crustaceans
<i>Stygobromus cowani</i>	Cowan's Amphipod	Crustaceans
<i>Stygobromus gallawayae</i>	Gallaway's Amphipod	Crustaceans

<i>Stygobromus gradyi</i>	Grady's Cave Amphipod	Crustaceans
<i>Stygobromus grahami</i>	A Cave Obligate Amphipod	Crustaceans
<i>Stygobromus harai</i>	Hara's Cave Amphipod	Crustaceans
<i>Stygobromus hyporheicus</i>	Hypoheic Amphipod	Crustaceans
<i>Stygobromus imperialis</i>	Imperial Amphipod	Crustaceans
<i>Stygobromus lacicolus</i>	Lake Tahoe Amphipod	Crustaceans
<i>Stygobromus mackenziei</i>	Mackenzie's Cave Amphipod	Crustaceans
<i>Stygobromus myersae</i>	Myers' Amphipod	Crustaceans
<i>Stygobromus mysticus</i>	A Cave Obligate Amphipod	Crustaceans
<i>Stygobromus rudolphi</i>	Rudolph's Amphipod	Crustaceans
<i>Stygobromus sheldoni</i>	Sheldon Stygobromid	Crustaceans
<i>Stygobromus sierrensis</i>	A Cave Obligate Amphipod	Crustaceans
<i>Stygobromus tahoensis</i>	Lake Tahoe Stygobromid	Crustaceans
<i>Stygobromus trinus</i>	Trinity County Amphipod	Crustaceans
<i>Stygobromus wengerorum</i>	Wenger Cave Stygobromid	Crustaceans
<i>Stygonyx courtneyi</i>		Crustaceans
<i>Stygoporus oregonensis</i>		Insects & other
<i>Stylurus intricatus</i>	Brimstone Clubtail	Insects & other
<i>Stylurus olivaceus</i>	Olive Clubtail	Insects & other
<i>Stylurus plagiatus</i>	Russet-tipped Clubtail	Insects & other
<i>Suaeda calceoliformis</i>	American Sea-blite	Plants
<i>Suaeda californica</i>	California Sea-blite	Plants
<i>Suaeda esteroa</i>	Estuary Suaeda	Plants
<i>Sublettea coffmani</i>		Insects & other
<i>Subularia aquatica americana</i>	Water Awlwort	Plants
<i>Suphisellus bicolor</i>		Insects & other
<i>Susulus venustus</i>	Beautiful Springfly	Insects & other
<i>Suwallia amoenacolens</i>		Insects & other
<i>Suwallia autumnna</i>		Insects & other
<i>Suwallia dubia</i>	Pale Sallfly	Insects & other
<i>Suwallia lineosa</i>		Insects & other
<i>Suwallia pallidula</i>	Yellow Sallfly	Insects & other
<i>Suwallia shepardii</i>	A Stonefly	Insects & other
<i>Suwallia sierra</i>	Sierra Sallfly	Insects & other
<i>Suwallia starki</i>		Insects & other
<i>Suwallia sublimis</i>	A Stonefly	Insects & other
<i>Sweltsa adamantea</i>		Insects & other
<i>Sweltsa borealis</i>	Boreal Sallfly	Insects & other
<i>Sweltsa californica</i>	Chico Sallfly	Insects & other
<i>Sweltsa coloradensis</i>	Colorado Sallfly	Insects & other
<i>Sweltsa continua</i>	Gabriel Sallfly	Insects & other

<i>Sweltsa exquisita</i>		Insects & other
<i>Sweltsa fidelis</i>	Mountain Sallfly	Insects & other
<i>Sweltsa lamba</i>		Insects & other
<i>Sweltsa occidens</i>		Insects & other
<i>Sweltsa oregonensis</i>		Insects & other
<i>Sweltsa pacifica</i>	Pacific Sallfly	Insects & other
<i>Sweltsa pisteri</i>	Coastal Sallfly	Insects & other
<i>Sweltsa resima</i>	California Sallfly	Insects & other
<i>Sweltsa revelstoka</i>		Insects & other
<i>Sweltsa salix</i>	A Stonefly	Insects & other
<i>Sweltsa tamalpa</i>	Tamalpais Sallfly	Insects & other
<i>Sweltsa townesi</i>	Sierra Sallfly	Insects & other
<i>Sweltsa umbonata</i>	Shasta Sallfly	Insects & other
<i>Sweltsa yurok</i>	A Stonefly	Insects & other
<i>Symbiocladius equitans</i>		Insects & other
<i>Sympetrum corruptum</i>	Variegated Meadowhawk	Insects & other
<i>Sympetrum costiferum</i>	Saffron-winged Meadowhawk	Insects & other
<i>Sympetrum danae</i>	Black Meadowhawk	Insects & other
<i>Sympetrum illotum</i>	Cardinal Meadowhawk	Insects & other
<i>Sympetrum internum</i>	Cherry-faced Meadowhawk	Insects & other
<i>Sympetrum madidum</i>	Red-veined Meadowhawk	Insects & other
<i>Sympetrum obtrusum</i>	White-faced Meadowhawk	Insects & other
<i>Sympetrum occidentale</i>		Insects & other
<i>Sympetrum pallipes</i>	Striped Meadowhawk	Insects & other
<i>Sympetrum signiferum</i>		Insects & other
<i>Sympetrum vicinum</i>	Autumn Meadowhawk	Insects & other
<i>Symphyotrichum bracteolatum</i>		Plants
<i>Symphyotrichum frondosum</i>	Alkali Aster	Plants
<i>Symphyotrichum lanceolatum hesperium</i>	Siskiyou Aster	Plants
<i>Symphyotrichum lanceolatum lanceolatum</i>	NA	Plants
<i>Symphyotrichum lentum</i>	Suisun Marsh Aster	Plants
<i>Sympotthastia diastena</i>		Insects & other
<i>Syncaris pacifica</i>	California Freshwater Shrimp	Crustaceans
<i>Syncaris pasadenae</i>	Pasadena Freshwater Shrimp	Crustaceans
<i>Synendotendipes luski</i>		Insects & other
<i>Tachycineta bicolor</i>	Tree Swallow	Birds
<i>Taenionema californicum</i>	California Willowfly	Insects & other
<i>Taenionema grinnelli</i>	Angeles Willowfly	Insects & other
<i>Taenionema jacobii</i>		Insects & other
<i>Taenionema jeanae</i>	A Stonefly	Insects & other

Taenionema jewetti		Insects & other
Taenionema kincaidi	Pale Willowfly	Insects & other
Taenionema oregonense		Insects & other
Taenionema pacificum	Pacific Willowfly	Insects & other
Taenionema pallidum	Common Willowfly	Insects & other
Taenionema raynorum	Yosemite Willowfly	Insects & other
Taenionema uinta		Insects & other
Taenionema umatilla		Insects & other
Taeniopteryx nivalis	Boreal Willowfly	Insects & other
Talitroides alluaudi		Crustaceans
Talitroides topitotum		Crustaceans
Tanypteryx hageni	Black Petaltail	Insects & other
Tanypus carinatus		Insects & other
Tanypus grodhausi		Insects & other
Tanypus imperialis		Insects & other
Tanypus neopunctipennis		Insects & other
Tanypus nubifer		Insects & other
Tanypus parastellatus		Insects & other
Tanypus punctipennis		Insects & other
Tanypus stellatus		Insects & other
Tanytarsus angulatus		Insects & other
Tanytarsus challeti		Insects & other
Tanytarsus dendyi		Insects & other
Tanytarsus hastatus		Insects & other
Tanytarsus limneticus		Insects & other
Tanytarsus mendax		Insects & other
Tanytarsus neoflavellus		Insects & other
Tanytarsus pelsuei		Insects & other
Taricha granulosa	Rough-skinned Newt	Herps
Taricha rivularis	Red-bellied Newt	Herps
Taricha sierrae	Sierra Newt	Herps
Taricha torosa	Coast Range Newt	Herps
Taxus brevifolia		Plants
Telebasis salva	Desert Firetail	Insects & other
Telmatogeton alaskensis		Insects & other
Telmatogeton japonicus		Insects & other
Telmatogeton macswaini		Insects & other
Telmatogeton spinosus		Insects & other
Telmatogeton trilobatus		Insects & other
Teloleuca bifasciata		Insects & other
Teloleuca pellucens		Insects & other

<i>Tempisquitoneura merrillorum</i>		Insects & other
<i>Tethymyia aptena</i>		Insects & other
<i>Thalassosmittia clavicornis</i>		Insects & other
<i>Thalassosmittia marina</i>		Insects & other
<i>Thalassosmittia pacifica</i>		Insects & other
<i>Thalassotrechus barbarae</i>		Insects & other
<i>Thaleichthys pacificus</i>	Eulachon	Fishes
<i>Thamnocephalus mexicanus</i>		Crustaceans
<i>Thamnocephalus platyurus</i>	Beavertail Fairy Shrimp	Crustaceans
<i>Thamnophis atratus atratus</i>	Santa Cruz Gartersnake	Herps
<i>Thamnophis atratus hydrophilus</i>	Oregon Gartersnake	Herps
<i>Thamnophis atratus zaxanthus</i>	Diablo Range Gartersnake	Herps
<i>Thamnophis couchii</i>	Sierra Gartersnake	Herps
<i>Thamnophis elegans elegans</i>	Mountain Gartersnake	Herps
<i>Thamnophis elegans terrestris</i>	Coast Gartersnake	Herps
<i>Thamnophis elegans vagrans</i>	Wandering Gartersnake	Herps
<i>Thamnophis gigas</i>	Giant Gartersnake	Herps
<i>Thamnophis hammondi hammondi</i>	Two-striped Gartersnake	Herps
<i>Thamnophis hammondi ssp. 1</i>	Santa Catalina Gartersnake	Herps
<i>Thamnophis marcianus marcianus</i>	Marcy's Checkered Gartersnake	Herps
<i>Thamnophis ordinoides</i>	Northwestern Gartersnake	Herps
<i>Thamnophis sirtalis fitchi</i>	Valley Gartersnake	Herps
<i>Thamnophis sirtalis infernalis</i>	California Red-sided Gartersnake	Herps
<i>Thamnophis sirtalis sirtalis</i>	Common Gartersnake	Herps
<i>Thamnophis sirtalis ssp. 1</i>	South Coast Gartersnake	Herps
<i>Thamnophis sirtalis tetrataenia</i>	San Francisco Gartersnake	Herps
<i>Thelypteris puberula sonorensis</i>	NA	Plants
<i>Thermonectus intermedius</i>		Insects & other
<i>Thermonectus marmoratus</i>		Insects & other
<i>Thermonectus nigrofasciatus nigrofasciatus</i>		Insects & other
<i>Thermonectus sibleyi</i>		Insects & other
<i>Thienemannimyia barberi</i>		Insects & other
<i>Thienemannimyia fusciceps</i>		Insects & other
<i>Thienemannimyia norena</i>		Insects & other
<i>Thraulodes brunneus</i>		Insects & other
<i>Thraulodes gonzalesi</i>		Insects & other
<i>Thraulodes tenulineus</i>		Insects & other
<i>Throscinus crotchi</i>		Insects & other
<i>Timpanoga hecuba</i>	A Mayfly	Insects & other

<i>Tinodes belisus</i>	A Caddisfly	Insects & other
<i>Tinodes cascadius</i>	A Caddisfly	Insects & other
<i>Tinodes consuetus</i>	A Caddisfly	Insects & other
<i>Tinodes gabriella</i>	A Caddisfly	Insects & other
<i>Tinodes parvulus</i>	A Caddisfly	Insects & other
<i>Tinodes powelli</i>	A Caddisfly	Insects & other
<i>Tinodes provo</i>	A Caddisfly	Insects & other
<i>Tinodes schusteri</i>	A Caddisfly	Insects & other
<i>Tinodes sigodanus</i>	A Caddisfly	Insects & other
<i>Tinodes siskiyou</i>	A Caddisfly	Insects & other
<i>Tinodes twilus</i>	A Caddisfly	Insects & other
<i>Tinodes usillus</i>	A Caddisfly	Insects & other
<i>Tlalocomyia andersoni</i>		Insects & other
<i>Tlalocomyia osbornii</i>		Insects & other
<i>Tlalocomyia ramifera</i>		Insects & other
<i>Tlalocomyia stewarti</i>		Insects & other
<i>Torreyochloa pallida</i>	NA	Plants
<i>Toxicoscordion fontanum</i>	NA	Plants
<i>Toxicoscordion micranthum</i>	NA	Plants
<i>Toxicoscordion venenosum venenosum</i>		Plants
<i>Toxorhynchites moctezuma</i>		Insects & other
<i>Tramea calverti</i>		Insects & other
<i>Tramea lacerata</i>	Black Saddlebags	Insects & other
<i>Tramea onusta</i>	Red Saddlebags	Insects & other
<i>Traverella albertana</i>		Insects & other
<i>Trepobates becki</i>		Insects & other
<i>Trepobates pictus</i>		Insects & other
<i>Trepobates taylori</i>		Insects & other
<i>Trepobates trepidus</i>		Insects & other
<i>Triaenodes frontalis</i>		Insects & other
<i>Triaenodes injustus</i>		Insects & other
<i>Triaenodes reuteri</i>		Insects & other
<i>Triaenodes tardus</i>	A Caddisfly	Insects & other
<i>Tribelos jucundum</i>		Insects & other
<i>Tribelos subatrum</i>		Insects & other
<i>Tribelos subletteorum</i>		Insects & other
<i>Trichocorixa arizonensis</i>		Insects & other
<i>Trichocorixa calva</i>		Insects & other
<i>Trichocorixa reticulata</i>		Insects & other
<i>Trichocorixa uhleri</i>		Insects & other

Trichocorixa verticalis		Insects & other
Tricorythodes condylus		Insects & other
Tricorythodes explicatus	A Mayfly	Insects & other
Tricorythodes fictus	A Mayfly	Insects & other
Triglochin maritima	Common Bog Arrow-grass	Plants
Triglochin palustris	Slender Bog Arrow-grass	Plants
Triglochin scilloides	NA	Plants
Triglochin striata	Three-ribbed Arrow-grass	Plants
Tringa melanoleuca	Greater Yellowlegs	Birds
Tringa semipalmata	Willet	Birds
Tringa solitaria	Solitary Sandpiper	Birds
Triops longicaudatus	Summer tadpole shrimps	Crustaceans
Triznaka pintada	Rough Sallfly	Insects & other
Triznaka sheldoni		Insects & other
Triznaka signata		Insects & other
Tropicus pusillus		Insects & other
Tropisternus californicus		Insects & other
Tropisternus columbianus		Insects & other
Tropisternus ellipticus		Insects & other
Tropisternus lateralis		Insects & other
Tropisternus orvus		Insects & other
Tropisternus salsamentus		Insects & other
Tropisternus sublaevis		Insects & other
Tryonia margae	Grapevine Springs Elongate Tryonia	Mollusks
Tryonia porrecta	Desert Tryonia	Mollusks
Tryonia rowlandsi	Grapevine Springs Squat Tryonia	Mollusks
Tryonia salina	Cottonball Marsh Tryonia	Mollusks
Tryonia variegata	Amargosa Tryonia	Mollusks
Tuctoria greenei	Green's Awnless Orcutt Grass	Plants
Tuctoria mucronata	Mucronate Orcutt Grass	Plants
Tvetenia vitracies		Insects & other
Twinnia hirticornis		Insects & other
Typha domingensis	Southern Cattail	Plants
Typha latifolia	Broadleaf Cattail	Plants
Uca crenulata		Crustaceans
Uranotaenia anhydor		Insects & other
Utacapnia columbiana	Columbian Snowfly	Insects & other
Utacapnia imbera		Insects & other
Utacapnia lemoniana		Insects & other
Utacapnia sierra	Sierra Snowfly	Insects & other
Utacapnia tahoensis	Tahoe Snnowflyl	Insects & other

<i>Utaperla sopladora</i>		Insects & other
<i>Utaxatax californiensis</i>		Insects & other
<i>Utaxatax newelli</i>		Insects & other
<i>Utaxatax ovalis</i>		Insects & other
<i>Utricularia gibba</i>	Humped Bladderwort	Plants
<i>Utricularia intermedia</i>	Flatleaf Bladderwort	Plants
<i>Utricularia macrorhiza</i>	Greater Bladderwort	Plants
<i>Utricularia minor</i>	Lesser Bladderwort	Plants
<i>Utricularia ochroleuca</i>	Northern Bladderwort	Plants
<i>Utricularia subulata</i>	NA	Plants
<i>Uvarus amandus</i>		Insects & other
<i>Uvarus subtilis</i>		Insects & other
<i>Vaccinium macrocarpon</i>	NA	Plants
<i>Vaccinium uliginosum occidentale</i>		Plants
<i>Vaccupernius packeri</i>		Insects & other
<i>Valvata humeralis</i>	Glossy Valvata	Mollusks
<i>Valvata tricarinata</i>		Mollusks
<i>Valvata utahensis</i>		Mollusks
<i>Valvata virens</i>	Emerald Valvata	Mollusks
<i>Veratrum fimbriatum</i>	Fringed False Hellebore	Plants
<i>Verbena scabra</i>	Sandpaper Vervain	Plants
<i>Veronica americana</i>	American Speedwell	Plants
<i>Veronica anagallis-aquatica</i>	NA	Plants
<i>Veronica catenata</i>	NA	Plants
<i>Veronica peregrina</i>	NA	Plants
<i>Veronica scutellata</i>	Marsh-speedwell	Plants
<i>Vertigo ovata</i>	Ovate Vertigo	Mollusks
<i>Vespericola armiger</i>	Santa Cruz Hesperian	Mollusks
<i>Vespericola embertoni</i>	Reeves Canyon Hesperian Snail	Mollusks
<i>Vespericola eritrichius</i>	Velvet Hesperian	Mollusks
<i>Vespericola euthales</i>	A Terrestrial Snail	Mollusks
<i>Vespericola haplus</i>	Butte Creek Hesperian	Mollusks
<i>Vespericola karokorum</i>	Karok Hesperian	Mollusks
<i>Vespericola klamathicus</i>	Klamath Hesperian	Mollusks
<i>Vespericola marinensis</i>	Marin Hesperian	Mollusks
<i>Vespericola megasoma</i>	Redwood Hesperian	Mollusks
<i>Vespericola orius</i>	El Dorado Hesperian	Mollusks
<i>Vespericola pilosus</i>	Brushfield Hesperian	Mollusks
<i>Vespericola pinicola</i>	Monterey Hesperian	Mollusks
<i>Vespericola pressleyi</i>	Big Bar Hesperian	Mollusks

<i>Vespericola rhodophila</i>	Azalea Hesperian Snail	Mollusks
<i>Vespericola rothi</i>	Ellery Creek Hesperian	Mollusks
<i>Vespericola sasquatch</i>	Sasquatch Hesperian Snail	Mollusks
<i>Vespericola scotti</i>	Benson Gulch Hesperian	Mollusks
<i>Vespericola shasta</i>	Shasta Hesperian	Mollusks
<i>Vespericola sierranus</i>	Siskiyou Hesperian	Mollusks
<i>Viola langsdorffii</i>	NA	Plants
<i>Viola macloskeyi</i>	NA	Plants
<i>Vireo bellii</i>	Bell's Vireo	Birds
<i>Vireo bellii arizonae</i>	Arizona Bell's Vireo	Birds
<i>Vireo bellii pusillus</i>	Least Bell's Vireo	Birds
<i>Visoka cataractae</i>	Cataract Forestfly	Insects & other
<i>Vorticifex effusa effusa</i>	Artemesian Rams-horn	Mollusks
<i>Vorticifex solida</i>	A Freshwater Snail	Mollusks
<i>Wolffia arrhiza</i>	NA	Plants
<i>Wolffia borealis</i>	Dotted Watermeal	Plants
<i>Wolffia brasiliensis</i>	Pointed Watermeal	Plants
<i>Wolffia columbiana</i>	Columbian Watermeal	Plants
<i>Wolffia globosa</i>	Asian Watermeal	Plants
<i>Wolffiella lingulata</i>	Tongue Bogmat	Plants
<i>Wolffiella oblonga</i>	Saber-shape Bogmat	Plants
<i>Wormaldia anilla</i>	A Caddisfly	Insects & other
<i>Wormaldia arizonensis</i>		Insects & other
<i>Wormaldia birneyi</i>	A Caddisfly	Insects & other
<i>Wormaldia gabriella</i>	A Caddisfly	Insects & other
<i>Wormaldia gesugta</i>	A Caddisfly	Insects & other
<i>Wormaldia hamata</i>	A Caddisfly	Insects & other
<i>Wormaldia laona</i>	A Caddisfly	Insects & other
<i>Wormaldia occidea</i>	A Caddisfly	Insects & other
<i>Wormaldia pachita</i>	A Caddisfly	Insects & other
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	Birds
<i>Xenelmis sandersoni</i>		Insects & other
<i>Xenochironomus xenolabis</i>		Insects & other
<i>Xenopelopia tinctoria</i>		Insects & other
<i>Xyrauchen texanus</i>	Razorback sucker	Fishes
<i>Yoraperla brevis</i>	Least Roachfly	Insects & other
<i>Yoraperla mariana</i>		Insects & other
<i>Yoraperla nigrisoma</i>	Black Roachfly	Insects & other
<i>Yoraperla siletz</i>	Coastal Roachfly	Insects & other
<i>Yphria californica</i>	A Caddisfly	Insects & other
<i>Zaitzevia parvula</i>		Insects & other

<i>Zaitzevia posthonia</i>		Insects & other
<i>Zannichellia palustris</i>	Horned Pondweed	Plants
<i>Zapada cinctipes</i>	Common Forestfly	Insects & other
<i>Zapada columbiana</i>	Columbian Forestfly	Insects & other
<i>Zapada cordillera</i>	Cordilleran Forestfly	Insects & other
<i>Zapada frigida</i>	Frigid Forestfly	Insects & other
<i>Zapada haysi</i>	Intermountain Forestfly	Insects & other
<i>Zapada oregonensis</i>	Oregon Forestfly	Insects & other
<i>Zavreliomyia sinuosa</i>		Insects & other
<i>Zavreliomyia thryptica</i>		Insects & other
<i>Zizania palustris interior</i>	NA	Plants
<i>Zizania palustris palustris</i>	NA	Plants
<i>Zoniagrion exclamationis</i>	Exclamation Damselfly	Insects & other
<i>Zumatrichia notosa</i>		Insects & other

Appendix N
20180925 Jordan

[illegible]

Appendix N
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[illegible]

Attribute	Explanation
OBJECTID	Processing field - ignore
Elements_GROUP_	Taxonomic grouping (Mammal, Bird, Fishes, Herps, Mollusks, Crustaceans, Insects & other inverts, Plants)
Elements_ELM_SCINAM	Scientific name
Elements_ELM_COMNAM	Common name
Elements_Fed_list	Status on Federal Endangered Species List as of April 13, 2015
Elements_State_list	Status on California Endangered Species or Sensitive Species lists as of April 13, 2015
Elements_Other_list	Status on other sensitive species lists as of April 13, 2015
Elements_MgtAg_list	Status on land management agency (USFS, BLM) sensitive species lists as of April 13, 2015
ObservationType_ObsTyp_Name	Observation Type Name (e.g., observations, modeled habitat, range, critical habitat)
Format_Fmt_Name	Format Name (Point, Line, Polygon)
HabitatUsage_HabU_Name	Habitat Usage Name (e.g., spawning, migration, breeding, wintering)
Source_Source_Name	Short name for source of species occurrence information

OBJECTID	Source ID	Source Name	Citation	WebLink	Aggregator
1	144	PISCES (Jan 8, 2014 download)	Katz, J. P. Moyle, R. Peek, N. Santos, A. Bell, R. Quiñones, and J. Viers. PIS	http://pisc.es.ucdavis.edu/node	PISCES
3	65	Nevada Wildlife Action Plan 2012 revision	Nevada Department of Wildlife. 2012. Nevada Wildlife Action Plan. Ren	http://www.ndow.org/uploadedFiles/ndoworg/Content/Nevada_WildlifeCo	
5	65	California	California. 2008. The California Database. Berkeley, CA. Available: http://www	http://www.california.org	
9	65	Elkies, S. and D. B. 1989. Fairy Shrimps of California's Puddles, Pools, and Plays			
10	10	NV Natural Heritage Program	Nevada Natural Heritage Program. 2011. Biotics - Nevada Dept of Conservation and Natural Resources. Carson City, NV.		
23	51	BLUMUSU National Aquatic Monitoring Center (aka The Bugla)	Western Center for Monitoring & Assessment of Freshwater Ecosystems. http://www.usu.edu/bugla/		Buglab
40	27	Arizona Natural Heritage Program	Arizona Dept. of Game and Fish. 2011. Arizona Natural Heritage Program	http://www.azgdf.gov/wr_credits/species_concern.shtml	
67	50	Oregon GAP Analysis Wildlife Models	Oregon Biodiversity Information Center. 2004. GAP Wildlife Models. For	http://www.pdx.edu/pnwilamp/wildlife-models	
74	74	Hovsing surveys	Hovsing, P. 2012. Final Basin survey habitats. Direct re		
76	56	SFEI San Francisco Bay Benthic Data	San Francisco Estuary Institute. 2008. SFEI San Francisco Bay Benthic	http://www.sfei.org	
77	68	Subterranean Institute database	Graenich, G.O. et al. 2012. Unpublished data, database report. The Sut	http://www.subinstitute.org/	
89	66	Occurrences approx. from NatureServe Explorer descriptions	NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life	http://www.natureserve.org/explorer	
93	63	Range approx. from NatureServe Explorer descriptions	NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life	http://www.natureserve.org/explorer	
103	103	USFWS Critical Habitat Designation	U.S. Fish and Wildlife Service. 2011. Final Critical Habitat. Fort Collins, C	http://crithab.fws.gov/orthabit	
104	44	SW Regional GAP Wildlife Habitat Relationship	Boykin, KG. et al. 2007. Predicted animal-habitat distributions and speci	http://swreap.nmss.edu/	
105	40	NPS Klamath Network Herp surveys 2002	Bury, RB, LC Gangle III, and S Litrakis. 2002. Inventory for Amphibians	http://irmaffiles.nps.gov/reference/holding/472918	
106	41	Sierra NV Nat Forests Critical Aquatic Refuges	US Forest Service. 2006. Critical Aquatic Refuges in Sierra Nevada Nat	http://www.fs.usda.gov/detail/sil/landmanagement/qis/?cid=fsdevdev_0483	
123	3	Jeannette "Mussel Sites 2009 Final"	Howard, JK. 2010. Sensitive Freshwater Mussel Surveys in the Pacific S		
124	124	Jeannette "Forest Service Mussel Sites 062810v2"	Howard, JK. 2010. Sensitive Freshwater Mussel Surveys in the Pacific S		
125	5	Jeannette "Mussel Sites Final"	Howard, JK. 2010. Sensitive Freshwater Mussel Surveys in the Pacific S		
126	14	California Wildlife Habitat Relationships	California Department of Fish and Game. 2009. California Wildlife Hab	http://www.dfg.ca.gov/bioeoddata/cwhr/downloads/GIS/cwhr_qis.xml	CWHR
128	28	BIOS Tuolumne aquatic surveys ds193	California Department of Fish and Game. 2009. Tuolumne Aquatic Reso	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
129	29	BIOS Hepps ds694	Groff, L. 2010. Herpetofauna Surveys, Northern California. Humboldt Sta	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
130	30	BIOS Wildlife surveys ds325	Garrison, BA. 2005. Wildlife Surveys - GDFP Lands, Region 2. CA Dep	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
131	32	BIOS mussel sites 2010 ds662	Krall, M. C Tennant, and ML Westover. 2010. Mussel Sites, Klamath Riv	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
132	32	BIOS mussel sites 2007 ds661	Krall, M. C Tennant, and ML Westover. 2007. Mussel Sites, Klamath Riv	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
133	38	BIOS ds323	Garrison, BA. 2005. Herp Coverboard Sampling - Spears and Didion Rat	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
134	31	BIOS Western Pond Turtle ds313	California Department of Fish and Game. 2010. Western Pond Turtle Ot	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
135	35	BIOS ds431	Spiegelberg, M. 2009. Sensitive Plants - Center for Natural Lands Manag	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
136	35	BIOS San Diego plants ds121	San Diego Dept. of Planning and Land Use. 2005. Species on San Diego	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
137	36	BIOS ds458	Spiegelberg, M. 2007. Sensitive Plants - Center for Natural Lands Manag	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
138	37	BIOS ds324	Garrison, BA. 2006. Herp Coverboard Sampling - Spears and Didion Rat	http://bios.dfg.ca.gov/dataset/index.asp	BIOS
142	145	SWAMP via CEDEN. Download 10 April 2014, Obs before 15	California State Water Resources Control Board. 2014. Surface Water Ai	http://www.ceden.org	SWAMP
143	143	J Howard mussel data compilation	Howard, J. 2014. Sensitive Freshwater Mussel Surveys Unpublished		
147	147	Frest and Johannes 1995	Frest, T.J. and E. J. Johannes. 1995. Interior Columbia Basin mollusk s		
148	150	Points approximated from Hershler et al. 2007. Extensive dive	Hershler et al. 2007. Extensive diversification of pebblesnails (Lithoglyphi	http://onlinelibrary.wiley.com/doi/10.1111/1096-3642.2007.00243.x/abstr	
149	151	California Natural Diversity Database (4/2016) - Sensitive	California Department of Fish and Wildlife. 2014. California Natural Divers	http://www.dfg.ca.gov/bioeoddata/cnddb/	CNDDb
150	153	California Natural Diversity Database (4/2016) - Sensitive	California Department of Fish and Wildlife. 2014. California Natural Divers	http://www.dfg.ca.gov/bioeoddata/cnddb/	CNDDb
153	163	Mussel ranges based on Xerces HUCs occurrence or J Howa	Howard, J. 2014. Freshwater Mussel Range Analysis (Unpublished data		
158	161	CAS HERP	California Academy of Sciences. Herpetology Collection. 2014. Species R	http://www.herpnet.org/	HerpNet
159	162	CAS SUA	California Academy of Sciences. Amphibian Collection. 2014. Species Re	http://www.herpnet.org/	HerpNet
160	163	CAS SUR	California Academy of Sciences. Reptile Collection. 2014. Species Reco	http://www.herpnet.org/	HerpNet
161	164	CAM Herps	Carnegie Museum of Natural History. Herpetology Collection. 2014. Spec	http://www.herpnet.org/	HerpNet
162	165	CAC HERP-V	Cincinnati Museum Center. Herpetology Vouchers. 2014. Species Reco	http://www.herpnet.org/	HerpNet
163	166	CUMV Amphibian	Cornell University Museum of Vertebrates. Amphibian Collection. 2014. S	http://www.herpnet.org/	HerpNet
164	167	CUMV Reptile	Cornell University Museum of Vertebrates. Reptile Collection. 2014. Spec	http://www.herpnet.org/	HerpNet
165	168	KU KUH	University of Kansas. Herpetology Collection. 2014. Species Records. Ac	http://www.herpnet.org/	HerpNet
166	171	LACM Herps	Natural History Museum of Los Angeles County. Herpetology Collection. 2	http://www.herpnet.org/	HerpNet
167	172	MCZ Herp	Harvard University Museum of Comparative Zoology. Herpetology Collec	http://www.herpnet.org/	HerpNet
168	171	MSB MSBHerp	Museum of Southwestern Biology. Herpetology Collection. 2014. Species	http://www.herpnet.org/	HerpNet
169	172	MSUM HE	Michigan State University Museum. Herpetology Collection. 2014. Species	http://www.herpnet.org/	HerpNet
170	173	MVZ Herp	University of California Berkeley Museum of Vertebrate Zoology. Herpetol	http://www.herpnet.org/	HerpNet
171	174	MMZ Hild	University of California Berkeley Museum of Vertebrate Zoology. Hildebrar	http://www.herpnet.org/	HerpNet
172	175	MZObs Herp	University of California Berkeley Museum of Vertebrate Zoology. Herpetol	http://www.herpnet.org/	HerpNet
173	176	PSM Herp	James R. Slater Museum of Natural History. Herpetology Collection. 2014	http://www.herpnet.org/	HerpNet
174	177	ROM Herps	Royal Ontario Museum. Herpetology Collection. 2014. Species Records. .	http://www.herpnet.org/	HerpNet
175	178	SBMNH HE	Santa Barbara Museum of Natural History. Herpetology Collection. 2014. 1	http://www.herpnet.org/	HerpNet
176	179	SBMNH OS	Santa Barbara Museum of Natural History. Osteological Collection. 2014.	http://www.herpnet.org/	HerpNet
177	179	SDNHM Herps	San Diego Natural History Museum. 2014. Species Reco	http://www.herpnet.org/	HerpNet
178	181	SMNS Herpetologie	Staatliches Museum für Naturkunde Stuttgart. Herpetology Collection. 201	http://www.herpnet.org/	HerpNet
179	182	UA UAMZ HERPETOLOGY	University of Alberta Museum of Zoology. Herpetology Collection. 2014. S	http://www.herpnet.org/	HerpNet
180	183	UBCBM CTC	University of British Columbia Beaty Biodiversity Museum. Cowan Tetrapo	http://www.herpnet.org/	HerpNet
181	184	UCM Herps	University of Colorado Museum of Natural History. Herpetology Collection.	http://www.herpnet.org/	HerpNet
182	185	UNR Herpetology	University of Nevada, Reno. Herpetology Collection. 2014. Species Reco	http://www.herpnet.org/	HerpNet
183	186	USNM Vertebrate Zoology, Amphibians & Reptiles	Smithsonian Institution National Museum of Natural History. Amphibian &	http://www.herpnet.org/	HerpNet
184	187	UWBM Herp	University of Washington Burke Museum. Herpetology Collection. 2014. S	http://www.herpnet.org/	HerpNet
185	188	YPM HER	Yale University Peabody Museum of Natural History. Herpetology Divisi	http://www.herpnet.org/	HerpNet
186	189	ZIN ZISP	Zoological Institute, Russian Academy of Sciences, St. Petersburg. Amphi	http://www.herpnet.org/	HerpNet
187	190	CASENT	California Academy of Sciences. Entomology Collection. 2014. Species R	http://calbug.berkeley.edu/	CalBug
188	191	CIS	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://calbug.berkeley.edu/	CalBug
189	192	CSCA	California State Arthropod Collection. 2014. Species Records. Accessed	http://calbug.berkeley.edu/	CalBug
190	193	EMEC	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://calbug.berkeley.edu/	CalBug
191	194	LACMENT	Los Angeles County Museum. Entomology Collection. 2014. Species Reco	http://calbug.berkeley.edu/	CalBug
192	195	CMC	Oakland Museum of California. 2014. Species Records. Accessed via C	http://calbug.berkeley.edu/	CalBug
193	196	SBMNHENT	Santa Barbara Museum of Natural History. Entomology Collection. 2014. 1	http://calbug.berkeley.edu/	CalBug
194	197	SDNHM	San Diego Natural History Museum. 2014. Species Records. Accessed v	http://calbug.berkeley.edu/	CalBug
195	198	UCBME	University of California, Davis. Bohart Museum. 2014. Species Records. .	http://calbug.berkeley.edu/	CalBug
196	199	UCRCENT	University of California, Riverside. Entomology Research Museum. 2014. 1	http://calbug.berkeley.edu/	CalBug
197	200	UMMZ	University of Michigan Museum of Zoology. 2014. Species Records. Acc	http://calbug.berkeley.edu/	CalBug
198	201	A	President and Fellows of Harvard College. Herbarium of the Arnold Arbore	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
199	202	AMES	President and Fellows of Harvard College. Oakes Ames Orchid Herbarium	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
200	203	BLMAR	Bureau of Land Management, Arcata Field Office. Herbarium. Accessed v	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
201	204	CAS	California Academy of Sciences. Herbarium. Accessed via Consortium of	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
202	205	FOA	California Department of Food and Agriculture. Herbarium. Accessed via	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
203	206	CHSC	California State University, Chico. Chico State Herbarium. Accessed via	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
204	207	CLARK	Riverside Metropolitan Museum. The Clark Herbarium. Accessed via Con	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
205	208	CSUSB	California State University, San Bernardino. Herbarium. Accessed via Con	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
206	209	DS	California Academy of Sciences. Herbarium. Accessed via Consortium of	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
207	210	ECON	Harvard University. Economic Herbarium of Oakes Ames. Accessed via C	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
208	211	GH	Harvard University. Gray Herbarium. Accessed via Consortium of Californ	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
209	212	HSC	Humboldt State University. Herbarium. Accessed via Consortium of Calif	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
210	213	IRVC	University of California, Irvine. Herbarium. Accessed via Consortium of Ca	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
211	214	JEPS	University of California, Berkeley. Jepson Herbarium. Accessed via Cons	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
212	215	JOTR	Joshua Tree National Park. Herbarium. Accessed via Consortium of Calif	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
213	216	JROH	Stanford University. Jasper Ridge Biological Preserve Herbarium. Access	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
214	217	LA	University of California, Los Angeles. Herbarium. Accessed via Consorti	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
215	218	NY	New York Botanical Garden. Herbarium. Accessed via Consortium of Calif	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
216	219	OB	California Polytechnic State University, San Luis Obispo. Herbarium. Acc	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
217	220	POM	Pacific Grove Museum of Natural History. Herbarium. Accessed via Cons	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
218	221	POM	Pomona College. Herbarium. Accessed via Consortium of California Herb	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
219	222	RSA	Rancho Santa Ana Botanic Garden. Herbarium. Accessed via Consortium	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
220	223	SACT	California State University, Sacramento. Herbarium. Accessed via Consor	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
221	224	SBBG	Santa Barbara Botanic Garden. Herbarium. Accessed via Consortium of C	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
222	225	SD	San Diego Natural History Museum. Herbarium. Accessed via Consortium	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
223	226	SEINET	Southwest Environmental Information Network. Herbarium. Accessed via	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
224	227	SVF	California State University, Northridge. Herbarium. Accessed via Consorti	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
225	228	SJSU	San Jose State University. Herbarium. Accessed via Consortium of Calif	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
226	229	UC	University of California, Berkeley. University Herbarium. Accessed via Co	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
227	230	UCD	University of California, Davis. Herbarium. Accessed via Consortium of C	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
228	231	UCLA	University of California, Los Angeles. Herbarium. Accessed via Consorti	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
229	232	UCR	University of California, Riverside. Herbarium. Accessed via Consortium o	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
230	233	UCSB	University of California, Santa Barbara. Herbarium. Accessed via Consorti	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
231	234	VVC	Victor Valley College. Herbarium. Accessed via Consortium of California	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
232	235	YLM-YOSE	Yosemite National Park. Herbarium. Accessed via Consortium of Californi	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
233	236	AUJ Herbarium	The Aarhus University. Herbarium Database. Accessed via Global Biodive	http://www.gbif.org/dataset/833db434-4762-11e1-a439-00145eb4569a	GBIF
234	237	AZESC SBMNH-ENT	Santa Barbara Museum of Natural History. California Beetle Project. Acce	http://www.gbif.org/dataset/84b130ac-4762-11e1-a439-00145eb4569a	GBIF
235	238	ANSP Indo-Pacific Mollusc DB	Academy of Natural Sciences. Ocean Biogeographic Information System	http://www.gbif.org/dataset/83a09216-4762-11e1-a439-00145eb4569a	GBIF
236	239	ANSP Malacology	Academy of Natural Sciences. Malacology Philadelphia. Accessed via Gk	http://www.gbif.org/dataset/862cd8d8-4762-11e1-a439-00145eb4569a	GBIF
237	240	BLB Bird	Ohio State University Museum of Biological Diversity. Borror Laboratory of	http://www.gbif.org/dataset/851f399e-4762-11e1-a439-00145eb4569a	GBIF
238	241	BLB Insects	Ohio State University Museum of Biological Diversity. Charles A. Tripleho	http://www.gbif.org/dataset/84ab7b76-4762-11e1-a439-00145eb4569a	GBIF
239	242	Borror Laboratory of Bioacoustics, Ohio State University, Colu	Ohio State University Museum of Biological Diversity. Borror Laboratory of	http://www.gbif.org/dataset/f11db245-39ff-4fc6-a0cc-12b412408b17	GBIF
240	243	CA. A Triphlemon Insect Collection, Ohio State University, Colum	Ohio State University Museum of Biological Diversity. Charles A. Tripleho	http://www.gbif.org/dataset/84ab7b76-4762-11e1-a439-00145eb4569a	GBIF
241	244	CANB 516055	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
242	245	CANB 516058	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
243	246	CANB 516346	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
244	247	CANB 589789	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
245	248	CANB 762494	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
246	249	CANB 762510	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
247	250	CANB 796487	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
248	251	CANB 796488	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
249	252	CANB 796489	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
250	253	CANB 809935	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
251	254	CANB 825801	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8d8f-4762-11e1-a439-00145eb4569a	GBIF
252	255	CAS BOT	California Academy of Sciences. Botany Collection. Accessed via Global B	http://www.gbif.org/dataset/f934f8e2-32ca-46a7-b2f8-b032a740454	GBIF
253	256	CAS CAS	Consortium of California Herbaria, California Academy of Sciences. Botan	http://www.gbif.org/dataset/84ab9414-b6c6-46c0-b816-9b6b303ca106	GBIF
254	257	CAS DS	California Academy of Sciences. Botany Collection. Accessed via Global B	http://www.gbif.org/dataset/f934f8e2-32ca-46a7-b2f8-b032a740454	GBIF
255	258	CAS HERP	California Academy of Sciences. Herpetology Collection. Accessed via Gk	http://www.gbif.org/dataset/cece4fc2-1fec-4b55-a335-7252548b3f0b	GBIF
256	259	CAS IZ	California Academy of Sciences. Invertebrate Collection. Accessed via Gk	http://www.gbif.org/dataset/44bcd848-ac71-4602-b773-241c3c008b6c	GBIF
257	260	CAS SUA	California Academy of Sciences. Amphibian Collection. Accessed via Gk	http://www.gbif.org/dataset/cece4fc2-1fec-4b55-a335-7252548b3f0b	GBIF
258	261	CAS SUR	California Academy of Sciences. Reptile Collection. Accessed via Global B	http://www.gbif.org/dataset/cece4fc2-1fec-4b55-a335-7252548b3f0b	GBIF
259	262	CASENT Arthropods	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://www.gbif.org/dataset/5d283bb6-644d-4626-8b3b-a4e6b5451393	GBIF
260	263	CASER Herps	Cheadle Center for Biodiversity and Ecological Restoration. Herpetology C	http://www.gbif.org/dataset/1050a336-b87a-44b1-b0ec-f6f6c3d2c8f8	GBIF
261	264	CDA CDA	Consortium of California Herbaria. California Department of Food and Agr	http://www.gbif.org/dataset/4fa89414-b6c6-46c0-b816-9b6b303ca106	GBIF
262	265	CHSC CHSC	Consortium of California Herbaria. California State University, Chico. Acc	http://www.gbif.org/dataset/4fa89414-b6c6-46c0-b816-9b6b303ca106	GBIF
263	267	CIS Arthropods	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://www.gbif.org/dataset/5d283bb6-644d-4626-8b3b-a4e6b5451393	GBIF
264	268	CLARK-A CLARK-A	Consortium of California Herbaria. Riverside Metropolitan Museum Clark	http://www.gbif.org/dataset/4fa89414-b6c6-46c0-b816-9b6b303ca106	GBIF
265	269	CAM Herps	Carnegie Museums. Herpetology Collection. Accessed via Global Biodiver	http://www.gbif.org/dataset/76dd8f0d-2daa-4a69-9fcd-55e0a423034a	GBIF
266	270	CAC HERP-V	Cincinnati Museum Center. Herpetology Vouchers. Accessed via Global E	http://www.gbif.org/dataset/81a675b3-886f-434e-adbe-1b6c43f68a36	GBIF
267	271	CNN CANP	Canadian Museum of Nature Herbarium. Vascular Plant Collection. Acce		

269	272 CMN CMMAR	Canadian Museum of Nature, Amphibian and Reptile Collection - Anura. P	http://www.cbif.org/dataset/830a1f84-7f62-11e1-a439-00145eb45e9a	GBIF
270	273 CMN CMMML	Canadian Museum of Nature Mollusc Collection - Unionoidea. Accessed via	http://www.cbif.org/dataset/830c7b08-7f62-11e1-a439-00145eb45e9a	GBIF
271	274 Consortium of California Herbaria CAS	Consortium of California Herbaria. California Academy of Sciences. Acces	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
272	275 Consortium of California Herbaria CDA	Consortium of California Herbaria. California Department of Food and Agr	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
273	276 Consortium of California Herbaria CHSC	Consortium of California Herbaria. California State University, Chico. Acces	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
274	277 Consortium of California Herbaria DS	Consortium of California Herbaria. California Academy of Sciences. Acces	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
275	278 Consortium of California Herbaria HSC	Consortium of California Herbaria. Humboldt State University. Accessed v	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
276	279 Consortium of California Herbaria HRC	Consortium of California Herbaria. University of California, Irvine. Acces	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
277	280 Consortium of California Herbaria JEPS	Consortium of California Herbaria. University of California, Berkeley Jeps	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
278	281 Consortium of California Herbaria PGM	Consortium of California Herbaria. Pacific Grove Museum of Natural Histo	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
279	282 Consortium of California Herbaria POM	Consortium of California Herbaria. Pomona College Herbaria. Accessed v	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
280	283 Consortium of California Herbaria RSA	Consortium of California Herbaria. Rancho Santa Ana Botanic Garden He	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
281	284 Consortium of California Herbaria SBBG	Consortium of California Herbaria. Santa Barbara Botanic Garden. Acces	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
282	285 Consortium of California Herbaria SD	Consortium of California Herbaria. San Diego Natural History Museum. Ac	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
283	286 Consortium of California Herbaria SDSU	Consortium of California Herbaria. San Diego State University. Accessed	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
284	287 Consortium of California Herbaria SJSU	Consortium of California Herbaria. San Jose State University. Accessed v	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
285	288 Consortium of California Herbaria UC	Consortium of California Herbaria. University of California, Berkeley Univ	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
286	289 Consortium of California Herbaria UCLA	Consortium of California Herbaria. University of California, Los Angeles. A	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
287	290 Consortium of California Herbaria UCR	Consortium of California Herbaria. University of California, Riverside. Acc	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
288	291 Consortium of California Herbaria UCSB	Consortium of California Herbaria. University of California, Santa Barba	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
289	292 Consortium of California Herbaria UCSC	Consortium of California Herbaria. University of California, Santa Cruz. Ac	http://www.cbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
290	293 CSCA Arthropods	University of California, Berkeley - Essig Museum, California Terrestrial Ar	http://www.cbif.org/dataset/5d283bb6-64dd-4626-8b3b-4ae6db5415c3	GBIF
291	294 CSUSB CSUSBS	Consortium of California Herbaria. California State University, San Bernar	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
292	295 CUMIL Sound/Film	Cornell Lab of Ornithology. Macaulay Library Audio and Video Collection. I	http://www.cbif.org/dataset/7f6dd07f-9e4d-40c0-bb71-b2a6c71ed9f1	GBIF
293	296 CUMV Amph	Cornell University Museum of Vertebrates. Amphibian Collection. Accessed	http://www.cbif.org/dataset/4a8e6c0e-5914-427d-993a-55a5250a34	GBIF
294	297 CUMV Rept	Cornell University Museum of Vertebrates. Reptile Collection. Accessed v	http://www.cbif.org/dataset/b90959f3-11e0-4902-9038-10f7111ca6d	GBIF
295	298 DS DS	Consortium of California Herbaria. California Academy of Sciences. Acces	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
296	299 E E	Royal Botanic Garden Edinburgh. Royal Botanic Garden Edinburgh Living	http://www.cbif.org/dataset/7ad20e0c-c955-11de-95c0-b8a03c50a862	GBIF
297	300 EMAP_NCA CAL00	Academy of Natural Sciences. Ocean Biogeographic Information System I	http://www.cbif.org/dataset/638bb5ee-7f62-11e1-a439-00145eb45e9a	GBIF
298	301 EMAP_NCA CAL02	Academy of Natural Sciences. Ocean Biogeographic Information System I	http://www.cbif.org/dataset/638bb5ee-7f62-11e1-a439-00145eb45e9a	GBIF
299	302 EMAP_NCA CAL03	Academy of Natural Sciences. Ocean Biogeographic Information System I	http://www.cbif.org/dataset/638bb5ee-7f62-11e1-a439-00145eb45e9a	GBIF
300	303 EMAP_NCA CAL09	Academy of Natural Sciences. Ocean Biogeographic Information System I	http://www.cbif.org/dataset/638bb5ee-7f62-11e1-a439-00145eb45e9a	GBIF
301	304 EMAP_NCA COL00	Academy of Natural Sciences. Ocean Biogeographic Information System I	http://www.cbif.org/dataset/638bb5ee-7f62-11e1-a439-00145eb45e9a	GBIF
302	306 EMAP_NCA COL09	Academy of Natural Sciences. Ocean Biogeographic Information System I	http://www.cbif.org/dataset/638bb5ee-7f62-11e1-a439-00145eb45e9a	GBIF
303	304 ENEC Arthropods	University of California, Berkeley - Essig Museum, California Terrestrial Ar	http://www.cbif.org/dataset/5d283bb6-64dd-4626-8b3b-4ae6db5415c3	GBIF
304	306 F Botany	Field Museum of Natural History (Botany). Seed Plant Collection. Acces	http://www.cbif.org/dataset/50c8536e-56bd-480b-806f-6285c3f842d	GBIF
305	310 FLMMH Invertebrate Zoology	Florida Museum of Natural History. Invertebrate Zoology. Accessed via Gl	http://www.cbif.org/dataset/85b1cfb6-7f62-11e1-a439-00145eb45e9a	GBIF
307	311 FR Herbarium Senckenberianum	Senckenberg Nature Research Society. Herbarium Senckenberianum. A	http://www.cbif.org/dataset/966426ce-7f62-11e1-a439-00145eb45e9a	GBIF
309	312 GLM GLMcol	Staatliche Naturwissenschaftliche Sammlungen Bayerns. The Fungus Collec	http://www.cbif.org/dataset/7a2660bc-7f62-11e1-a439-00145eb45e9a	GBIF
310	310 GZU Herbarium GZU	Rijks Franzen University Herbarium. Institute for Botany - Herbarium GZU	http://www.cbif.org/dataset/8077a573-476c-4c1e-993a-55a5250a34	GBIF
311	311 Harvard University GH	Consortium of California Herbaria. Gray Herbarium. Accessed via Global Biod	http://www.cbif.org/dataset/861e6af6-7f62-11e1-a439-00145eb45e9a	GBIF
312	315 Herbarium ARIZ	University of Arizona Herbarium. Accessed via Global Biodiversity Informa	http://www.cbif.org/dataset/95b97882-7f62-11e1-a439-00145eb45e9a	GBIF
313	316 HSC HSC	Consortium of California Herbaria. Humboldt State University. Accessed v	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
315	318 Naturalist Observations	Naturalist.org. Research-Grade Observations. Accessed via Global Biodi	http://www.cbif.org/dataset/50c95909-22c7-4a22-a47d-6c84925ef4a7	GBIF
316	319 INHS Insect Collection	Illinois Natural History Survey. Insect Collection. Accessed via Global Bio	http://www.cbif.org/dataset/68513375-3aaf-416f-9975-b07c56721661	GBIF
317	320 IRVC IRVC	Consortium of California Herbaria. University of California, Irvine. Acces	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
318	321 JEPS JEPS	Consortium of California Herbaria. University of California, Berkeley Jeps	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
319	322 JOTR JOTR	Consortium of California Herbaria. Joshua Tree National Park. Acces	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
320	323 JROH JROH	Consortium of California Herbaria. Jasper Ridge Biological Preserve, Stan	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
321	324 K Herbarium	Royal Botanic Garden. Kew Herbarium. Accessed via Global Biodiversi	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
322	325 KU KANU	University of Kansas Biodiversity Institute. R. L. McGregor Herbarium Vas	http://www.cbif.org/dataset/95c3836e-56bd-480b-806f-6285c3f842d	GBIF
323	326 KU KUH	University of Kansas Biodiversity Institute. Herpetology Collection. Acces	http://www.cbif.org/dataset/dce00a1f-f6b4-4411-9771-92c62c40a80	GBIF
324	327 KU SEMC	University of Kansas Biodiversity Institute. Snow Entomological Museum C	http://www.cbif.org/dataset/aae308f4-9f9c-4cdd-b4ef-c026f48b6511	GBIF
325	328 L L	Naturalis Biodiversity Center. National Herbarium Nederland. Accessed v	http://www.cbif.org/dataset/7b330400-7f62-11e1-a439-00145eb45e9a	GBIF
326	329 LACM LACM	Consortium of California Herbaria. University of California, Los Angeles. A	http://www.cbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9b6b303ca106	GBIF
327	330 LACM Herps	Natural History Museum of Los Angeles County. Herpetology Collection. I	http://www.cbif.org/dataset/7a257af-a030-4322-aa6b-66719e1a9527	GBIF
328	331 LACMENT Arthropods	University of California, Berkeley - Essig Museum, California Terrestrial Ar	http://www.cbif.org/dataset/5d283bb6-64dd-4626-8b3b-4ae6db5415c3	GBIF
329	332 LD General	Lund Botanical Museum. Accessed via Global Biodiversity Information Fac	http://www.cbif.org/dataset/aa0cf80c-0c64-11dd-84d1-b8a03c50a862	GBIF
330	333 LI Biologiezentrum Linz	Biologiezentrum Linz Oberosterreich. Biologiezentrum Linz. Accessed via	http://www.cbif.org/dataset/857ce666-7f62-11e1-a439-00145eb45e9a	GBIF
331	334 LI Herbarium	Louisiana State University. Herbarium. Accessed via Global Biodiversity In	http://www.cbif.org/dataset/5d283bb6-64dd-4626-8b3b-4ae6db5415c3	GBIF
332	335 MBSMervicoll	Staatliche Naturwissenschaftliche Sammlungen Bayerns. The Erysiptales	http://www.cbif.org/dataset/858d5d10-7f62-11e1-a439-00145eb45e9a	GBIF
333	336 MA MA	Real Jardin Botanico de Madrid. Alcaze Collection. Accessed via Global Bi	http://www.cbif.org/dataset/834c9918-7f62-11e1-a439-00145eb45e9a	GBIF
334	337 MCZ Herp	Harvard University Museum of Comparative Zoology. Herpetology Collect	http://www.cbif.org/dataset/4bfac3ea-8763-44b6-a71a-76a9f5234d33	GBIF
335	338 MCZ LZ	Harvard University Museum of Comparative Zoology. Invertebrate Zoology	http://www.cbif.org/dataset/4bfac3ea-8763-44b6-a71a-76a9f5234d33	GBIF
336	339 MCZ Mal	Harvard University Museum of Comparative Zoology. Malacology Collection	http://www.cbif.org/dataset/4bfac3ea-8763-44b6-a71a-76a9f5234d33	GBIF
337	340 MCZ SBMNH-ENT	Santa Barbara Museum of Natural History. California Beetle Project. Acces	http://www.cbif.org/dataset/84b130ac-7f62-11e1-a439-00145eb45e9a	GBIF
338	341 MHP MHP-H	Sternberg Museum of Natural History. Herpetology Collection. Accessed v	http://www.cbif.org/dataset/84e823d2-7f62-11e1-a439-00145eb45e9a	GBIF
339	342 MNHN P	Museum National d'Histoire Naturelle. Vascular Plants Collection. Acces	http://www.cbif.org/dataset/b5cd794f-84f4-4a85-8c26-7550087b531	GBIF
340	343 MO Tropicos	Missouri Botanical Garden. Tropicos. Accessed via Global Biodiversity Inf	http://www.cbif.org/dataset/7bd65af4-7f62-11e1-a439-00145eb45e9a	GBIF
341	344 MSUM HE	Michigan State University. Herpetology and Herpetology Collection. I	http://www.cbif.org/dataset/847b0b02-7f62-11e1-a439-00145eb45e9a	GBIF
342	345 MVZ Herp	Museum of Vertebrate Zoology. Herpetology Collection. Accessed via Gl	http://www.cbif.org/dataset/09c42e76-e6d5-4552-a07f-bf88a00333b8	GBIF
343	346 MVZ Hild	Museum of Vertebrate Zoology. Hildebrand Collection. Accessed via Glob	http://www.cbif.org/dataset/423d9318-4d44-4d31-81bc-27778c44a3bc	GBIF
344	347 MVZ MVZ Herps	Museum of Vertebrate Zoology. Herpetology Collection. Accessed via Gl	http://www.cbif.org/dataset/09c42e76-e6d5-4552-a07f-bf88a00333b8	GBIF
345	348 MVZ MVZ Hildebrand	Museum of Vertebrate Zoology. Hildebrand Collection. Accessed via Glob	http://www.cbif.org/dataset/423d9318-4d44-4d31-81bc-27778c44a3bc	GBIF
346	349 MVZ MVZ Observations-Herp	Museum of Vertebrate Zoology. Herpetology Observations. Accessed via	http://www.cbif.org/dataset/36a2d61c-00c5-4d3a-976f-d70e5737343e	GBIF
347	350 MVZ OS	Museum of Vertebrate Zoology. Herpetology Observations. Accessed via	http://www.cbif.org/dataset/36a2d61c-00c5-4d3a-976f-d70e5737343e	GBIF
348	351 NCSM NCSM-Invert	North Carolina Museum of Natural Sciences. Invertebrates Collection. Acc	http://www.cbif.org/dataset/d7ce3688-e91d-4f26-b2b8-333357c6daf9	GBIF
349	352 NLD037 NLD	Centre for Genetic Resources, the Netherlands. Plant Genetic Resouces	http://www.cbif.org/dataset/857f9628-7f62-11e1-a439-00145eb45e9a	GBIF
350	353 NMR insect	Natural History Museum Rotterdam. Insecta collection. Accessed via Glot	http://www.cbif.org/dataset/d5e61920-9863-4d33-865a-800fc70ef640	GBIF
351	354 NOAA 2001 San Francisco Bay	Ocean Biogeographic Information System. San Francisco Bay Data. Acces	http://www.cbif.org/dataset/93a0ba86-7f62-11e1-a439-00145eb45e9a	GBIF
352	355 NSW NSW	Natural Herbarium of New South Wales. Herbarium Collection. Acces	http://www.cbif.org/dataset/853006c0-7f62-11e1-a439-00145eb45e9a	GBIF
353	356 NY Herbarium	Consortium of California Herbarium. New York Botanical Garden. Acces	http://www.cbif.org/dataset/7133f0fa-7f62-11e1-a439-00145eb45e9a	GBIF
354	361 OBI OBI	Consortium of California Herbaria. California Polytechnic State University.		

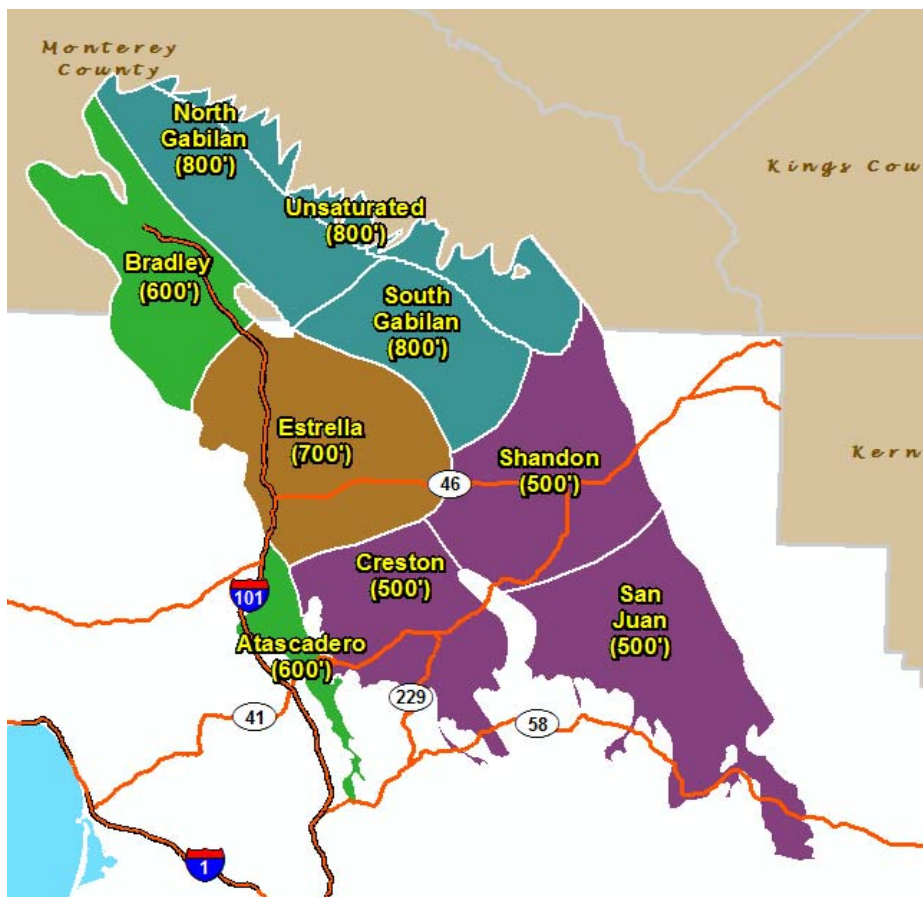
428	131 UMMZI Arthropods	University of California, Berkeley - Essig Museum, California Terrestrial Ar	http://www.cbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e6b5415c3	GBIF
429	432 University of Alberta Museums ALTA-VP	University of Alberta Museums. Vascular Plant Herbarium. Accessed via	http://www.cbif.org/dataset/2429287b-e6f5-4cfd-afcc-11cc3ba950ca	GBIF
430	433 University of Alberta Museums UASM	University of Alberta Museums. Entomology Collection. Accessed via Glt	http://www.cbif.org/dataset/8971dfba-7f62-11e1-a439-0145eb45e9a	GBIF
431	434 University of British Columbia UBC	University of British Columbia Herbarium. Accessed via Global Biodiversi	http://www.cbif.org/dataset/0710d794-4883-435f-bba1-58f81110cd13	GBIF
432	UNRM Herpetology	University of Nevada. Herpetology Collection. Accessed via Global Biodi	http://www.cbif.org/dataset/6257574a-656d-4019-87a2-9666f55231b	GBIF
433	436 UPRM INVCOCL	University of Puerto Rico. Invertebrate Collection. Accessed via Global Bi	http://www.cbif.org/dataset/11622344-4e06-4963-54a9-0145eb45e9a	GBIF
434	437 US Botany	Smithsonian Institution National Museum of Natural History. Botany Colle	http://www.cbif.org/dataset/5df38344-b821-49c2-8174-f0f294df0d	GBIF
435	438 USA151 USA151	United States National Plant Germplasm System. USA151 Collection. Acc	http://www.cbif.org/dataset/85802736-f762-11e1-a439-0145eb45e9a	GBIF
436	439 USA955 USA955	United States National Plant Germplasm System. USA955 Collection. Acc	http://www.cbif.org/dataset/85802736-f762-11e1-a439-0145eb45e9a	GBIF
437	USGS-NAS NAS	United States Geological Survey. Aquatic Species. Accessed via Glt	http://www.cbif.org/dataset/6f3c311c-c5ab-4f23-9a2d-10514f9b6d4	GBIF
438	441 USNM Amphibians & Reptiles	Smithsonian Institution National Museum of Natural History. Amphibian &	http://www.cbif.org/dataset/5df38344-b821-49c2-8174-f0f294df0d	GBIF
439	442 USNM Entomology	Smithsonian Institution National Museum of Natural History. Entomology i	http://www.cbif.org/dataset/5df38344-b821-49c2-8174-f0f294df0d	GBIF
440	443 USNM Invertebrate Zoology	Smithsonian Institution National Museum of Natural History. Invertebrate	http://www.cbif.org/dataset/5df38344-b821-49c2-8174-f0f294df0d	GBIF
441	444 USU UTC	Utah State University. Specimen Database. Accessed via Global Biodiversi	http://www.cbif.org/dataset/85ac3c18-f762-11e1-a439-0145eb45e9a	GBIF
442	445 UTEP Herps	University of Texas at El Paso. Herpetology Collection. Accessed via Glt	http://www.cbif.org/dataset/62f264eb-c93d-4483-84ae-a3333ba950ca	GBIF
443	446 USVC Herb	Utah Valley University. Utah Valley State College Herbarium. Accessed vi	http://www.cbif.org/dataset/854a88d8-f762-11e1-a439-0145eb45e9a	GBIF
444	447 UWBM Herp	University of Washington Burke Museum. Herpetology Collection. Access	http://www.cbif.org/dataset/78122332-6315-41bd-914b-e9c1342d9093	GBIF
445	448 UWBM Plant	University of Washington Burke Museum. Plant Collection. Accessed via	http://www.cbif.org/dataset/8310f570-f762-11e1-a439-0145eb45e9a	GBIF
446	449 UWBM Plants	University of Washington Burke Museum. Plant Collection. Accessed via	http://www.cbif.org/dataset/8310f570-f762-11e1-a439-0145eb45e9a	GBIF
447	450 VVC VVC	Consortium of California Herbaria. Victor Valley College. Accessed via Glt	http://www.cbif.org/dataset/4fa89414-b6c6-4e0d-b616-9b6b303ca106	GBIF
448	452 W Herbarium W	Vienna Natural History Museum. Herbarium. Accessed via Global Biodive	http://www.cbif.org/dataset/75260c2-f762-11e1-a439-0145eb45e9a	GBIF
449	453 YM-YOSE YM-YOSE	Consortium of California Herbaria. Yosemite National Park Herbarium. Ac	http://www.cbif.org/dataset/4fa89414-b6c6-4e0d-b616-9b6b303ca106	GBIF
450	454 YPM ENT	Yale University Peabody Museum. Entomology Division. Accessed via Glt	http://www.cbif.org/dataset/96404cc2-f762-11e1-a439-0145eb45e9a	GBIF
451	455 YPM HER	Yale University Peabody Museum. Vertebrate Zoology Division - Herpetol	http://www.cbif.org/dataset/861d3364-f762-11e1-a439-0145eb45e9a	GBIF
452	456 YPM IZ	Yale University Peabody Museum. Vertebrate Zoology Division - Invertebr	http://www.cbif.org/dataset/861d3364-f762-11e1-a439-0145eb45e9a	GBIF
453	457 ZIN ZISP	Zoological Institute, Russian Academy of Sciences, St. Petersburg. Amp	http://www.cbif.org/dataset/754a4334-f762-11e1-a439-0145eb45e9a	GBIF
454	458 ZMB Collection Crustacea	Senckenberg Natural Research Society. Crustacean Collection. Accessed	http://www.cbif.org/dataset/7b84c0a2-f762-11e1-a439-0145eb45e9a	GBIF
455	459 Don Sada Springsnads database 2003	Sada, D. 2003. Desert Research Institute Springs Database (http://www.dri.edu/directory/4934-don-sada)	http://www.dri.edu/directory/4934-don-sada	GBIF
456	460 Hersher, Liu, Bradford 2013	R. Hersher, H. Liu, and C. Bradford. 2013. Systematics of a widely distrib	http://zooleys.pensoft.net/articles.php?id=3635	GBIF
457	461 Anymals.org user: 13	For Naturkunde Berlin. Anymals.org. Citizen Science Data. 1-162-961f-0d145eb45e9a	http://www.cbif.org/dataset/6c3f7f6e-a952-11e2-961f-0d145eb45e9a	GBIF
458	462 CAS ORN	California Academy of Sciences. Ornithology Collection. Accessed via Glt	http://www.cbif.org/dataset/42f66ab-200d-4479-8795-4915eb45e9a	GBIF
459	466 CCBER Birds	Chesapeake Center for Biodiversity and Ecological Restoration. Ornithology C	http://www.cbif.org/dataset/4ada1c77-3895-47d8-8dc-93c44e1df802	GBIF
460	467 CLO EBRD	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD" Collection	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
461	468 CLO EBRD AK	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD AK" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
462	469 CLO EBRD BCN	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD BCN" Coll	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
463	470 CLO EBRD CA	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD CA" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
464	471 CLO EBRD CAN	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD CAN" Coll	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
465	472 CLO EBRD CB	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD CB" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
466	473 CLO EBRD CBW	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD CBW" Col	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
467	474 CLO EBRD CL	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD CL" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
468	475 CLO EBRD CR	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD CR" Colle	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
469	476 CLO EBRD ISS	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD ISS" Colle	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
470	477 CLO EBRD KLM SISK	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD KLM SISK	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
471	478 CLO EBRD LWBA	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD LWBA" C	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
472	479 CLO EBRD MA	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD MA" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
473	480 CLO EBRD MEX	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD MEX" Col	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
474	481 CLO EBRD NH	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD NH" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
475	482 CLO EBRD NJ	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD NJ" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
476	483 CLO EBRD NY	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD NY" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
477	484 CLO EBRD NZ	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD NZ" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
478	485 CLO EBRD PAN	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD PAN" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
479	486 CLO EBRD TX	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD TX" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
480	487 CLO EBRD VA	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD VA" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
481	488 CLO EBRD VMS	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD VMS" Col	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
482	489 CLO EBRD YD	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD YD" Collec	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
483	490 CLO EBRD YARD	Cornell Lab of Ornithology. eBird Observation Dataset. "EBIRD YARD" C	http://www.cbif.org/dataset/4fa7b334-ce0d-4e88-aaae-260c1380d49e	GBIF
484	491 CLO GBBG	Avian Knowledge Network. Great Backyard Bird Count. Accessed via Glt	http://www.cbif.org/dataset/82cb293c-f762-11e1-a439-0145eb45e9a	GBIF
485	492 CMN CMNAV	Canadian Museum of Nature. Bird Collection. Accessed via Global Biodiver	http://www.cbif.org/dataset/8309005e-f762-11e1-a439-0145eb45e9a	GBIF
486	493 CMV Bird	Cornell University Museum of Vertebrates. Bird Collection. Accessed via	http://www.cbif.org/dataset/76a860c-1b92-4159-8036-b6b5303ca106	GBIF
487	494 DMNH Bird	Delaware Museum of Natural History. Bird Collection. Accessed via Globa	http://www.cbif.org/dataset/21c1d435-715a-4069-5503-77f6b0e22969	GBIF
488	495 DMNS Bird	Denver Museum of Nature & Science. Bird Collection. Accessed via Globa	http://www.cbif.org/dataset/2f54cb88-4167-499a-81fb-0a202465212	GBIF
489	496 DMNS DMNS Birds	Denver Museum of Nature & Science. Bird Collection. Accessed via Globa	http://www.cbif.org/dataset/2f54cb88-4167-499a-81fb-0a202465212	GBIF
490	497 Facult de Ciencias UNAM MZFC-A	Universidad Nacional Autónoma de México. Museo de Zoología "Alfonso L	http://www.cbif.org/dataset/890c34ee-f762-11e1-a439-0145eb45e9a	GBIF
491	498 HSI WildlifeBids	Harvard University Museum of Comparative Zoology. Accessed via Global	http://www.cbif.org/dataset/30a7b66b-f762-11e1-a439-0145eb45e9a	GBIF
492	499 LACM Birds	Natural History Museum of Los Angeles County. Birds Collection. Acces	http://www.cbif.org/dataset/7a25f7aa-03b5-4322-aa6e-6b7191a9527	GBIF
493	500 MCZ Bird	Harvard University Museum of Comparative Zoology. Bird Collection. Acc	http://www.cbif.org/dataset/4fb4c3ea-8763-4f4b-a71a-76a6f5243d3	GBIF
494	501 MCZ Orn	Harvard University Museum of Comparative Zoology. Ornithology Collects	http://www.cbif.org/dataset/4fb4c3ea-8763-4f4b-a71a-76a6f5243d3	GBIF
495	502 MSB Bird	Museum of Southwestern Biology. Bird Collection. Accessed via Global Bi	http://www.cbif.org/dataset/59076cd3-349f-4068-af57-bc34449c3916	GBIF
496	503 MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
497	504 MSB MSB Birds	Museum of Southwestern Biology. Bird Collection. Accessed via Global Bi	http://www.cbif.org/dataset/59076cd3-349f-4068-af57-bc34449c3916	GBIF
498	505 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
499	506 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
500	507 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
501	508 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
502	509 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
503	510 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
504	511 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
505	512 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
506	513 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
507	514 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
508	515 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
509	516 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
510	517 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via	http://www.cbif.org/dataset/b211f321-326b-4333-8012-2fbc0c6c0c6c	GBIF
511	518 MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via		

581	593 California Avian Datacenter, Level 3 - Plumas/Lassen	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
582	594 California Avian Datacenter, Level 3 - Presidio	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
583	595 California Avian Datacenter, Level 3 - Rancheria Gulch	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
584	596 California Avian Datacenter, Level 3 - RSLCOOPMONITORIN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
585	597 California Avian Datacenter, Level 3 - RSLCOOPMONITORIN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
586	598 California Avian Datacenter, Level 3 - RSLCOOPMONITORIN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
587	599 California Avian Datacenter, Level 3 - RSLBMETHODSLONK	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
588	600 California Avian Datacenter, Level 3 - RSLTRRPMMAINSTEM	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
589	601 California Avian Datacenter, Level 3 - RSLTRRPSOUTHFORI	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
590	602 California Avian Datacenter, Level 3 - RSLTRRPTREBS	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
591	603 California Avian Datacenter, Level 3 - RSLWILDFIREBISCUIT	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
592	604 California Avian Datacenter, Level 3 - RSLWILDFIRECANOE	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
593	605 California Avian Datacenter, Level 3 - RSLWILDFIRELEWIST	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
594	606 California Avian Datacenter, Level 3 - RSLWILDFIREMEGRAI	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
595	607 California Avian Datacenter, Level 3 - San Joaquin BOR	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
596	608 California Avian Datacenter, Level 3 - San Joaquin Experiment	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
597	609 California Avian Datacenter, Level 3 - San Joaquin River NWR	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
598	610 California Avian Datacenter, Level 3 - Sierra Meadows	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
599	611 California Avian Datacenter, Level 3 - Sierra Nevada Mgmt Ind	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
600	612 California Avian Datacenter, Level 3 - Sonoma Oaks	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
601	613 California Avian Datacenter, Level 3 - Sonoma Riparian	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
602	614 California Avian Datacenter, Level 3 - Susanville	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
603	615 California Avian Datacenter, Level 3 - Tidal Marsh	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
604	616 California Avian Datacenter, Level 3 - Upper Owens River Wat	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
605	617 California Avian Datacenter, Level 5 - Big Sur Ornithology Lab	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
606	618 California Avian Datacenter, Level 5 - BOR Grasslands	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
607	619 California Avian Datacenter, Level 5 - Lassen Foothills Riparian	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
608	620 California Avian Datacenter, Level 5 - Monterey RCD	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralbe http://data.prbo.org/cadc2/	California Avian Datacenter
609	621 BIOS ds463 - Bird Species of Special Concern	Schoenig, S. 2009. Bird Species of Special Concern. Digitized range information from W. D. Shuford and T. Gardali, eds. 2008. California Bird Spe BIOS	
610	48 USGS Nonindigenous Aquatic Species	US Geological Survey Southeast Ecological Science Center. 2011. Nonin http://nas.er.usgs.gov/	
612	622 CAS MAM	California Academy of Sciences. Mammalogy Collection. Accessed via www.qbif.org/dataset/6ce7290f-47f6-4046-8356-371f5b6749df	GBIF
613	623 CUMV CUMV Mammal	Cornell University Museum of Vertebrates. Mammal Collection. Accessed www.qbif.org/dataset/35720b3e-adcd-4b83-b4f1-967f1d457d6a	GBIF
614	624 CUMV Mammal	Cornell University Museum of Vertebrates. Mammal Collection. Accessed www.qbif.org/dataset/35720b3e-adcd-4b83-b4f1-967f1d457d6a	GBIF
615	625 FMNH Mammals	Field Museum of Natural History (Zoology). Mammal Collection. Accessed www.qbif.org/dataset/41f1c5c40-5681-496f-9733-6b5681b3b7a6	GBIF
616	626 KU KUM	University of Kansas Biodiversity Institute. Mammalogy Collection. Access www.qbif.org/dataset/1d04e739-98a9-4e16-9970-98f30f9e9e3	GBIF
617	627 LACM Mammals	Natural History Museum of Los Angeles County. Mammal Collection. Acc www.qbif.org/dataset/7a2577aa-03fb-4322-a9ab-66719e1a9527	GBIF
618	628 LSMZ Mammals	Louisiana State University Herbarium. Mammals Collection. Accessed via www.qbif.org/dataset/847e2306-f762-11e1-a439-00145eb45e6a	GBIF
619	629 MSB Mamm	Museum of Southwestern Biology. Mammal Collection. Accessed via www.qbif.org/dataset/b15d4952-7d20-46f1-8a3e-556a512b04c5	GBIF
621	631 MVZ MVZ Mammals	Museum of Vertebrate Zoology. Mammal Collection. Accessed via www.qbif.org/dataset/0daed095-478a-4af6-abf5-18acb790fb62	GBIF
622	632 PDBO 20122	University of California, Santa Barbara Marine Science Institute. Paleobiol www.qbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e6a	GBIF
624	634 PSM Mammal	James R. Slater Museum of Natural History. Mammal Collection. Acces www.qbif.org/dataset/8eddc200-4535-4c65-9b4d-f723eafef607e	GBIF
625	635 Royal Ontario Museum: ROM Mammals	Royal Ontario Museum. Mammalogy Collection. Accessed via www.qbif.org/dataset/c5c4a23e-2035-4416-ab64-032d6df52ddb	GBIF
626	636 SBMNH MAM	Santa Barbara Museum of Natural History. Mammal Collection. Accessed www.qbif.org/dataset/75018539-6328-41de-b875-7c2e61dc1635	GBIF
627	637 TTU Mammals	Museum of Texas Tech University. Mammals Collection. Accessed via www.qbif.org/dataset/854770cc-55e3-4af2-9417-0447d6c7902d	GBIF
628	638 UCLA Mammals	University of California, Los Angeles. Dickey Collection, Mammals. Acces www.qbif.org/dataset/8631226a-f762-11e1-a439-00145eb45e6a	GBIF
629	639 UMMZ Mammals	University of Michigan Museum of Zoology. Mammal Collection. Acces www.qbif.org/dataset/6d22fc0a-9903-40b8-802b-403398218e4a	GBIF
631	640 NMFS Critical Habitat - Green Sturgeon	National Marine Fisheries Service. 2008. Green Sturgeon Critical Habitat. http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm	
632	641 NMFS Critical Habitat - Winter Chinook	National Marine Fisheries Service. 1993. Sacramento River Winter-run Ch http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm	
633	642 NMFS Critical Habitat - Chinook and Steelhead	National Marine Fisheries Service. 2005. Chinook and Steelhead Critical H http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm	
634	643 USFWS Critical Habitat Designations (2011-2016)	US Fish and Wildlife Service. 2016. Critical Habitat Data. Sacramento, CA http://www.fws.gov/sacramentos/Critical-Habitat/Data/es_critical-habitat_data.htm	
635	644 California dragonfly and damselfly database	Balt-Damerow, JE, PT Oboyski, and VH Resh. 2015. California dragonfly http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4337221/	
636	645 Southern California Stormwater Monitoring Coalition database	Southern California Stormwater Monitoring Coalition. 2013. SMC databas http://www.socalsmc.org/Bioassessment.aspx	

PRODUCTION WELLS APPROXIMATELY MAPPED WITHIN THE PRGWB

PRGWB SUB-AREAS	PRODUCTION WELL COUNT	DRILLING THRESHOLD	> DRILLING THRESHOLD
ATASCADERO	387	600 FEET	3
BRADLEY	9	600 FEET	0
CRESTON	950	500 FEET	68
ESTRELLA	2,205	700 FEET	253
NORTH GABILAN	0	800 FEET	0
SAN JUAN	53	500 FEET	12
SHANDON	285	500 FEET	26
SOUTH GABILAN	56	800 FEET	5
UNSATURATED	0	800 FEET	0
TOTAL FOR PRGWB	3,945		367

PLEASE NOTE THAT ENVIRONMENTAL HEALTH IS ACTIVELY WORKING ON INPUTING WELL INVENTORY INTO OUR DATABASE AND HAS CURRENTLY ENTERED 11,965/18,580 PRODUCTION WELLS (DOMESTIC PRIVATE, DOMESTIC PUBLIC AND IRRIGATION) THAT WERE PERMITTED FROM 1964 TO PRESENT. THIS SPREADSHEET DOES NOT REPRESENT OUR COMPLETE INVENTORY AT THIS TIME.





SAN LUIS OBISPO COUNTY FARM BUREAU

4875 MORABITO PLACE, SAN LUIS OBISPO, CA 93401

PHONE (805) 543-3654 • FAX (805) 543-3697 • www.slofarmbureau.org

October 8, 2018

Supervisor John Peschong, District 1
Supervisor Bruce Gibson, District 2
Supervisor Adam Hill, District 3
Supervisor Lynn Compton, District 4
Supervisor Debbie Arnold, District 5

San Luis Obispo County Board of Supervisors
1055 Monterey St. Room D430
San Luis Obispo, CA 93401

RE: County Groundwater Sustainability Agency (GSA) Meetings

Dear Supervisors:

The San Luis Obispo County Farm Bureau represents hundreds of members who are impacted and actively interested in local groundwater use and availability. As a stakeholder in the process and outcome, our members attend meetings or seek information about the implementation of the Sustainable Groundwater Management Act, which will determine local groundwater use for the designated over drafted basins. Public observation and input are a benefit to the decision-making process.

Farm Bureau is making a recommendation regarding the format of future San Luis Obispo County Groundwater Sustainability Agency (GSA) meetings for the groundwater basins the County serves.

1. Hold dedicated, formal County GSA meetings for each groundwater basin, with appropriate notification (that it will be a GSA meeting), agendas, and minutes.
2. At each meeting, have a presentation of the updates relevant to the individual groundwater basin.
3. Provide for recordation of public comment.

The above recommendations are important to conduct meaningful dialogue between represented landowners and the agency in charge of managing each groundwater basin. Having the GSA meetings incorporated into regular Board of Supervisor meetings creates uncertainty about intent and scope of the item and does not provide landowners or interested parties with clear notice, nor does it provide a forum for presentations and meaningful discussion – especially when the item is placed on your Board's consent agenda.

Thank you for your consideration of this recommendation.

Sincerely,

Anna Negranti, President
San Luis Obispo County Farm Bureau

CC: Colt Esenwein, Public Works Director
Carolyn Berg, Senior Water Resources Engineer

Dennis R Loucks

Re: Paso Robles Subbasin General Services Plan (GSP) Development
October 8, 2018

There are substantial concerns with regard to the contracted consultant, Montgomery & Associates performance as it relates to methodology and data that has been presented to date.

The comments listed generally pertain to the Power Point Presentation of September 12, 2018 and to comments made by Montgomery & Associated during a "Groundwater Sustainability Workshop" on October 4, 2018.

Slide 21: Estimated Sustainable Yield for GSP Area.

This slide indicated that the Estimated sustainable yield from 1981 to 2011 was 68,500 AFY.

The estimated sustainable yield from 1981 to 2016 was estimated at 62,300 AFY.

The slides were of surprise to people in attendance since prior scientific reports (Todd & Geoscience) estimated Safe Yields and Perennial Yields up to 97,700 AFY.

Why the drastic change?

When Derrick Williams was asked what his source was for these numbers; he told the group on October 4, that the source was Montgomery & Associates and as hydrologists that's what they do. That answer is insufficient. Where did the data originate? The slide also reflects groundwater pumping from 1981 to 2016 at 76,000 AFY. This figure is very close to the 76,658 AFY (Safe Yield) presented by the City of Paso Robles and County of San Luis Obispo, etal in the recent prescription trial. It should be noted that GSI Environmental (paid by citizens) in that trial estimated the safe yield at 92,000 AFY.

Historical context is in order:

2002 Fugro West Study	94,000 AFY	Paid by Taxpayers (Perennial Yield)
2005 Fugro Study	97,700 AFY	Paid by Taxpayers (Perennial Yield)
2015 Geoscience	90,215 AFY	Paid by Taxpayers (Safe Yield)
2016 Montgomery & Assoc.	62,300 AFY	Paid by Taxpayers (Sustainable Yield)
2018 GSI Environmental	92,000 AFY	Paid by Private Group, No tax dollars (Safe Yield)

As indicated, the methodology is not clear in Montgomery Assoc. figures and is contrary to accepted previous scientific studies. Supporting evidence should be required of Montgomery & Associates.

During the presentation on October 4, terms were stated that have different meanings. Example: In the Power Point the term “overdraft” is used. Derrick Williams explained that their use of “overdraft” reflected a hydrologist’s definition and not a legal definition. The other term that has been introduced is “Estimated sustainable yield” To help avoid the confusion of terms, listed below are definitions from the State Department of Water Resources.

Perennial yield — The maximum quantity of water that can be withdrawn annually from a groundwater basin over a long period of time (during which water supply conditions approximate average conditions) without developing an overdraft condition.

Safe yield — The maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect.

Sustainability — A sustainable system or process has longevity and resilience. A sustainable system manages risk but cannot eliminate it. A sustainable system generally provides for the economy, the ecosystem, and social equity. Water sustainability is the dynamic state of water use and supply that meets today’s needs without compromising the long-term capacity of the natural and human aspects of the water system to meet the needs of future generations. For example, planning ways to eventually eliminate drafting more groundwater than can be recharged over the long term is one approach for improving sustainability.

Groundwater overdraft — The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions.

Slide 29: Process for Establishing Measurable Objectives:

The basis for establishing measurable objectives and particularly minimum threshold objectives was based on a survey that received 111 responses. The survey asked the property owners their well water level preferences. Did they prefer current water levels? Did they prefer higher water levels?

To establish minimum well water thresholds based on a survey without factual documentation is a flawed process. In essence, you are obtaining opinions and “beliefs” that the respondents well is fine or in some cases would like to see their

water level higher, who wouldn't want more water in their wells. As we learned during the presentation of October 4, those that want more water or higher levels in their wells will have water projects presented to them that they will be expected to pay for. I don't recall that aspect being presented in the survey; perhaps it was omitted on purpose?

Considering the hundreds of thousands of dollars spent by the County, City of Paso Robles and other entities pursuing an attempted theft of water from property owners overlying the basin, tax payer funds would be better served to establish monitoring stations throughout the basin that would reflect current water levels in real time. This would be actual factual information to determine minimum well thresholds. The property owners of this basin deserve accurate information so that informed decisions can be made.

Slide 35: Measurable Objective and Minimum Threshold at Example Creston Well

What is the source of this hydrograph?

The graph indicates a number 27S/13E-28F01 (Creston) In my research, I was able to determine that the number is from the State of California, Water Data Library/CASGEM program.

I felt it was necessary to examine the groundwater elevation graph presented in Slide 35 and compare with the Groundwater Level information from the State Water Data Library. The number referenced in your slide was determined to be a Station Name/Number. The web site only referenced Water Quality Data with Station Numbers and not Groundwater Levels. (Actually, I was unable to locate any reference to the number on your slide.) Groundwater Levels, for example, Creston is number 355262N1205215W001. Why are you listing Water Quality Data reference numbers when you are presenting Groundwater Level Data?

The graph in slide 35 references a period from about 1970 to about 2016 the information from the Water Data Library/CASGEM references a period from 2012 to 2018. I was unable to retrieve additional historical data for the example Creston area. The water levels from the period 2012 to 2018 were relatively flat, and appear to be different from those indicated in slide 35.

Again, this is why reliable and indisputable accurate well level data is critical to managing the groundwater levels in the basin.

Dennis R Loucks

Cc: Montgomery & Associates
Supervisor John Peschong
Supervisor Debbie Arnold

Frederick C. Hoey



October 12, 2018

Mr. Derrik Williams
Montgomery & Associates
1232 Park Street, Suite 201B
Paso Robles, CA 93446

Derrik:

I am writing as a follow-up to your recent meeting in Creston. Water issues have been front and center in Creston for quite some time and the turnout for the meeting was an indication of the intensity of our passion regarding protecting our water resources. I hope you discovered during the meeting that those of us in Creston are always up to date regarding the operation of our wells and the level of our water.

I also hope that you quickly discovered that Creston residents are familiar with the general condition of the Paso Robles Groundwater Basin and are protective of Creston's unique position within the basin. Therefore, we are offended when Creston data are co-mingled with data from other areas.

Several individuals who asked questions at the meeting were not necessarily familiar with the difference between a GSA and a Planning Sub Area or the fine points of writing the GSP, but that doesn't matter. What they do know is that including data from El Pomar, an area with existing groundwater problems, is a fraud on Creston's data¹. A radius originating near the intersection of El Pomar and South El Pomar covering roughly 4,000 acres or greater, which comprises several very large vineyard operations, identifies an area with issues not found in Creston.

Creston landowners have always been concerned that our water resources could be used to alleviate problems in other areas of the Paso Basin such as Estrella; however, the co-mingling of Creston and El Pomar data has raised new fears among many Creston landowners that the El Pomar area may actually be the target. If you want people to trust your representations you must think in terms of "how will my audience actually

¹ With regard to the issue of data in general, all data that are referenced in your documents should be footnoted as to the sources of data and where and when published. When you have adjusted data that fact should also be noted along with the purpose and method of adjustment. When data are unreferenced or adjusted without explanation that calls into question the correctness and reliability of your work product.

Derrik Williams Letter, page 2

interpret what I am presenting or saying”?

Before the meeting in Creston, I posted on your groundwater communications portal, comments making the case that the Creston area should be designated a separate Planning Sub Area, a copy of which is enclosed. Clearly, the existing outline of the El Pomar-Estrella Sub Area identified in Figure 3-14 of Chapter 3 is what apparently made it convenient to co-mingle Creston data with El Pomar data. Creston is unique and deserves to be a separate Planning Sub Area.

Last Monday you discussed the need for more monitoring wells. In discussing that topic and related issues with some of my colleagues we have developed specific general thoughts based on the following thesis:

Given the size, the variety of topography, and the geological complexity, the Paso Robles Groundwater Basin presents a wide range of localized issues best managed by several localized Planning/Management areas in order to provide long term reliability to the Paso Robles Basin GSP, therefor:

- Rather than only a few Planning/Management areas a larger number of smaller separate areas should be created each sharing common conditions and issues.
- Ideally, each area would have 5 to 10 monitoring wells depending on the size of the area and specific conditions.
- With several smaller Planning/Management areas throughout the basin comparisons of progress or failure of specific policies, practices or tactics between areas could be easily compared and modified to achieve improved area results on a forward basis, thus contributing to improved basin wide results.
- Conversely, measuring the performance results of very large geographic areas is much more problematic in terms of understanding the actual causes of either over or under performance.

On a related matter I am sure that you are aware of subsidence of nearly two inches in the Shandon, Red Hills areas documented in the 1997 USGS report. However, the issue has not been addressed in subsequent reports, etc. My colleague Dennis Loucks and I believe that the matter deserves critical examination as do other areas of the basin

Derrik Williams Letter, page 3

with known significant lowering of water levels that may be prone to subsidence.

Since land subsidence is a sustainability indicator requiring examination under SGMA, it is recommended that the USGS report be updated to determine if land subsidence has been curtailed or if subsidence has continued to occur. The historical data that could be obtained by USGS would indicate areas in the basin that are in need of additional management. I strongly suggest that the Cooperative Committee be asked to make a formal written request to USGS to update their 1997 report. An updated report would be a vital management tool, and since it would be completed by another government entity presumably there should be no cost.

Another matter which concerns several of us is the potential for water banking schemes by very large landowners with high production wells located in strategic areas of the basin. There appear to be several candidates for this activity who would profit from their groundwater resources. A related activity is the sale of paper water allowing a purchaser to exceed their pumping limits in their physical location in exchange for the seller reducing pumping in an equal amount. I am acquainted with many landowners who are vehemently opposed to water banking, which the GSP should prohibit.

A related matter, which is prevalent in our basin, is the fact that the general lowering of groundwater has created void areas above the groundwater level as it may fluctuate season to season. Access to this “space” is attractive to entities wanting to engage in water banking activities. Something that you should present at your next workshops is data on how much of this space exists and how the basin can be protected from water banking activities utilizing this space.

Lastly, my colleagues and I request that you reconsider the management of your Groundwater Communications Portal. We learned on Monday that comments posted on the portal would be reviewed by staff and directed to appropriate GSP representatives. Moreover, the comments would not be available for public review until the plan is at the completion stage, several months hence. If what we understand is in fact accurate, this would be detrimental to the creation of the plan as it would be difficult to revisit chapters that were believed to have been completed. The process as outlined will be frustrating for the public as well as having a limiting influence on basin citizen comment and presumably a burdensome process for your staff. One can only conclude that the process has been designed to intentionally limit public interference with your development of the GSP. The GSP process is, after all, intended to be conducted with significant citizen input not a process principally influenced by large landowners with major water resources under their control.

Derrik Williams Letter, page 4

In reality Your process effectively excludes several thousand landowners reliant on wells who essentially have no responsibility for the current condition of the Paso Robles Groundwater Basin. When thinking about how you should change the Portal process you should review the events surrounding the rejection of the AB2453 mandatory water district, which was overwhelmingly rejected by basin voters in March 2016. Don't tell me that landowners don't understand basin water issues just because they don't flock to Cooperative Committee meetings. They understand very clearly the nature of the interests who want to control our basin water.

I look forward to hearing from you.

Sincerely,

A handwritten signature in black ink, appearing to read "Joel Hoey". The signature is fluid and cursive, with a long horizontal stroke extending from the end.

Attachment: GCP Posting of October 6, 2018

Cc: Supervisor Debbie Arnold
Supervisor John Peschong

20181012_Hoey

GSP Chapter 3 Comments

By

Fred C. Hoey

A Creston resident

Posted to the Paso Robles Groundwater Communications Portal

In reference to Chapter 3, Figure 3-14 North County Planning Subareas: I object to the El Pomar-Estrella-Sub Area as defined. Interestingly, this Sub Area is startlingly similar to the boundaries of the “area of influence” of the Estrella-El Pomar-Creston Water District as defined by SLO-LAFCO. I expect this harmony is deliberate.

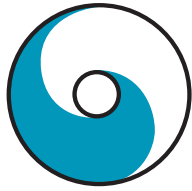
The Creston area is distinctly different from both the El Pomar and Estrella areas; accordingly, actions that are appropriate and necessary for the El Pomar and Estrella areas will not be appropriate for Creston. For instance within the Estrella area a significant “cone of depression” has been created by the egregious groundwater pumping by the City of Paso Robles, which has been compounded by the local concentration of large vineyard operations.

Many Creston landowners have long been concerned that Creston groundwater would ultimately be utilized to remedy the damage that has been done to the Estrella groundwater levels.

By combining three geographic areas, each with their own unique issues, into a Planning Subarea the authors of Chapter 3 wrongly assumed that the citizens of Creston would not rise up in strong opposition to such blatant, potential piracy of our water resources to cover the sins of the City of Paso Robles through the exploitation of the Estrella area.

I strongly urge that the Creston area be identified as a separate Planning Subarea, a view shared by all of my Creston friends and connections.

October 6, 2018



Rainfall to Groundwater.net

Verna Jigour, PhD.

V•Jigour LLC

October 15, 2018

Attn. Paso Robles Subbasin Cooperative Committee

Subject: GSP Process Comments: Addendum to comments on Chapters 1-3

Dear Cooperative Committee Leaders,

I congratulate the Cooperative Committee on its exemplary, timely progress toward the Groundwater Sustainability Plan (GSP). Based on what I've been able to glean about the progress of other GSAs around the state, Paso Robles Subbasin appears to be at the forefront of groundwater sustainability planning.

Given my "outsider's" perspective, I attribute that to the combination of leadership by the County of San Luis Obispo, including its skilled planners, sound consultants and the apparent engagement of GSA stakeholders. Most of all, the elegance and efficiency of the cooperative, collaborative approach seems exemplified by the progress y'all have made. So, again, Congratulations!

Further congratulations are offered for your inviting public, including "outsider" interface such as mine via your [Paso Robles Groundwater Communication Portal](#), through which I've been able to catch up some on your efforts to date.

The following offers more general and overall comments on your GSP in progress as background and support for my comments on the draft GSP chapters.

Longtime Academic/Professional Concern with Paso Robles Subbasin

Labeling myself "outsider" is partly tongue-in-cheek. In truth, while I've not lived in San Luis Obispo County, its expansive rangelands have been "on my radar" for two decades. Throughout that time, I've viewed these lands more in the context of upper Salinas River [watershed/](#) [catchment](#).

Around the turn of the millennium, as part of my doctoral program I initiated and secured funding for the Ventana/ Central Coast Wildlands Project, which offered a Geographic Information System (GIS) analysis of habitat connectivity needs for a suite of focal wildlife species spanning the Central West California Ecoregion.

Veering a bit from related projects in California at that time, I selected steelhead as my own focal species and developed, with technical and even some volunteer assistance, a GIS database of historical steelhead streams and their watersheds, extending from San Francisco Bay southward to San Diego County, since my California Department of Fish and Game source data extended through that greater region.

During the second phase of project funding I relinquished project management to a colleague and the project's final report (Thorne and colleagues 2002) included only overall maps of the distribution of steelhead by population status, along with limited description of the database.

The results of analyses I conducted using the steelhead database during the first phase were relegated to my doctoral dissertation, which was approved by my doctoral committee in July 2008 [Jigour 2008 (2011) abstract attached]. The interval between the GIS analyses and committee approval mostly represents the time I spent conducting and documenting an extensive interdisciplinary literature review supporting the importance of woody plant cover to the [detention](#) (infiltration and percolation) functions of watersheds/ catchments.

Among the most striking results of my analyses was the massive expanse of **nonnative annual grasslands** in the watersheds of historical steelhead rivers and streams whose runoff is not controlled by large dams, nowhere better exemplified than in the upper Salinas River watershed/ catchment, a.k.a. region of Paso Robles Subbasin.

Note that this applies to much of the inland Monterey County watersheds/ catchments of Salinas River, as well, but especially with many rangelands “hidden” behind the foothills from the agricultural floodplain, the opportunities there are even farther out of sight and mind to Salinas Valley GSAs.

I must emphasize the **nonnative** part of that ecological description, which is absolutely the case, contrary to what the current GSP Chapter 3 suggests. That nonnative description is a clue to the fact that these nonnative annual rangelands represent anthropogenically degraded watersheds/ catchments. Thus, History, and even Prehistory of Land Use is an appropriate topic to at least summarily address in Chapter 3.

The fairly recent history of removal of oaks for use in the local charcoal industry is another clue that should be spatially analyzed, as only local sources may best do. My vision is that students could be supported by GSA scholarships in fleshing out such pertinent information as part of their academic programs.

The charcoal industry history should be compared with other historical land use trends, such as the state sanctioned/ funded mid-20th century efforts to remove oaks and other woody plants in the name of “rangeland improvement” summarized, with citations, in my blog post #6. [Ball and Chain & Other Links](#)

In recent decades landscape and restoration ecologists have increasingly recognized the influences on historic and current land cover/vegetation by intentional land management practices of indigenous Californians. While it may be impossible in most cases to document exactly how the landscape would look without the recently recognized indigenous land management skills, some inferences based on that awareness may be useful in establishing vegetative goals and processes to restore watershed/ catchment functions.

Thus, consideration of **all anthropogenic impacts (including prehistoric)** to the function of existing and prospective restored watersheds/ catchments is entirely germane to the GSP. For an overview, please see my blog post #4. [Think Outside the Basin](#).

While my initial focus was on improving the function of the Salinas River and other Central West Ecoregion watersheds for steelhead – especially augmenting baseflow – it has always been clear that augmenting baseflow necessarily benefits regional groundwater stocks, since baseflow essentially reflects its net status.

Moreover, detention storage offered in watershed/ catchment vadose zones – “the soil profile as a natural reservoir” (Hursh and Fletcher 1942), as well as in the bedrock aquifers that provide longer-term storage but eventually drain to the alluvial aquifers GSAs are directly concerned with, offers the most cost-effective form of short and longer-term storage because: 1.) no hard infrastructure involved, 2.) reduced complexity of permitting ecological restoration projects, and 3.) over time, restored sites will become relatively self-sustaining, so much less costly to maintain than engineered structures.

2018 Outreach to Paso Robles GSA Points of Contact

While this is my first input on the draft GSP in progress. I have sent email alerts for each of my seven blog posts to date, beginning January 2018, to the specific points of contact for each of the GSAs in the Paso Robles Subbasin. In mid-April I mailed hard copy letters to a couple of you. But to date I don’t believe any of your contacts have taken time to explore the [Rainfall to Groundwater](#) web site to learn about these opportunities that you won’t see proposed/ defined elsewhere.

To date Rainfall to Groundwater is the only proposed approach to groundwater recharge that does not involve diversion of surface waters. Please see [Surface](#)

[Water Diversions vs Baseflow Augmentation](#). Furthermore, Paso Robles Subbasin watersheds/ catchments are the prototypical model of expansive opportunities within a single (greater) watershed/ catchment. So I do hope these comments may finally get your attention.

Water Budget Model & Process

These comments pertain to the July 25, 2018 Project Status Update, Water Budget Status. The third page upper exhibit depicting, “Use Model(s) to Develop Water Budgets” indicates that the sole input to “Watershed Model” is “Daily Streamflow”.

I assume that “daily streamflow” would be based on one or more stream gages, but draft chapter 3.6.3 and Figure 3-12: Surface Water Gauging and Precipitation Stations suggest few existing gauges relative to the expanses of associated watershed/ catchment area.

Certainly more gauges are welcome, but my critique here is that daily streamflow **does not** represent all contributions from the watershed/ catchment. It fails to account for subsurface detention in the vadose zone as well as in bedrock aquifers, and fails to acknowledge drainage, a.k.a. [interflow](#) into the alluvial basins of concern from upstream bedrock aquifers and vadose zones. As noted in the second page exhibit, the water budget must include accounting of all inflows. Since we’re taking groundwater in the first place, it should be clear that not all groundwater arose from surface flows. So how can “daily streamflow” be the **sole input** to “Watershed Model”?

Nevertheless, your team is far from alone. That surface water bias is among the current prevailing paradigms that blinds practitioners, including DWR, to the opportunities for Rainfall to Groundwater. Please see [Stream Networks vs Watersheds/ Catchments](#).

Recommended Links

I’m running out of time and out of steam so I’ll just point you to a few more links from my website and hope you’ll try surfing a bit from those. [California Case](#) offers an overview. Also recommended for orientation are [Surface-Groundwater Systems in a Holistic Water Cycle](#) and [Plants in an Ecohydrology Context](#), both of which emphasize the vadose zone – watershed/ catchment interface between surface and groundwater.

I posted an [Executive Summary in May](#) but plan to post an updated/ refined version within the next week. I’ll be emailing an alert for a new blog post to the GSA points of contact (and anyone new who may sign up for my newsletter) soon.

I do hope my comments have opened your collective minds to new opportunities for the Paso Robles Subbasin GSP.

Sincerely,

Verna Jigour, PhD

Citations

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<http://cwt33.ecology.uga.edu/publications/801.pdf>

Jigour, V. M. 2008 (2011). Watershed restoration for baseflow augmentation. Dissertation. Interdisciplinary Studies: Arts & Sciences: Conservation Ecology. Union Institute & University.

Thorne, J., D. Cameron, and V. Jigour. 2002. A guide to wildlands conservation in the central coast region of California. California Wilderness Coalition, Davis, California, USA.

To: Committee Members, Paso Robles Groundwater Sustainability Plan
From: Dennis R Loucks, Fred Hoey and Greg Grewal
Date: October 17,2018

Re: Groundwater Sustainability Plan, Chapter 5, Subsidence.

Dear Committee Members,

Our group is concerned that the consultant, Montgomery & Associates, is not adequately addressing the subsidence that has occurred in the Paso Robles Groundwater Basin.

We have reviewed the dismissive statements in the PowerPoint presentation and the incomplete statements made in Chapter 5.4 Subsidence. As you know, Subsidence is a key requirement in the Sustainability Plan and it cannot be cavalierly dismissed, as it has been to date.

Please take the time to review our research and reasons why this key SGMA requirement must be considered carefully.

Background:

Several weeks ago, we discovered a USGS report (open file report 00-447), Titled: **Use of InSAR to Identify Land-Surface Displacements Caused by Aquifer-System Compaction in the Paso Robles Area, San Luis Obispo County, California, March to August 1997**

The report authored by D.W. Valentine, Densmore, Galloway and Amelung was completed in 2001 and can be found on the USGS web site. The report, nine pages in length, discusses the methodology, results, areas of study, and provides a summary and conclusion. There are also four maps/images. We encourage the Committee Members to review this report and to compare with the findings of the Consultant.

Our summary of USGS report:

The report stated that in the Paso Robles area, about 3 miles northeast of Paso Robles there was downward land-surface displacement of .06 inches, northwest of Paso Robles, .08 inches downward displacement, and 2.1 inches in the southern signature area encompassing approx..75-square-miles (Figure 4, USGS)

Subsidence was also located in other areas of the County:

Atascadero Area:

“The phase signature shows about 1 to 2 inches of downward ground displacement, which coincides with the seasonal water-level declines between spring and fall 1997 of about 54 feet (figure 4)”

Paso Robles Groundwater Basin:

“In the Shandon and Red Hills areas, as much as 2 inches of displacement was identified, which is apparently related to pumping for agricultural use.” Other areas outside of our basin were also identified, Morro Bay, Arroyo Grande/Pismo Beach/Nipomo, Santa Maria Valley area, and Point Sal areas.

After reading the USGS report, we were astonished that this had not been, to our knowledge, ever discussed in the numerous engineering studies completed in the past twenty years. We felt it was a vital element that required further investigation. Considering the report is 21 years old, and subsidence of 2 inches was documented in a sixth month period, what is the current condition of the basin 21 years later? Has it stabilized? or has it continued to subside? Our fear is that with the growth of agriculture and rural development it may be unwelcome information. Be it as it may, it is necessary, in fact a requirement, of SGMA that subsidence be addressed.

Therefore it was our recommendation that the USGS study be updated and that monitoring stations be established with regard to subsidence. In fact, we forwarded a letter to California Department of Water Resources requesting that subsidence monitors be required in Groundwater Sustainability Plans. A copy was forwarded to the Consultant, Montgomery & Assoc.

Please compare our brief summary of the USGS report to that of Montgomery & Assoc.:

5.4 Subsidence

Land subsidence is the lowering of the land surface. While several human-induced and natural causes of subsidence exist, the only process applicable to the GSP is subsidence due to lowered groundwater elevations caused by groundwater pumping.

Direct measurements of subsidence have not been made in the Subbasin using extensometers or repeat benchmark calibration; however, interferometric synthetic aperture radar (InSAR) has been used in the area to remotely map subsidence. This technology uses radar images taken from satellites that are used to create maps of changes in land surface elevation. The studies done in the area show that a localized area three miles northeast of the City of Paso Robles had a downward displacement of .06 to 2.1 inches between Spring 1997 and Fall 1997 (Valentine, D.W. et al., 2001)

5.4 Subsidence, The Consultant's summary doesn't mention other relevant areas in the referenced USGS report, such as 2.1 inches in an approx. 75 square mile area, and about 2 inches of displacement in the Shandon and Red Hills area, apparently related to pumping for agricultural use.

To further compound this issue, when the Consultant presents a PowerPoint that states in reference to Subsidence:

“No direct measurements”

“Some satellite data suggest small ground surface drops over”

“ Not a significant concern”

“ Subsidence: Not a significant problem”

We find the Consultant's comments dismissive and incomplete.

Conclusions/Recommendations:

Our group of concerned citizen's are not Engineer's or Hydrologists but we, as many other concerned citizens, recognize that the current condition of the basin must be determined in order to effectively manage the basin in the future for the benefit of all residents.

We firmly believe that evidence exists that would lead a reasonable person to conclude that subsidence in the basin has occurred. We feel it is now reasonable to determine if subsidence has stabilized or has continued, please consider updating the InSAR through the USGS and consider installing subsidence monitors.

Enclosures: USGS Open file report 00-447

Cc: Committee Members

From: Jennifer Caffee
Sent: Tuesday, October 16, 2018 3:41 PM
To: Angela Ruberto
Subject: Fw: [EXTERNAL]SGMA Chapter 5 Subsidence
Attachments: Committee letter subsidence.docx

From: Dennis <[REDACTED]>
Sent: Monday, October 15, 2018 5:02 PM
To: john@johnpeschong.com Peschong; BOS_District 5_Web Contact
Cc: [REDACTED]
Subject: [EXTERNAL]SGMA Chapter 5 Subsidence

ATTENTION: This email originated from outside the County's network. Use caution when opening attachments or links.

Attached are our thoughts regarding the subsidence chapter that will be presented tomorrow. Had difficulty scanning the USGS report. Please copy for the committee if possible.

Thank you,

Dennis Loucks



Use of InSAR to Identify Land-Surface Displacements Caused by Aquifer-System Compaction in the Paso Robles Area, San Luis Obispo County, California, March to August 1997

By David W. Valentine¹, Jill N. Densmore², Devin L. Galloway², and Falk Amelung³.

Open-File Report 00-447

Version 1.0

2001

U.S. Department of the Interior

Gail A. Norton, Secretary

U.S. Geological Survey

Charles G. Groat, Director

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey (USGS) editorial standards or with the North American Stratigraphic Code. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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Introduction

During the 1990's, the population of San Luis Obispo County has grown steadily, and some land use has been converted from dry farming and grazing to irrigated vineyards and urban areas. Because surface-water supplies are insufficient to meet the growing demand for water, ground-water pumpage has increased and the resulting water-level declines have raised concern that this water resource may become overstressed. To address this concern many questions need to be answered. One particular concern is whether the larger ground-water basins within the county function as large individual basins or whether subsurface structures divide these large basins into smaller subbasins, as differences in ground-water-level data suggest. In 1999, the San Luis Obispo County Flood Control and Water Conservation District entered into a cooperative agreement with the U.S. Geological Survey to test the validity of using Interferometric Synthetic Aperture Radar (InSAR) as a tool to aid in locating subsurface structures in ground-water basins by determining seasonal and historical land-surface changes. Spaceborne InSAR has been used to identify displacements of the land surface caused by aquifer-system compaction in other ground-water basins, such as the basins in Antelope Valley, California (Galloway and others, 1998); Santa Clara Valley, California (Ikehara and others, 1998); and in the Las Vegas area of Nevada (Amelung and others, 1999). Spatially detailed InSAR imagery of these basins show that InSAR can reveal sub-centimeter vertical land-surface displacements. Owing to the high spatial detail of InSAR imagery, the InSAR-derived displacement maps can be used with ground-water-level data to reveal

differential aquifer-system compaction related to the presence of geological structures or the distribution of compressible sediments that may define subbasin boundaries. Many faults have already been identified in San Luis Obispo County, but identifying additional faults or other hydrologic barriers hidden in the subsurface is important to understanding ground-water flow. InSAR displacement maps of the Paso Robles area of San Luis Obispo County were compared with maps of seasonal changes in ground-water levels to detect the presence of aquifer-system compaction. Other areas of potential aquifer-system compaction within the county also were identified but are not discussed in detail here.

Location and Description of Study Area The area of the study includes most of San Luis Obispo County, California, which is located about 160 miles northeast of Los Angeles, California (Figure 1). The climate of the area is characterized by dry summers and relatively wet winters with most of the 13 inches of mean annual precipitation occurring during the winter (Paso Robles Information Services, www page, Internet URL <<http://www.pasorobleschamber.com/facts/index.htm>>). The primary focus of this study is a 400-square-mile area near Paso Robles, which includes part of the Paso Robles subunit of the Salinas ground-water basin (Figure 1). This area has been proposed for a more intense study and would benefit from better definition of the extent and continuity of the ground-water basin.

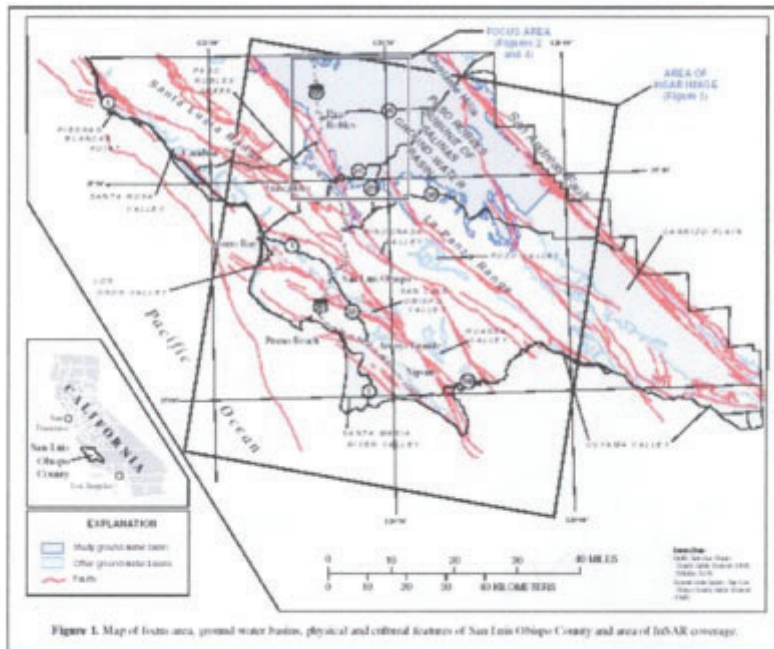
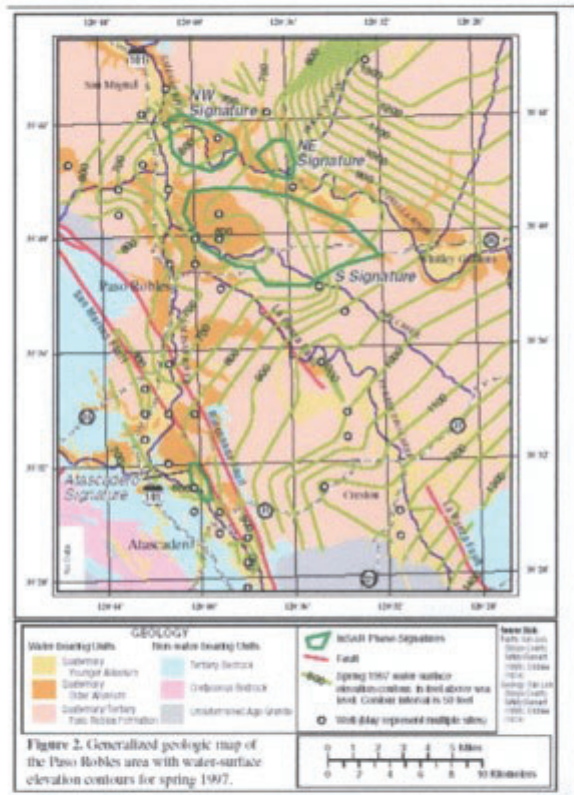


Figure 1. Map of Iosito area, ground water basin, physical and cultural features of San Luis Obispo County and area of InSAR coverage

The Paso Robles subunit is bounded by the Cholame Hills on the northeast, the Santa Lucia Range on the southwest and west, and the La Panza Range on the south. The main water-bearing units in the Paso Robles subunit are Quaternary younger and older alluvium and Quaternary and

Tertiary continental sediments of the Paso Robles Formation (Figure 2). The younger and older alluvium consists of poorly sorted, unconsolidated gravel, sand, and silt. The Paso Robles Formation consists of unconsolidated to poorly consolidated coarse sand and gravel, as well as finer sand, silt, and clay and some limestone that formed from deposition in floodplains and small lakes. The water-bearing units are underlain by non-water-bearing Tertiary and Cretaceous bedrock and granite. Mapped faults crossing the basin include the San Marcos, Rinconada, and La Panza faults (Campion and others, 1983).



Methodology

InSAR

InSAR is a means for remotely mapping land-surface displacements. Paired, synthetic-aperture radar (SAR) images taken from earth-orbiting satellites are used to create an interference image or

interferogram. The interferogram shows the change in the radar line-of-sight distance, or range, between land surface and the radar antenna between the paired images. The interferogram can be viewed as a spatially detailed displacement map with 1,600-6,400 square meter pixels generally attainable. For a particular pixel, a resolution of range displacement is on the order of hundredths of an inch (millimeters). In coherent radar echoes, the phase is exactly proportional to the measured time delay and effective path length of the signal. The path differences of two signals can be determined by observing the phase differences or signature of the echoes. This phase signature is represented graphically by a color fringe. Range displacements are identified from coherent phase signatures between the two radar scenes on the interferogram. For C-band radar of the European Remote Sensing (ERS) platforms, the maximum detectable phase shift is one-half the wavelength of the radar microwave, which represents 1.1 inches (28 millimeters) of range displacement. Larger range displacements are calculated by identifying multiple coherent phase signatures from color fringes on the image; 1.1 inches (28 millimeters) of range displacement for each color fringe plus some fraction of 1.1 inches (28 millimeters) for a partial color fringe. Thus, the interferogram represents a displacement map of phase signatures in the range of 0-1.1 inches (0-28 millimeters), but range displacements exceeding 1.1 inches (28 millimeters) can be calculated by counting color fringes on the imagery. Because the line-of-sight of the ERS satellites are reclined 23 degrees from vertical at the center of the radar image, an equivalent vertical displacement represented by one color fringe on an interferogram would be slightly larger than the range displacement, about 1.2 inches (30.5 millimeters).

The resulting map of phase signatures can be related to several factors; displacement of the land surface, topographic effects, and changes in the travel time of the radar signal owing to tropospheric delays. Topographic effects were removed using a 1-day tandem interferogram (Zebker and others, 1994b) processed from SAR scenes imaged on succeeding days. Subtraction of the tandem interferogram from the original interferogram results in the "change" interferogram that contains range displacements from ground displacements plus any tropospheric delays.

For this study, raw SAR images made by European Remote Sensing satellites ERS-1 and ERS-2 were used. Five-month, 7-month, 15-month, and 20-month interferograms were created using techniques described by Zebker and others (1994a), Peltzer and Rosen (1995), Peltzer and others (1996), and Galloway and others (1998). Each of the four interferograms (3861 square miles or 10,000 square kilometers) was examined for coherent phase signatures. Only the 5-month interferogram (Figures 3 and 4) from March 28 to August 15, 1997, showed coherent phase signatures that warranted further examination. Topographic effects were removed using a 1-day tandem interferogram processed from SAR scenes imaged on December 29 and 30, 1995. The lack of coherent phase signatures in the 7-, 15-, and 20-month interferograms is due to atmospheric effects on the radar signal or temporal decorrelation of the interferograms. Areas where it was not possible to correct for tandem effects are excluded from the differential interferograms, and instead, the gray-scale image of the radar amplitude is shown.

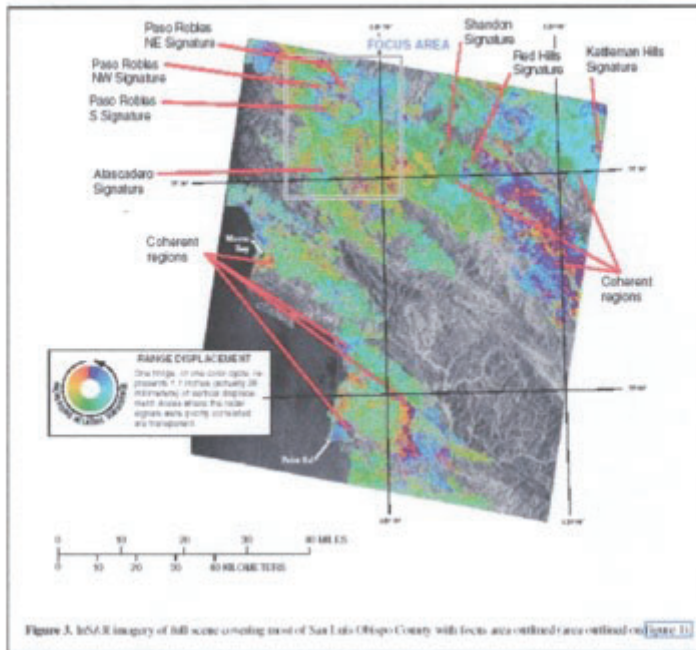


Figure 3. InSAR imagery of hill scene covering most of San Luis Obispo County with focus area outlined (area outlined on [Figure 11](#))

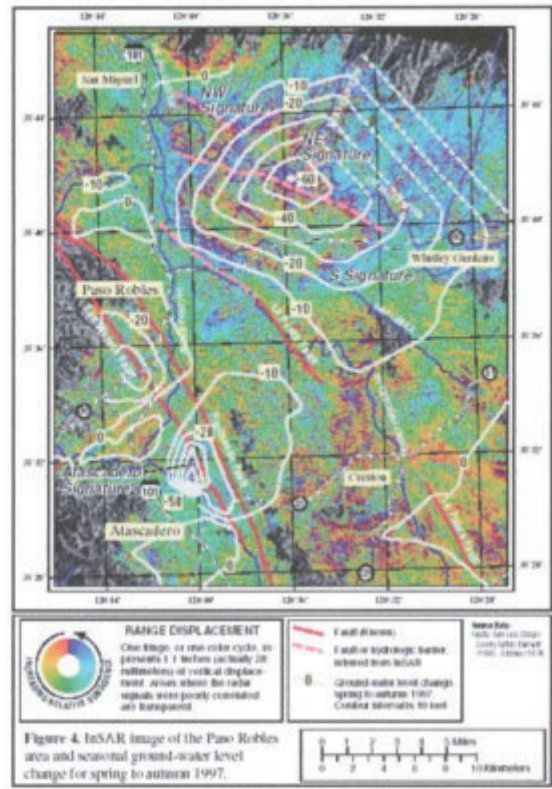


Figure 4. InSAR image of the Paso Robles area and seasonal ground-water level change for spring to autumn 1997.

Ground-Water Levels Water-level data for 58 wells for both the spring and fall of 1997 in 40 public land survey sections were obtained from San Luis Obispo County Flood Control and Water Conservation District (unpublished data, 1999). Although the state well number was provided for the wells, the exact well locations are not known. Therefore, all wells in a section were assigned an approximate position that corresponds with the center of the section, and thus well locations may be off by as much as 0.7 mile. Because the data are sparse, a triangular-irregular mesh was used to construct the contour maps of spring 1997 water-surface elevations (Figure 2) and the seasonal ground-water level change (Figure 4). The seasonal ground-water level change was calculated by subtracting fall 1997 water levels from spring 1997 water levels.

Results

The interferogram for March 28-August 15, 1997, shows four phase signatures in two separate locations within the area of primary focus for this study (Figure 4). Three of these signatures are located northeast of Paso Robles and the other is northeast of Atascadero (Figure 4). Other

coherent phase signals, outside of the area of primary focus, are also apparent on this interferogram.

Paso Robles

The interferogram shows three phase signatures about 3 miles northeast of Paso Robles (Figure 4). These three phase signatures lie along the trend of an unmapped syncline with the thicknesses of Paso Robles formation sediments exceeding 4,000 feet (Dibblee, USGS, oral commun., 1999). The southern signature shows a relative change of about two phase signatures (2.1 inches or 56 millimeters) of increasing range distance (downward land-surface displacement) in an approximately 75-square-mile area. The maximum downward displacement in the northwest signature is about 0.8 inches (20 millimeters) and the northeast signature is 0.6 inches (about 14 millimeters). The southern and northeastern phase signatures coincide with an area of seasonal water-level decline of about 60 feet (Figure 4); downward displacement in these areas may be related to water-level declines. The northwestern phase signature also appears to coincide with a depression in the spring 1997 water-surface elevation (Figure 2). The southwestern boundary of the southern phase signature is subparallel to an extension of the La Panza Fault (Dibblee, 1974) and appears to be bounded by the fault. The northwestern and northeastern phase signatures do not appear to be related to any mapped geological structures, but their separation from the southern phase signature may suggest the presence of a ground-water boundary or barrier (Figure 4). The separation of the northeast and northwest phase signatures appear to coincide with the northeast trending ground-water contours (just north of Hog Canyon in Figure 2), which may indicate the presence of a ground-water boundary or barrier. It is also possible that the concentration of pumping in the areas of these three phase signatures and the subsequent water-level declines has caused localized ground-surface displacement and that these are not barriers or subbasin boundaries.

Atascadero area

The interferogram (Figure 4) shows an areally small phase signature in the Atascadero area east of Highway 101 and the Salinas River. The eastern edge of the signature is bordered by the San Marcos and the Rinconada faults. The phase signature appears to be controlled, in part, by the ground-water barriers formed by the faults and by the geometry of the basins adjacent to the faults. The phase signature shows about 1 to 2 inches (28 to 56 millimeters) of downward ground displacement, which coincides with the seasonal water-level declines between spring and fall 1997 of about 54 feet (Figure 4).

Other regions

In addition to the phase signatures identified in the area of primary focus, coherent regions also were identified in seven additional regions of the interferogram (Figure 3). In the Kettleman Hills area, as much as 4 inches (110 millimeters) of land-surface displacement was identified in two oil fields using InSAR (Fielding and others, 1998). This displacement probably is related to withdrawal of oil from the area and not to the withdrawal of ground water. In the Shandon and Red Hills areas, as much 2 inches (56 millimeters) of displacement was identified, which is apparently related to pumping for agricultural use. Coherent phase signals also were identified in the Morro Bay, Arroyo Grande/Pismo Beach/Nipomo, Santa Maria Valley area, and Point Sal areas.

Summary And Conclusions

During the 1990's, the population of San Luis Obispo County has grown steadily and surface-water supplies have been insufficient to meet the growing demand for water. Ground-water pumpage has increased to meet this shortfall, resulting in seasonal water-level declines and concern that the water resources of the area may become overstressed. One particular concern is whether the larger ground-water basins within the county function as large individual basins or whether subsurface structures divide these large basins into smaller subbasins. Interferometric Synthetic Aperture Radar was tested for use as a tool to aid in locating subsurface structures in ground-water basins by determining land-surface changes. Owing to the high spatial detail of InSAR imagery, the InSAR-derived displacement maps can be used with ground-water-level data to reveal differential aquifer-system compaction related to the presence of geological structures or the distribution of compressible sediment that may define subbasins.

The area of this study includes most of San Luis Obispo County, California, which is located about 160 miles northwest of Los Angeles, California. The primary focus of this study is a 400-square-mile area near Paso Robles. This area was selected for more intense investigation because a ground-water study for the area has been proposed that would benefit from better definition of the extent and continuity of the ground-water basins. The main water-bearing units in the Paso Robles area are Quaternary younger and older alluvium and Quaternary/Tertiary continental sediments.

InSAR is a means of remotely mapping land-surface displacements using paired synthetic-aperture radar images taken from earth-orbiting satellites. These images are used to create an interferogram that shows the change in the range between the land surface and the radar antenna on the order of millimeters for the paired images. The differences between two signals can be determined by observing the phase signatures of the radar echoes. These differences are represented graphically by a color fringe, which represents about 1.1 inches (28 millimeters) of range displacement. For this study, raw SAR images taken on March 28 and August 15, 1997, were used to create an interferogram. Water levels from 58 wells with both spring and fall 1997 measurements were used to construct water-level contour map for spring of 1997 and a seasonal water-level-change map for spring to fall 1997.

The interferogram showed three phase signatures about 3 miles northeast of Paso Robles, which indicated ground-surface displacements of from 0.6 to 2.1 inches (14 to 58 millimeters); the southern and northeast phase signatures coincide with an area of water-level decline of over 60 feet. There appears to be a ground-water barrier between the southern signature and the northeast and northwest signatures and also between the northeast and northwest signatures. These may not be actual barriers but more related to concentrated ground-water pumpage in the area of these signatures. The interferogram also shows an areally small phase signature in the Atascadero area that is bounded on the east by previously mapped faults and coincides with an area of seasonal ground-water level change of about 54 feet. The ground deformation in this area is on the order of 1 to 2 inches. In addition to those phase signatures in the area of primary focus, seven additional coherent phase signals were identified in other areas covered by the interferogram; Kettleman Hills, Shandon, Red Hills, Morro Bay, Arroyo Grande/Pismo Beach/Nipomo, Santa Maria Valley area, and Point Sal.

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Last modified: Friday, January 11 2013, 01:35:07 AM





California Water Rights Issues January 2019

Under the California Constitution, water must be put to the reasonable and beneficial use of the citizens. No water rights grant any party the right to waste water or use more than is required for their reasonable and beneficial use. Waste by the holder of the water right can be curtailed or revoked.

No water user in the State of California "owns" any water. Instead a water right grants the holder only the right to access the water. Thus a landowner has the right to access the water beneath his property for his/her reasonable and beneficial use. The owner of all water in California is the State. The State is the trustee of the water for the benefit of the public. This is referred to as the Public Trust Doctrine. The benefits to the public that the State must consider are economic, recreational, aesthetic and environmental. If at any time the State determines that the current use does not benefit the public trust the State can reallocate the water. The Public Trust Doctrine therefore means no water rights in California are truly "vested" in the traditional sense of property rights. (A Primer On California Water Rights, Gary W. Sawyers, Esq.)

Unfortunately, there are groups which are manipulating the California Legislature in violation of the Public Trust Doctrine to transfer water allocations from groups such as mutual water companies to the water users who are then allowed to transfer water allocations over the objections of the mutual water companies.

The vast majority of all mutual water companies were organized to provide water to their members only. Green River Mutual Water Company is no exception. Stock of the Green River Mutual Water Company is held by the land owners within the Green River Mutual Water Company district and the shares are appurtenant to the land. However recent legislation is looking to take the private allocations of water of existing mutual water companies and require them to become quasi-public water companies with the ability of the recipients to transfer the water.

AB 240, passed by the California Legislature in 2014, requires existing and future mutual water companies in California to either amend or draft bylaws that allow the directors of the mutual water companies to sell water to others (state agencies, schools and other mutual water companies) at the expense of the members who either paid for the installation and maintenance of the water system or are going to pay for the installation and maintenance of a water system. For existing mutual water companies, AB 240 would appear to be an act of eminent domain without compensation to the members who own the wells, installed and maintain the systems. For newly formed mutual water companies, AB 240 appears to make the shareholders indorse, through their bylaws, the public access to their water.

It can be fairly said that AB 240 is a very clever legislative scheme to force private mutual water companies in California to allow the users to be able to transfer water allocations to others through subtle changes to the California Corporations Code. Some of the more onerous provisions are as follows:

1. The first requirement of AB 240 is for all mutual water companies to amend their articles and by laws incorporating the provisions of AB 240 pursuant to the Corporations Code sections 14300 et. seq.;
 2. Once the bylaws and articles are amended, then the water companies are required to record certified copies of articles and bylaws with County Recorder, (Corp. Code Section 14300);
 3. Once the provisions of AB 240 are accepted and incorporated in the articles and bylaws the directors may sell water to the state, any department or agency of the state, any school district, to any public agency or to any other mutual water company and, during emergencies, to the County for fire protections. Thus if the directors decide to sell water to another water company that is selling water to Los Angeles or some other public entity, the shareholders could not stop the directors from doing so even if the amount of water sold exceeds the capacity of the current system (Corp. Code 14300);
 4. After amending the Corporation articles and bylaws to comply with AB 240, the Corporation is then required to submit a map to LAFCO showing the approximate boundaries of the area the water company serves. This triggers reporting to and oversight by LAFCO (Corp. Code 14301.1 (a));
 5. Once the Corporation has registered with LAFCO the Corporation is then required to respond to all requests for information from LAFCO concerning the operation of the water system (Corp. Code 14301.1 (b));
 6. Once AB 240 is adopted into the bylaws, the mutual water company must maintain a financial reserve fund for repairs and replacement to its water production, transmission and distribution facilities at a level sufficient for continuous operation in compliance with the federal Safe Drinking Act and the California Safe Drinking Water Act. This is over the top. Current corporate reserves for Green River Mutual Water Company are sufficient for repairs only and would require additional dues from the members to comply with the replacement requirement (Corp. Code 14301.3);
- AB 240, under the guise of the Public Trust Doctrine, and through pressure from lobbying groups lobbying for individuals and large wealthy trusts are attempting to drive legislation aimed at granting water user's rights to transfer water allocations over the objections of the water suppliers. In other words, doing the very thing the California Constitution was designed to prevent; turning water into personal property that can be bought and sold for profit.

Property of Green River Mutual Water Company
 Charles V. Daugherty, Esq.



www.greenrivermwc.com

Water By-the Numbers

Sometimes it's a little easier to understand something if you break it down into a simpler form. The following is as simple as it gets.

The average person uses 80 - 100 gallons of water per day, which works out to 2,400 - 3,000 gallons per month. Whitley Gardens has 110 households with an average of 4 people per household. With 440 people using 100 gallons per day it works out to 44,000 gallons per day and 1,320,000 gallons of water per month. If you extend that out for a year, that number becomes 15,840,000 gallons. This number does not include livestock or agriculture.

The average vineyard, using a drip irrigation system uses 20 gallons per acre per minute. For 188 acres this works out to 3,760 gallons per hour. The average vineyard watering cycle is an 8 hour cycle, or 1,804,800 gallons of water per cycle/per day. That's 484,800 gallons more than Whitley Gardens uses in a month.

Let's take another step.

A 500hp pump with an 11inch line, pumps 800gpm. Pumping for 1 hour generates 48,000 gallons. Therefore, over an 8 hour period it pumps 384,000 gallons!

So the average vineyard watering cycle uses 1,804,800 gallons and it waters once a week. That works out to 7,219,200 gallons for a 4 week period. Take it a step further to an 8 month period of time (32 weeks) and it works out to 57,753,600 gallons. Twice a week works out to 115,507,200 gallons. New vines and hot weather would easily require more irrigation. To pump this much water would require 2,406 hours or 300 eight(8) hour days of operation.

Just a reminder, Whitley Gardens uses 15,840,000 per year. The vineyard uses just under 100,000,000 gallons more!

Let's go a step further and we'll call it the "what if" scenario.

What if the pump ran 12 hours a day 5 days a week 3,120 hours a year which equals 149,760,000 gallons of water. That's a lot of water, but that's not the end. This is only 1 well and one pipe. What are the numbers when you have 3 pumps? Yes, 3 wells, 3 - 500hp pumps! Those 3 wells total 1500hp, pumping 2400 gallons per minute, 144,000 gallons per hour and for an 8 hour day 1,152,000 gallons.

This begs the question, why do you need this kind of capacity? Where's the water going?

Whitley Gardens also has 3 wells serving its community. We use a 30hp pump on each well for a grand total of 90hp — 1410hp less than the vineyard!

Respectfully,

Steve Pitts

Board Member

Green River Mutual Water Company

Angela Ruberto

From: Dana Merrill <DMerrill@mesavineyard.com>
Sent: Tuesday, February 26, 2019 7:07 PM
To: Angela Ruberto
Subject: [EXT]Screenshot 2019-02-26 at 7.00.35 PM
Attachments: Image-1.jpg; ATT00001.txt



ATTENTION: This email originated from outside the County's network. Use caution when opening attachments or links.

This cost example has some flaws. 7 tons per acre is at least 2 tons per acre high. On the cost side, we are now spending closer to \$4,500 per acre direct cost, plus the long term debt, taxes and equipment. The net revenue after adding the penalty is closer to zero and no way will a grower still net \$4,800 per acre.

Who provided these numbers? Why not talk to some of us who own and manage, including budgeting and accounting, for the operations? Some higher grossing vineyards can pay more but the example overstates the average revenue potential of vineyards in the Paso Basin.

slocounty.ca.gov

#4 Pumping Fees Example 5

Financial Implications for Growers

Revenue and cost assumptions obtained from crop enterprise budgets published by UC Davis, and personal interviews with growers. Actual revenues and costs vary across growers and properties.

Illustrative Enterprise Budget (Vineyard)

Assumption	Value	Unit
Yield	7	Tons/ac
Price	\$1,200	Per ton
Gross Revenue	\$8,400	Per ac
Operating Costs	\$2,400	Per ac
Cash Overhead	\$1,200	Per ac
Total Cash Costs	\$3,600	Per ac
Without water charges → Net Revenue	\$4,800	Per ac
Pumping Allowance	1	AF/ac
Actual Pumping	1.25	AF/ac
Overproduction	0.25	AF/ac
Base Assessment	\$116	Per ac (\$93/AF x 1.25 AF)
Overproduction Surcharge	\$208	Per ac (\$832/AF x 0.25 AF)
Total Water Charges	\$324	Per ac
With water charges → Net Revenue	\$4,476	Per ac

#4 Pumping Fees Example 6

Angela Ruberto

From: Dana Merrill <DMerrill@mesavineyard.com>
Sent: Monday, February 25, 2019 10:51 PM
To: Angela Ruberto
Subject: [EXT]Comments on projects etc

ATTENTION: This email originated from outside the County's network. Use caution when opening attachments or links.

Angela,

My comments in brief are:

1. Better detailed data is needed before selecting specific projects by area. Shandon and Creston (depending on where Creston extends) seem to have stable water levels vs the Red Zone. So recharge or supplemental water needs to be likely worth the cost to areas in better shape. Or prove taking there does help the Red Zone.
2. Many small users is Jardine, Squirrel Hollow, etc may need regional systems which could be a few deep Wells or supplemental water. Domestic and AG May have different solutions. Antiquated subdivisions have special challenges that require solutions different than commercial Agriculture. Those are a failure of good Planning which didn't exist when the lots created. Government should now help resolve but wells and septic systems on 1 acre parcels not sound planning. Same as Los Osos faced only worse.
3. More spending on dedicated monitoring has been promised for years but never built. Do that first to be sure the solutions will work.
4. Prioritize getting the County Naci share, where the County Paso Basin was left out, into the Basin. Get the city Paso Robles to take its full allotment which would lessen the salt level of its effluent. More purple pipe water could then go to vineyards . Basin landowners could subsidize the lake water treatment plant expansion cost for the city.
5. there should be an alternative to take State water before treatment at Polonio Pass. Maybe pipe to Estrella River then pump out by Whitley Gardens. Save pipeline costs perhaps. More water at lower cost is available although more pipeline is needed.
6. Get representative monitoring well system going and build projects as results of monitoring dictates. Figure out where our projects should be concentrated.
7. Get Irrigated Land Ordinance renewed for 5 years for stability. Expiring is not going to be good in 2020. County has a system and while it's not perfect it's a start we have experience with.
- 8 An Economic Study needs to be included to know whether Ramp Down or Supplemental water is best. A Ramp Down is not possible as we have few annual irrigated crops, the economic multiplier factor in reverse will devastate the local economy based on the wine and tourist industry. Winegrapes use so little water we have no lower use crop alternatives.
9. Get the Paso Basin on a priority list for State Water, otherwise urban uses will grab it and its gone. Buy a base amount the add annual purchases on high rainfall years at lower prices for recharge. Continue to rely on wells but support groundwater levels with supplemental water.
10. Adopt a Monterey County mandatory reporting system based on meters for Ag Wells 5 inch or larger. Exempt true non commercial de minimous users. They should contribute a minimal fixed admin fee to the system. Commercial Ag pay based on usage to incentivize efficiency. Group by zones as Monterey does.
11. Get more sophisticated data. Water levels have dropped most in the Red Zone but the Basin is deepest there. So many Wells still produce well. If we were to simply concentrate on the Red Zone and have the whole basin pay, would that be logical or fair? Do we know? If not, find out before proposing projects that likely can't pass a 218 election for funding anyway.
12. Our first 5 years post GSP submission need a vast improvement in data. Measure changes is water levels across the basin so we all have confidence in the data. And know the Economic impacts on us all, farmers, retired folks, city

residents. That should help with buy in. Other than the Purple Pipe city of Paso project and getting on the State Water reservation list we are not ready for projects or drastic Ramping Down. Those two projects might be all we need.

I may have further comments but wanted to get these in. Thanks for the opportunity.

Dana Merrill
Paso Robles, CA

Sent from my iPad

Limoneira's Water Strategy

"When the well is dry, we know the worth of water," Ben Franklin advised. He could have been talking about the 21st Century. Today it should come as no surprise to anyone that, whether land is under active farming or being readied for urban development, the availability and cost of water are crucial to business plans and economic success.

Over the past decade, the availability of and the potential for rising costs of water that is largely supplied by public districts is believed to be a threat both to agriculture and to future urban development. At Limoneira, we have long understood that land with water is worth considerably more than land without it.

Water is often called a public resource, but it is also subject to private ownership, which comes with a responsibility of stewardship. Our land use practices are efficient, and our water use history is long and exemplary. We take our stewardship responsibility seriously and fully understand that our use of an important public natural resource is not only the essence of a public private partnership, but it is also our legacy.

Through our land position, historic water use, sustainable land use practices and by making investments in infrastructure, Limoneira has developed long-term, firm and reliable rights to water sufficient to meet any of our land use objectives. The fair market value of the Company should increase as the investment community begins to appreciate the linkage between Limoneira's water position and its long-term business objectives.

The value of water has escalated at rates greater than 6.5 percent per annum since at least the mid-1960s. There is no expectation that these historic increases, which are translated into higher costs for many companies, will be curtailed. In the face of forecasted increased water supply scarcity and cost, what distinguishes Limoneira from our competitors is our ability to directly and indirectly monetize the value of our water position through enhanced competitiveness positioning and profitability.

We expect to capitalize on our position with each of the following opportunities:

- Less expensive water supply costs. Imported water for the Bay-Delta and the Colorado River is becoming increasingly expensive. Regardless of whether there is an engineering solution to present infrastructure problems, there are no guarantees that quantities will be restored to earlier delivery levels or that environmental issues will be resolved. In any event, all imported water supply costs are expected to rise dramatically over the next several decades. By way of contrast, Limoneira holds rights

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to local groundwater and surface water for which development costs have largely been previously paid.

- **High reliability of water (no shortages).** Imported supplies are subject to ongoing environmental and regulatory challenges. There is no scenario where these risks can be eliminated. On the other hand, Limoneira has actively maintained sustainable land use practices that can be amply supplied from the company's existing sources of supply.
- **Long-term water to support transitional land uses (ag to urban).** Land development in the West requires the demonstration of a long-term reliable water supply, sufficient to meet the water supply needs of the land for a minimum of twenty years. Land without water rights and water supplies will struggle to satisfy this legal/planning requirement. Limoneira's historical water position will fulfill even the most stringent of tests for water, thereby ensuring that new development will not be constrained by the absence of water supply.
- **Local water transfers.** Water transfers and exchanges can create a free market short, interim and long-term return on the redistribution of water. Limoneira has the good fortune of possessing access to a variety of surface water and groundwater supplies that can be traded for compensation in those years where the water is not required for Limoneira's operations. The company's opportunity for success in carrying out water transfers will be enhanced by conditions of increased scarcity. Moreover, our ability to transfer water is inherently more feasible than in other parts of California because they would be local and, in many cases, conducted consistent with over-arching regulatory plans.

Water infrastructure agreements. It's one thing to have access to water rights. It's another thing to get the water from where it originates to where it is needed. Limoneira enjoys rights to water related infrastructure that will allow it to integrate its water supplies and to move water from its point of origin to its highest value use.

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LIMONEIRA

SINCE 1893

October 1, 2018

Via Email

Derrick Williams
1232 Park Street, Suite 201B
Paso Robles, CA 93446 [MAP]
805.259.4095
dwilliams@elmontgomery.com

Re: Paso Robles Basin GSP

Dear Derrick:

It was a pleasure to meet you at the groundwater sustainability planning meeting at Windfall Farms on September 19, 2018. As I briefly mentioned at the end of the meeting, Windfall Farms is willing to offer wells on our property for monitoring by the Cooperative Committee. Several of the wells are not in use, and thus, may be well situated to monitor static water levels in the basin. Please contact Lee Nesbitt, our general manager (805-239-0711; LNesbitt@limoneira.com), to coordinate this monitoring.

On a broader note, I appreciated your informative presentation of the options for managing groundwater resources in the basin. You asked for our opinion concerning where water levels should be maintained in the area. We wish to see water levels maintained close to current conditions. We could tolerate slightly lower levels if this is necessary to effectuate a gradual transition to sustainable groundwater management, but appreciate that production will need to be limited to achieve sustainable management consistent with SGMA's mandates. We do not anticipate that water levels will be materially raised in the near term and expect that the costs of achieving such result would be prohibitive. Additionally, we would certainly support the County looking at ways to import water utilizing available underground storage.

We look forward to further cooperation with you and the rest of the Cooperative Committee in developing an effective GSP for the basin.

Sincerely,



Alex M. Teague
Senior Vice President/COO
Limoneira Company

cc: Lee Nesbitt, Windfall Farms
Russell McGlothlin, Brownstein Hyatt Farber Schreck, LLP
Debbie Arnold, 5th District Supervisor

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Edits (P. 3)

8.1 Definitions

□ **Minimum thresholds** refer to numeric values for each sustainability indicator used to define undesirable results.

Minimum thresholds are indicators of where an unreasonable condition might occur. For example, current groundwater elevations might be a minimum threshold if lower groundwater elevations would result in significant and unreasonable costs.

8.2 Sustainability Goal

(P. 5)

The projects and management actions are designed to achieve sustainability within 20 years by one or more of the following means:

- Tiered groundwater pumping fees to promote conservation and fund water supply projects. The tiered fees could be established to promote pumping within the sustainable yield. Pumping that exceeds the sustainable yield would be subject to the higher tiered fees that would fund projects the GSAs find to be cost effective solutions to sustainable management.
- Diligent adherence to Best Management Practices and increased awareness to achieve decreased groundwater use will be pursued.
- Pumping rates could be ramped down until the cumulative pumping rate is at or below the sustainable yield of the Subbasin. This would ensure that the future pumping is within the sustainable yield, which would prevent further lowering of groundwater levels.
- Expanded use of recycled water to offset groundwater pumping in the Subbasin will be pursued. This would contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Long-term and short-term contracts for excess surface water from the Nacimiento Reservoir to offset groundwater pumping in the Subbasin would contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Long-term and short-term contracts for State Water Project water from the Coastal Branch Aqueduct to offset groundwater pumping in the Subbasin would contribute to reducing groundwater pumping from its current levels and prevent further lowering of groundwater levels.
- Storm water infiltration projects would increase basin recharge.
- Increased reservoir storage behind the Salinas Dam could provide additional water for either direct or in-lieu recharge.

- Enhanced best management practices for crop irrigation could minimize water loss from irrigation systems and agricultural reservoirs.

8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria (p. 6)

8.4.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were determined based on hydrogeologic data and understanding, GSA input, the Sustainable Management Criteria survey, public meetings, and discussions with GSA staff. Significant and unreasonable groundwater levels in the Subbasin are those that:

- Cause significant financial burden to those who rely on the groundwater resource
 - Increased pumping costs due to greater lift
 - Shallow domestic wells going dry
 - Cost for deeper installation or construction of new wells
- Require reductions in groundwater extraction creating directly proportional reductions in the area economy
- Significantly interfere with other sustainability indicators

8.4.2 Minimum Thresholds (P. 7)

Section §354.28(c)(1) of the SGMA regulations states that “*The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results.*”

8.4.2.1 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

The information used for establishing the chronic lowering of groundwater levels minimum thresholds include:

- Information about public definitions of significant and unreasonable conditions and desired groundwater elevations, gathered from the SMC survey and public outreach meetings.
- Feedback about significant and unreasonable conditions gathered during public meetings.
- Historical groundwater elevation data from wells monitored by the County of San Luis Obispo
- Depths and locations of existing wells
- Maps of current and historical groundwater elevation data

Initial minimum thresholds and measurable objectives were established using the process described below.

(P. 9)

Based on hydrogeologic data and understanding of the Basin, the survey and public outreach results, historical groundwater elevations from monitoring wells that represented desired conditions were identified. These desired conditions were used to establish the initial measurable objectives and reasonable minimum thresholds in the Subbasin.

Paso Robles Formation Aquifer. Initial minimum thresholds were set using 2017 groundwater elevations. The thresholds were also based on current and historic groundwater elevations from monitoring wells along with depth of existing wells and of the aquifer in each area of the Basin represented by each specific monitoring well. 2017 standing groundwater levels have been selected as measureable objectives and minimum thresholds are set below those levels and sufficiently above the bottom of adjacent wells to protect groundwater extraction. Groundwater trends are analyzed and relative rates of decline of autumn standing groundwater levels over the last five years are projected to 2025 as an initial elevation for the minimum threshold. This allows at least a five year period for the Agency to begin GSP implementation. The numeric groundwater level selected at each monitoring site to represent the minimum threshold beyond which undesirable results may occur are adjusted to reflect the specific conditions at each monitoring site and the adjacent portion of the Basin the monitoring site is selected to reflect. Protecting a sustainable groundwater supply for existing wells was a guiding consideration. Minimum thresholds were selected to allow

8.4.2.7 Effects on Beneficial Users and Land Uses (p. 16 + 17)

The groundwater elevation minimum thresholds may have several effects on beneficial users and land uses in the Subbasin.

Agricultural land uses and users. The groundwater elevation minimum thresholds limit lowering of groundwater levels in the Subbasin. In the absence of other effective measures this has the effect of potentially limiting the amount of groundwater pumping in the Subbasin. Limiting the amount of groundwater pumping will limit the amount and type of crops that can be grown in the Subbasin, which could result in a proportional reduction in the economic viability of some properties. The groundwater elevation minimum thresholds could therefore limit expansion of the Subbasin's agricultural economy. This could have various effects on beneficial users and land uses:

8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria

8.4.4 Undesirable Results (P 24)

8.4.4.1 Criteria for Defining Undesirable Results

The chronic lowering of groundwater elevation undesirable result is a quantitative combinations of groundwater elevation minimum threshold exceedances. For the Paso Robles Subbasin, the groundwater elevation undesirable result is:

Over the course of two years, no more than two exceedances for the groundwater elevation minimum thresholds within a 5-mile radius or within a defined management area of the Basin for any single aquifer. If a single monitoring well is in exceedance for two consecutive years also represents an undesirable result for the area of the Basin represented by the monitoring well. Geographically

isolated exceedances will require investigation to determine if local or Basin wide actions are required in response.

Undesirable results provide flexibility in defining sustainability. Increasing the number of allowed minimum threshold exceedances provides more flexibility, but may lead to significant and unreasonable conditions for a number of beneficial users. Reducing the number of allowed minimum threshold exceedances ensures strict adherence to minimum thresholds, but reduces flexibility due to unanticipated hydrogeologic conditions. The undesirable result was set to balance the interests of beneficial users with the practical aspects of groundwater management under uncertainty. As the monitoring system grows, the number of exceedances allowed may be adjusted. One additional exceedance will be allowed for approximately every seven new monitoring wells. This was considered a reasonable number of exceedances given the hydrogeologic uncertainty of the basin. Close monitoring of groundwater data over the following years will allow actual numbers to be refined based on observable data. Management of the Basin will adapt to specific conditions and to a growing understanding of basin conditions and processes to adopt appropriate responses.

8.5 Reduction in Groundwater Storage Sustainable Management Criteria

(p. 26) 8.5.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were assessed based on the Sustainable Management Criteria survey, public meetings, available data, and discussions with GSA staff. Significant and unreasonable changes in groundwater storage in the Subbasin are those that:

- Lead to long-term reduction in groundwater storage
- Interfere with other sustainability indicators

Responses to the Sustainable Management Criteria survey and public input suggest that most areas of the basin would like to see more groundwater in storage to help with droughts, and some areas of the basin would like to see significantly more groundwater in storage. Public input on which concessions would be acceptable to increase the amount of groundwater in storage revealed two highly ranked concessions:

1. New pumping be offset with new recharge or reduced pumping
2. Pumping be reduced in dry years

However, the concession that agricultural pumping be reduced in all years ranked relatively low. This suggests that, while stakeholders would prefer more groundwater in storage, they also would not prefer to reduce existing agricultural pumping during average years. Stakeholders also prefer that groundwater storage be increased by retaining wet year flows for local recharge and/or importing water.

8.5.2 Minimum Thresholds (p. 26)

Section §354.28(c)(2) of the SGMA regulations states that “*The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin*

without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.”

The reduction of groundwater in storage minimum threshold is established for the Subbasin as a whole, not for individual aquifers. Therefore, one minimum threshold for groundwater in storage is established for the entire Subbasin, but any reduction in storage that would cause an undesirable result in only a limited portion of the basin shall be addressed in that area or areas where declining well levels indicate actions or projects will be effective..

In accordance with the SGMA regulation cited above, the minimum threshold metric is a volume of pumping per year, or an annual pumping rate. Conceptually, the total volume of groundwater that can be pumped annually from the Subbasin without leading to undesirable results is equal to the estimated sustainable yield of the Subbasin. As discussed in Chapter 6, absent the addition of supplemental water, the future estimated long-term sustainable yield of the Subbasin under reasonable climate change assumptions is 61,100 AFY. This estimated sustainable yield will change in the future as additional data become available.

This GSP adopts changes in groundwater elevation as a proxy for the change in groundwater storage metric. As allowed in § 354.36(b)(1) of the SGMA regulations, groundwater elevation data at the RMSs will be reported annually as a proxy to track changes in the amount of groundwater in storage.

The minimum threshold for change in groundwater storage is *the minimum threshold for chronic lowering of groundwater levels minimum threshold*. Based on well-established hydrogeologic principles, stable groundwater elevations held above this minimum threshold represent no change in groundwater storage . Therefore, the minimum threshold using groundwater elevations as a proxy is that the long term groundwater elevation averaged across all the wells in the groundwater level monitoring network will remain above the minimum threshold for chronic lowering of groundwater levels minimum threshold.

Exceedances of this minimum threshold, if limited to specific areas of the Basin, shall be addressed by projects or management actions taken where they will effect those areas of exceedance. Multiple exceedances appearing across the Basin will require proportional Basin wide responses.

8.5.2.4 Effect on Beneficial Uses and Users (P. 28)

The reduction in groundwater storage minimum threshold of maintaining stable average groundwater elevations along with its proxy, will potentially require a reduction in the amount of groundwater pumping in the Subbasin. Reducing pumping may impact the beneficial uses and users of groundwater in the Subbasin.

edits for 8.8.2.1 subsidence – reasonable and justifiable (P. 42)

8.8.2 Minimum Thresholds for Land Subsidence Management Criteria

Section 354.28(c)(5) of the SGMA regulations states that “*The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.*”

8.8.2.1 Information Used and Methodology for Establishing Subsidence Minimum Thresholds

The information used for establishing the land subsidence minimum thresholds included:

- Historical land surface elevation data from continuous GSP locations in the Subbasin
- Feedback about significant and unreasonable conditions gathered from GSA staff members and stakeholders

Land surface elevation is measured by the University NAVSTAR Consortium (UNAVCO) at five continuous global positioning system (GPS) sites in and around the Subbasin (Figure 7-5). Minimum thresholds for subsidence are set at these five locations. The basis for the subsidence minimum threshold is to protect against long term subsidence that would create significant undesirable results. The five GPS sites in the monitoring network have displayed multi-year land surface fluctuations that do not display a long-term decline in land elevation that indicate subsidence is occurring in the Subbasin. Since 2001 four of the five stations show ground surface elevations are trending upwards. The historical land surface fluctuations at these five sites demonstrate that a decline in land surface observed in one year may be compensated for by a similar rise in land surface the following year.

Discussions with GSA staff and the public indicated that, people were generally in agreement with the goal of no significant subsidence that would harm infrastructure.

Rate of Subsidence. Any rate of subsidence, if maintained over a long period of time, could lead to significant and unreasonable conditions. A rate of subsidence that would represent significant loss of groundwater storage or produce significant harm to infrastructure over the following twenty years would be unreasonable. An unacceptable rate of subsidence is one that exceeds half inch (0.041 foot) per year over any five year period. Annual land surface fluctuations are acceptable, they occur naturally and do not indicate long-term subsidence.

As shown on Figure 7-6, most of the continuous GPS surface elevation monitors show more years with an annual rise in land surface elevation than not. This rise is likely part of a longer-term trend, and does not appear to be related to seasonal elastic subsidence. The maximum measured rate of rise for each of the five continuous GPS sites is tabulated in Table 8-10.

Extent of Subsidence. An amount of subsidence sufficient to damage infrastructure in any portion of the Subbasin would be significant and unreasonable. Therefore, the same minimum threshold is set for all five of the existing continuous GPS sites.

The State has suggested that there will likely be assistance available in the future for periodic USGS Lidar surveys that give very exacting surface elevation maps that when compared over time could be used to track changes across the whole Basin Surface.

Land Surface Elevation Monitoring Data

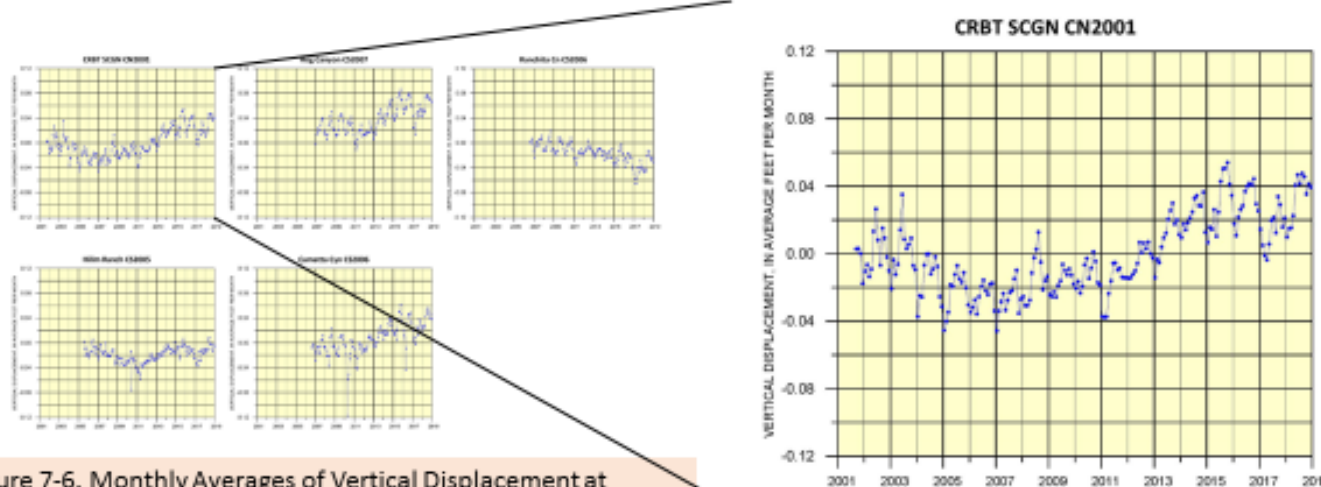


Figure 7-6. Monthly Averages of Vertical Displacement at UNAVCO Continuous GPS Stations

15 April 2019

County Government Center,
1055 Monterey Street, Room 206
San Luis Obispo, CA 93408

Submitted online via: [https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-\(SGMA\)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx](https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-(SGMA)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx)

Re: Chapters 4-8 and Appendix B of the Paso Robles Subbasin Draft GSP

Dear Angela Ruberto,

The Nature Conservancy (TNC) appreciates the opportunity to comment on Chapters 4-8 and Appendix B of the Paso Robles Subbasin Draft Groundwater Sustainability Plans (GSP) being prepared under the Sustainable Groundwater Management Act (SGMA).

TNC as a Stakeholder Representative for the Environment

TNC is a global, nonprofit organization dedicated to conserving the lands and waters on which all life depends. We seek to achieve our mission through science-based planning and implementation of conservation strategies. For decades, we have dedicated resources to establishing diverse partnerships and developing foundational science products for achieving positive outcomes for people and nature in California. TNC was part of a stakeholder group formed by the Water Foundation in early 2014 to develop recommendations for groundwater reform and actively worked to shape and pass SGMA.

Our reason for engaging is simple: California's freshwater biodiversity is highly imperiled. We have lost more than 90 percent of our native wetland and river habitats, leading to precipitous declines in native plants and the populations of animals that call these places home. These natural resources are intricately connected to California's economy providing direct benefits through industries such as fisheries, timber and hunting, as well as indirect benefits such as clean water supplies. SGMA must be successful for us to achieve a sustainable future, in which people and nature can thrive within the Paso Robles subbasin and California.

We believe that the success of SGMA depends on bringing the best available science to the table, engaging all stakeholders in robust dialog, providing strong incentives for beneficial outcomes and rigorous enforcement by the State of California.

Given our mission, we are particularly concerned about the inclusion of nature, as required, in GSPs. The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs.

These tools and resources are available online at GroundwaterResourceHub.org. The Nature Conservancy's tools and resources are intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Addressing Nature's Water Needs in GSPs

SGMA requires that all beneficial uses and users, including environmental users of groundwater, be considered in the development and implementation of GSPs (Water Code § 10723.2).

The GSP Regulations include specific requirements to identify and consider groundwater dependent ecosystems (23 CCR §354.16(g)) when determining whether groundwater conditions are having potential effects on beneficial uses and users. GSAs must also assess whether sustainable management criteria may cause adverse impacts to beneficial uses, which include environmental uses, such as plants and animals. In addition, monitoring networks should be designed to detect potential adverse impacts to beneficial uses due to groundwater. Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decision, and using data collected through monitoring to revise decisions in the future. Over time, GSPs should improve as data gaps are reduced and uncertainties addressed.

To help ensure that GSPs adequately address nature as required under SGMA, The Nature Conservancy has prepared a checklist (**Attachment A**) for GSAs and their consultants to use. The Nature Conservancy believes the following elements are foundational for 2020 GSP submittals. For detailed guidance on how to address the checklist items, please also see our publication, *GDEs under SGMA: Guidance for Preparing GSPs* (https://groundwaterresourcehub.org/public/uploads/pdfs/GWR_Hub_GDE_Guidance_Doc_2-1-18.pdf).

1. Environmental Representation

SGMA requires that groundwater sustainability agencies (GSAs) consider the interests of all beneficial uses and users of groundwater. To meet this requirement, we recommend actively engaging environmental stakeholders by including environmental representation on the GSA board, technical advisory group, and/or working groups. This could include local staff from state and federal resource agencies, nonprofit organizations and other environmental interests. By engaging these stakeholders, GSAs will benefit from access to additional data and resources, as well as a more robust and inclusive GSP.

2. Basin GDE and ISW Maps

SGMA requires that groundwater dependent ecosystems (GDEs) and interconnected surface waters (ISWs) be identified in the GSP. We recommend using the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) provided online (<https://gis.water.ca.gov/app/NCDataSetViewer/>) by the Department of Water Resources (DWR) as a starting point for the GDE map. The NC Dataset was developed through a collaboration between DWR, the Department of Fish and Wildlife and TNC.

3. Potential Effects on Environmental Beneficial Users

SGMA requires that potential effects on GDEs and environmental surface water users be described when defining undesirable results. In addition to identifying GDEs in the basin, The Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing *what* is being impacted. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in **Attachment C**. Our hope is that this information will help your GSA better

evaluate the impacts of groundwater management on environmental beneficial users of surface water. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs.

4. Biological and Hydrological Monitoring

If sufficient hydrological and biological data in and around GDEs is not available in time for the 2020/2022 plan, data gaps should be identified along with actions to reconcile the gaps in the monitoring network.

Our comments related to Chapters 4-8 of the Paso Robles Subbasin Draft GSP are provided in detail in **Attachment B**, and where applicable are in reference to the numbered items in **Attachment A**. **Attachment D** describes six best practices that GSAs and their consultants can apply when using local groundwater data to confirm a connection to groundwater for DWR's Natural Communities Commonly Associated with Groundwater Dataset (<https://gis.water.ca.gov/app/NCDatasetViewer/>).

Thank you for fully considering our comments as you develop your GSP.

Best Regards,



Sandi Matsumoto
Associate Director, California Water Program
The Nature Conservancy

Attachment A

Considering Nature under SGMA: A Checklist

The Nature Conservancy is neither dispensing legal advice nor warranting any outcome that could result from the use of this checklist. Following this checklist does not guarantee approval of a GSP or compliance with SGMA, both of which will be determined by DWR and the State Water Resources Control Board. The checklist is available online: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_GDE_Checklist_for_SGMA_Sept2018.pdf

GSP Plan Element*		GDE Inclusion in GSPs: Identification and Consideration Elements	Item Number	
Admin Info	2.1.5 Notice & Communication 23 CCR §354.10	Description of the types of environmental beneficial uses of groundwater that exist within GDEs and a description of how environmental stakeholders were engaged throughout the development of the GSP.	1.	
Basin Setting	2.2.2 Current & Historical Groundwater Conditions 23 CCR §354.16	Interconnected surface waters:	2.	
		Interconnected surface water maps for the basin with gaining and losing reaches defined (included as a figure in GSP & submitted as a shapefile on SGMA portal).	3.	
		Estimates of current and historical surface water depletions for interconnected surface waters quantified and described by reach, season, and water year type.	4.	
		Basin GDE map included (as figure in text & submitted as a shapefile on SGMA Portal).	5.	
		If NC Dataset was used:	Basin GDE map denotes which polygons were kept, removed, and added from NC Dataset (Worksheet 1, can be attached in GSP section 6.0).	6.
			The basin’s GDE shapefile, which is submitted via the SGMA Portal, includes two new fields in its attribute table denoting: 1) which polygons were kept/removed/added, and 2) the change reason (e.g., why polygons were removed).	7.
			GDEs polygons are consolidated into larger units and named for easier identification throughout GSP.	8.
		If NC Dataset was not used:	Description of why NC dataset was not used, and how an alternative dataset and/or mapping approach used is best available information.	9.
		Description of GDEs included:		10.
		Historical and current groundwater conditions described in each GDE unit.		11.
		Ecological condition described in each GDE unit.		12.
		Each GDE unit has been characterized as having high, moderate, or low ecological value.		13.
		Inventory of species, habitats, and protected lands for each GDE unit with ecological importance (Worksheet 2, can be attached in GSP section 6.0).		14.

Sustainable Management Criteria	2.2.3 Water Budget 23 CCR §354.18	Groundwater inputs and outputs (e.g., evapotranspiration) of native vegetation and managed wetlands are included in the basin's historical and current water budget.		15.
		Potential impacts to groundwater conditions due to land use changes, climate change, and population growth to GDEs and aquatic ecosystems are considered in the projected water budget.		16.
	3.1 Sustainability Goal 23 CCR §354.24	Environmental stakeholders/representatives were consulted.		17.
		Sustainability goal mentions GDEs or species and habitats that are of particular concern or interest.		18.
		Sustainability goal mentions whether the intention is to address pre-SGMA impacts, maintain or improve conditions within GDEs or species and habitats that are of particular concern or interest.		19.
	3.2 Measurable Objectives 23 CCR §354.30	Description of how GDEs were considered and whether the measurable objectives and interim milestones will help achieve the sustainability goal as it pertains to the environment.		20.
	3.3 Minimum Thresholds 23 CCR §354.28	Description of how GDEs and environmental uses of surface water were considered when setting minimum thresholds for relevant sustainability indicators:		21.
		Will adverse impacts to GDEs and/or aquatic ecosystems dependent on interconnected surface waters (beneficial user of surface water) be avoided with the selected minimum thresholds?		22.
		Are there any differences between the selected minimum threshold and state, federal, or local standards relevant to the species or habitats residing in GDEs or aquatic ecosystems dependent on interconnected surface waters?		23.
	3.4 Undesirable Results 23 CCR §354.26	For GDEs, hydrological data are compiled and synthesized for each GDE unit:		24.
		If hydrological data <i>are available</i> within/nearby the GDE	Hydrological datasets are plotted and provided for each GDE unit (Worksheet 3, can be attached in GSP Section 6.0).	25.
			Baseline period in the hydrologic data is defined.	26.
			GDE unit is classified as having high, moderate, or low susceptibility to changes in groundwater.	27.
			Cause-and-effect relationships between groundwater changes and GDEs are explored.	28.
		If hydrological data <i>are not available</i> within/nearby the GDE	Data gaps/insufficiencies are described.	29.
			Plans to reconcile data gaps in the monitoring network are stated.	30.
		For GDEs, biological data are compiled and synthesized for each GDE unit:		31.
		Biological datasets are plotted and provided for each GDE unit.		32.
		Data gaps/insufficiencies are described.		33.
		Plans to reconcile data gaps in the monitoring network are stated.		34.
		Description of potential effects on GDEs, land uses and property interests:		35.

		Cause-and-effect relationships between GDE and groundwater conditions are described.	36.
		Impacts to GDEs that are considered to be “significant and unreasonable” are described.	37.
		Known hydrological thresholds or triggers (e.g., instream flow criteria, groundwater depths, water quality parameters) for relevant species or ecological communities are reported.	38.
		Land uses include and consider recreational uses (e.g., fishing/hunting, hiking, boating).	39.
		Property interests include and consider privately and publicly protected conservation lands and opens spaces, including wildlife refuges, parks, and natural preserves.	40.
Sustainable Management Criteria	3.5 Monitoring Network 23 CCR §354.34	Description of whether hydrological data are spatially and temporally sufficient to monitor groundwater conditions for each GDE unit.	41.
		Description of how hydrological data gaps and insufficiencies will be reconciled in the monitoring network.	42.
		Description of how impacts to GDEs and environmental surface water users, as detected by biological responses, will be monitored and which monitoring methods will be used in conjunction with hydrologic data to evaluate cause-and-effect relationships with groundwater conditions.	43.
Projects & Mgmt Actions	4.0. Projects & Mgmt Actions to Achieve Sustainability Goal 23 CCR §354.44	Description of how GDEs will benefit from relevant project or management actions.	44.
		Description of how projects and management actions will be evaluated to assess whether adverse impacts to the GDE will be mitigated or prevented.	45.

* In reference to DWR’s GSP annotated outline guidance document, available at:
https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/GD_GSP_Outline_Final_2016-12-23.pdf

Attachment B

TNC Evaluation of Chapters 4 - 8 and Appendix B of the Paso Robles Subbasin GSP Draft

4.1 Subbasin Topography and Boundaries (p.3)

- [Paragraph 2] Please provide additional information on what data was used to determine that "poor quality" groundwater in the Paso Robles Formation would exclude groundwater from being part the subbasin.
- Defining the bottom of subbasin based on geochemical properties is a suitable approach for defining the base of freshwater, however, as noted on page 9 of DWR's Hydrogeologic Conceptual Model BMP (https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_HCM_Final_2016-12-23.pdf) "the definable bottom of the basin should be at least as deep as the deepest groundwater extractions". **Thus, groundwater extraction well depth data should also be included in the determination of the basin bottom.** This will prevent the possibility of extractors with wells deeper than the basin boundary (defined by the base of freshwater) from claiming exemption of SGMA due to their well residing outside the vertical extent of the basin boundary.

4.7.2 Groundwater Discharge Areas Inside the Subbasin (p.31)

- [Paragraph 2] We support the use of the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) to map groundwater dependent ecosystems in the Paso Robles Groundwater Basin (GSP Draft Figure 4-18). Since the NC Dataset is intended as a starting point, The Nature Conservancy has developed a Guidance Document to assist GSAs and their consultants address GDEs in GSPs. Also refer to **Attachment D** for best practices when using the NC dataset.
- The identification of GDEs within GSPs is a required GSP element of the Basin Setting Section under the description of Current & Historical Groundwater Conditions (23 CCR §354.16). Recognizing natural points of discharge (seeps & springs) as GDEs is consistent with the SGMA definition of GDEs¹, however, we recommend **the identification of GDEs (GDE map Figure 4-18) for the Paso Robles basin be moved to Chapter 5: Groundwater Conditions and elaborated upon with a description of current and historical groundwater conditions in the GDE areas.** Chapter 5 is a more appropriate place for the identification of GDEs, since groundwater conditions (e.g., depth to groundwater, interconnected surface water maps, groundwater quality) are necessary local information and data from the GSP in assessing whether polygons in the NC dataset are connected to groundwater in a principal aquifer.
- Decisions to remove, keep, or add polygons from the NC dataset into a basin GDE map should be based on best available science in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed,

¹ Groundwater dependent ecosystem refer to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. [23 CCR §351 (m)]

added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. **We recommend revising Figure 4-18 to reflect this recommended methodology.**

5.2.1 Change in Groundwater Storage in the Alluvial Aquifer (p. 5-23)

- While it's true that there was no net change in groundwater storage in the Alluvial Aquifer between 1981 and 2011, groundwater storage losses certainly occurred during dry years and recovered in wet years. Potential impacts on groundwater storage loss due to groundwater is still very possible, especially since groundwater pumping data has been estimated from groundwater flow models populated with insufficient vertical groundwater gradient data, shallow monitoring data, and surface flow data. Groundwater storage in the Paso Robles formation has also be on a decline since 1980 due to groundwater pumping (Figure 5-15). Understanding groundwater storage fluctuations in the Alluvial Aquifer depends on how vertical groundwater gradients are impacted by pumping and groundwater storage changes in the Paso Robles Formation **Please address these data gaps in the monitoring network.**

5.5 Interconnected Surface waters (p. 5-27) - Environmental User Checklist (Attachment A) Items 2-4.

- **Please specify what data were used to determine the elevation of the stream or river bottom.**
- The regulations [23 CCR §351(o)] define interconnected surface waters (ISW) as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water. Thus, only considering ISWs as those where *simulated* groundwater elevations were above the stream or river bottom for at least half of the time between 2010 and 2016 does not meet the SGMA definition for the following reasons:
 - 1) groundwater elevations that are above the stream or river bottom only attempts to map gaining reaches, not losing reaches. ISWs can be either gaining and losing (see Figure 5-16). This is especially problematic in places where losing conditions existed, but the river bottom was used to compare groundwater elevations because stream elevation data was missing; however, in reality, the stream elevation was higher than the river bottom.
 - 2) looking for interconnections that last more than half of the time does not adequately take into consideration shorter interconnections between groundwater and surface water that occur "at any point" in time. This is especially true since the years between 2010 and 2016 were mostly drought years, which would reduce the number of interconnected surface water areas on Figure 5-17. As seen in section 5.2, significant losses in groundwater storage in both the alluvial and Paso Robles formations occur during drought years, thus potentially causing depletions of surface water (also quantified in Section 5.5.1).

Due to limited shallow monitoring wells and stream gauges in the basin, **Mapping ISWs would be better estimated by first determining which reaches are**

completely disconnected from groundwater. This approach would involve comparing simulated groundwater elevations with a land surface Digital Elevation Model that could identify which surface waters have groundwater consistently below surface water features, such that an unsaturated zone would separate surface water from groundwater. Groundwater elevations that are always deeper than 50 feet below the land surface can be identified as disconnected surface waters. Please also increase the simulated groundwater elevation time period to include 2017-2019 (which have relatively wetter conditions). Also, please reconcile data gaps (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP to improve ISW mapping in future GSPs.

6. Water Budget (p.25) - Environmental User Checklist (Attachment A) Items 15-16:

- **Please clarify what assumptions and data were used to calculate Riparian Evapotranspiration.**
- Why was evapotranspiration only calculated for riparian vegetation? In Chapter 3.4.2 of the Draft GSP, native vegetation was identified as the largest water use sector in the subbasin by land area. **Please estimate evapotranspiration for all native vegetation in the subbasin for the water budget.**

7.2.1 Groundwater Level Monitoring Network Data Gaps (p.12) - Environmental User Checklist (Attachment A) Items 41-43:

The last row of Table 7-2 states that “Data must be able to characterize conditions and monitor adverse impacts to beneficial uses and users identified within the basin”. Aside from GDEs mapped in the basin (Figure 4-18), environmental surface water users have not been identified in the GSP thus far. SGMA requires that potential effects on GDEs and environmental surface water users be described when defining undesirable results. In addition to identifying GDEs in the basin, The Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define “significant and unreasonable adverse impacts” without knowing *what* is being impacted, nor is possible to monitor ISWs in a way that can “identify adverse impacts on beneficial uses of surface water” [23 CCR §354.34(c)(6)(D)]. For your convenience, we’ve provided a list of freshwater species within the boundary of the Paso Robles basin in **Attachment C**. Our hope is that this information will help your GSA better evaluate and monitor the impacts of groundwater management on environmental beneficial users of surface water. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list, and how best to monitor them. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs. **Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap, and make plans to reconcile these in Chapter 10 (Plan Implementation).**

7.6 Interconnected Surface Water Monitoring Network (p.25) - Environmental User Checklist (Attachment A) Items 41-43:

- The first sentence in this section is contradictory to the ISW mapping conducted in Chapter 5 - ISWs do exist in the Paso Robles Subbasin (Figure 5-17).
- Depletions of surface water were also estimated in Section 5.5.1, and the statement that "there is no need for a monitoring network that quantifies surface water depletion from ISW" is false and goes against SGMA requirements. SGMA requires that when monitoring depletions of interconnected surface water that "spatial and temporal exchanges between surface water and groundwater [...] are necessary to calculate depletions of surface water caused by groundwater extraction" [23CCR §354.34(c)(6)] and that the monitoring network "shall be designed to ensure adequate coverage of sustainability indicators" [23CCR § 354.34(d)]. Where minimum thresholds for ISWs are to be quantified by "The location, quantity, and timing of depletions of interconnected surface water" [23 CCR §354.28(c)(6)(A)]. **Thus, there is a need for a monitoring network that quantifies surface water depletion from interconnected surface waters.**
- In addition to the need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, **there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands.** Ideally, co-locating stream gauges with clustered wells that can monitor groundwater levels in both the Alluvial and Paso Robles Formation aquifers would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surface water and groundwater.
- **There is a need to integrate biological indicators that can monitor adverse impacts to beneficial uses of surface water and groundwater within ISWs.**

8.3 General Process for Establishing Sustainable Management Criteria - Environmental User Checklist (Attachment A) Items 17-40

- Stakeholder involvement is crucial when establishing sustainable management criteria. The role of the GSA is to represent and balance the needs of *all groundwater* beneficial uses and users in the basin, which has been expressed in the Sustainability goal in Section 8.2. According to p.6, only rural residents, farmers, and local cities were surveyed to gather input on sustainable management criteria. **Please specify what information or efforts have been used/made to protect the interests of environmental users and disadvantaged community members.**
- SGMA requires that sustainable management criteria are consistent with other state, federal or local regulatory standards [23 CCR§354.28(b)(5)]. **Please describe what process was used to identify other regulatory standards that need consideration when establishing minimum thresholds for sustainability criteria.**

8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria

- [8.4.1] The definition of 'significant and unreasonable' is a qualitative statement that is used to describe when undesirable results would occur in the basin, such that a minimum threshold can be quantified. Potential effects on all beneficial users of groundwater in the basin need to be taken into consideration. According to the

California Constitution Article X, §2, water resources in California must be “put to beneficial use to the fullest extent of which they are capable”. **Please modify the local definition for ‘significant and unreasonable’ (provided on p. 6), so that it also specifies potential effects on environmental beneficial users of groundwater in the basin, and addresses how water rights amongst beneficial users will be prioritized when establishing thresholds.**

- [8.4.2.1] The use of 2017 groundwater elevations to establish minimum thresholds for the Paso Robles Formation Aquifer is inadequate, since the SGMA benchmark date is January 1, 2015. Also, no scientific rationale was explained for using 2007 groundwater elevation data to establish initial minimum thresholds for the Alluvial Aquifer. SGMA is based on the use of best available science, and selecting minimum thresholds solely on public opinion from a select group of stakeholders (e.g., domestic well users, irrigators, municipalities) in the basin, is not a scientifically-based approach nor does it consider potential effects on environmental beneficial users of groundwater. A better approach is to use 10-year baseline period of groundwater elevation data (2005-2015) to establish how groundwater conditions during that time period affect different water users across the basin. **Please document the consideration of the following when establishing minimum thresholds for chronic lowering of groundwater levels:**
 - Are groundwater elevations between 2005-2015 above the max screen depth for domestic, agriculture, municipal wells?
 - Are the proposed minimum thresholds preserving water rights? [Water Code §10720.5(b)]
 - Are the proposed minimum thresholds consistent with other state, federal or local regulatory standards? [23 CCR§354.28(b)(5)]
 - Are there environmental beneficial groundwater users that need consideration, particularly those that are legally protected under the United States Endangered Species Act or California Endangered Species Act? (See **Attachment C** in the attached letter for a list of freshwater species located in the Paso Robles Subbasin).
 - Is the equity being applied across different beneficial user groups (e.g., domestic, agriculture, municipal, environmental) when establishing minimum thresholds?
- [8.4.2.1] **Please provide a description for how the initial minimum threshold groundwater elevations for the Alluvial Aquifer (Figure 8-3) may impact environmental beneficial users of groundwater (e.g., GDEs) in the basin. When converting groundwater elevations to depth to groundwater contours, please use the USGS digital elevation model (see Attachment D in the letter).**
- [8.4.2.1] **Please make a back-up plan in the Monitoring network chapter on how the GSA will install shallow monitoring wells in the Alluvial Aquifer if confidentially agreements still prevent existing wells from being used as representative monitoring wells for the Chronic Lowering of Groundwater sustainability indicator.**
- [8.4.2.5] Depletions of interconnected surface waters do exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1, and the statement that “there are no current minimum thresholds or undesirable

results “for interconnected surface water” is inadequate and goes against SGMA requirements. **Thus, there is a need to establish sustainable management criteria for interconnected surface waters in the basin. (See further comments in letter regarding Interconnected Surface Waters).**

- [8.4.2.7] The description of how the groundwater elevation minimum thresholds affect ecological land uses and users (Section 8.4.2.7 – p.17) is inadequate for the following reasons:
 - The draft GSP has failed to describe current and historical groundwater conditions with GDE areas. Thus, it is impossible to assess how the proposed minimum thresholds relate to historical groundwater conditions in the GDE and whether potential adverse effects could occur to the GDEs as a result of groundwater conditions.
 - Legally protected species located with GDEs have not been identified. Thus, it is impossible to evaluate whether federal, state, or local standards exist for groundwater elevations needed to protect these listed species (see Section 8.4.2.8).
- [8.4.3.1] Under SGMA, Measurable Objectives are to be established to achieve the sustainability goal of the basin within 20 years of Plan implementation [23 CCR § 354.30 (a)]. **Please modify the methodology for setting measurable objectives for groundwater levels (p.18-19) so that it helps attain the sustainability goal defined on p. 4 (Section 8.2):** “sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, and environmental benefit of residents and business in the Subbasin. This GSP outlines the approach to achieve a sustainable groundwater resource free of undesirable results within 20 years, while maintaining the unique cultural, community, and business aspects of the Subbasin. In adopting this GSP, it is the express goal of the GSAs to balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasin’s resources.”
- [8.4.4.1] **Please elaborate how the 15% exceedance criteria balances the interests of environmental beneficial users in comparison with other groundwater users in the basin.**

8.9 Depletion of Interconnected Surface Water Sustainable Management Criteria

- [8.9.1] According to Chapter 5, interconnected surface waters exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1. While there is certainly data gaps and a need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing more stream. SGMA is based on best available science and adaptive management, **thus there should be an attempt to identify some minimum thresholds for ISWs**, which are to be quantified by “The location, quantity, and timing of depletions of interconnected surface water” [23 CCR §354.28(c)(6)(A)].
- [8.9.2] There is a need to evaluate potential effects on beneficial uses of surface and groundwater. **Please refer to Attachment C for a list of freshwater species in Paso Robles Subbasin that may be exist within ISWs. We recommend that after identifying which freshwater species exist in your basin, especially**

federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs.

Appendix B: Methodology for Identifying Potential Groundwater Dependent Ecosystems - Environmental User Checklist (Attachment A) Items 5-14:

- For clarification, iGDEs are mapped polygons in DWR's NC dataset.
- Please specify what field verification methods (e.g., isotope analysis, enhanced shallow groundwater monitoring) will be used to definitively determine whether potential GDEs are true GDEs.
- It is highly advised that multiple depth to groundwater measurements are used to verify whether an iGDE (or NC dataset polygon) is connected to groundwater, so that fluctuations in the groundwater regime can be adequately represented. The analysis described on p.7 to create Figure B-3 only relies on Spring 2017 depth data, which is also after the Jan 1, 2015 SGMA benchmark date. Also, according to the shallow monitoring well data gaps described in Chapter 5 and 7, there is insufficient data to confidently remove data for NC polygons that are >5km away from a shallow well. See Attachment D of this letter for six best practices when using groundwater data to verify the NC dataset.
- The NC dataset needs to be groundtruthed with aerial photography to screen for changes in land use that many not be reflected in the NC dataset (e.g., recent development, cultivated agricultural land, obvious human-made features).
- Grouping multiple GDE polygons into larger units by location (proximity to each other) and principal aquifer will simplify the process of evaluating potential effects on GDE due to groundwater conditions under GSP Chapter 7: Sustainable Management Criteria.
- Groundwater conditions within GDEs should be briefly described within the portion of the Basin Setting Section where GDEs are being identified.
- Not all GDEs are created equal. Some GDEs may contain legally protected species or ecologically rich communities, whereas other GDEs may be highly degraded with little conservation value. Including a description of the types of species (protected status, native versus non-native), habitat, and environmental beneficial uses (Refer to **Attachment C** for a list of freshwater species found in the Paso Robles Subbasin and refer to Worksheet 2, p.74 of GDE Guidance Document) can be helpful in assigning an ecological value to the GDEs. Identifying an ecological value of each GDE can help prioritize limited resources when considering GDEs as well as prioritizing legally protected species or habitat that may need special consideration when setting sustainable management criteria.
- Decisions to remove, keep, or add polygons from the NC dataset into a basin GDE map should be based on best available science in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed, added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. **We**

recommend revising Figure 4-11, Appendix B, and including it in Chapter 5 to reflect this change.

Attachment C

Freshwater Species Located in the Paso Robles Subbasin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result “depletion of interconnected surface waters”, Attachment C provides a list of freshwater species located in the Paso Robles Subbasin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the Paso Robles groundwater basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015². The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife’s BIOS³ as well as on The Nature Conservancy’s science website⁴.

Scientific Name	Common Name	Legally Protected Status		
		Federal	State	Other
BIRD				
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority
Aix sponsa	Wood Duck			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya collaris	Ring-necked Duck			
Aythya valisineria	Canvasback		Special	
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			

² Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoS ONE, 11(7). Available at: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710>

³ California Department of Fish and Wildlife BIOS: <https://www.wildlife.ca.gov/data/BIOS>

⁴ Science for Conservation: <https://www.scienceforconservation.org/products/california-freshwater-species-database>

<i>Calidris mauri</i>	Western Sandpiper			
<i>Chen caerulescens</i>	Snow Goose			
<i>Chen rossii</i>	Ross's Goose			
<i>Chroicocephalus philadelphia</i>	Bonaparte's Gull			
<i>Cistothorus palustris palustris</i>	Marsh Wren			
<i>Egretta thula</i>	Snowy Egret			
<i>Fulica americana</i>	American Coot			
<i>Gallinago delicata</i>	Wilson's Snipe			
<i>Gallinula chloropus</i>	Common Moorhen			
<i>Geothlypis trichas trichas</i>	Common Yellowthroat			
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird of Conservation Concern	Endangered	
<i>Icteria virens</i>	Yellow-breasted Chat		Special Concern	BSSC - Third priority
<i>Lophodytes cucullatus</i>	Hooded Merganser			
<i>Megaceryle alcyon</i>	Belted Kingfisher			
<i>Mergus merganser</i>	Common Merganser			
<i>Mergus serrator</i>	Red-breasted Merganser			
<i>Numenius americanus</i>	Long-billed Curlew			
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron			
<i>Oxyura jamaicensis</i>	Ruddy Duck			
<i>Pandion haliaetus</i>	Osprey		Watch list	
<i>Pelecanus erythrorhynchos</i>	American White Pelican		Special Concern	BSSC - First priority
<i>Phalacrocorax auritus</i>	Double-crested Cormorant			
<i>Podiceps nigricollis</i>	Eared Grebe			
<i>Podilymbus podiceps</i>	Pied-billed Grebe			
<i>Porzana carolina</i>	Sora			
<i>Rallus limicola</i>	Virginia Rail			
<i>Recurvirostra americana</i>	American Avocet			
<i>Riparia riparia</i>	Bank Swallow		Threatened	
<i>Setophaga petechia</i>	Yellow Warbler			BSSC - Second priority
<i>Tachycineta bicolor</i>	Tree Swallow			
<i>Tringa melanoleuca</i>	Greater Yellowlegs			
<i>Tringa solitaria</i>	Solitary Sandpiper			
<i>Vireo bellii</i>	Bell's Vireo			
<i>Vireo bellii pusillus</i>	Least Bell's Vireo	Endangered	Endangered	

Xanthocephalus xanthocephalus	Yellow-headed Blackbird		Special Concern	BSSC - Third priority
CRUSTACEAN				
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable
Cyprididae fam.	Cyprididae fam.			
Hyalella spp.	Hyalella spp.			
Pacifastacus spp.	Pacifastacus spp.			
FISH				
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	Special Concern	Vulnerable - Moyle 2013
Catostomus occidentalis mnioltus	Monterey sucker			Least Concern - Moyle 2013
Catostomus occidentalis occidentalis	Sacramento sucker			Least Concern - Moyle 2013
Cottus gulosus	Riffle sculpin		Special	Near-Threatened - Moyle 2013
Entosphenus tridentata ssp. 1	Pacific lamprey		Special	Near-Threatened - Moyle 2013
Lavinia exilicauda exilicauda	Sacramento hitch		Special	Near-Threatened - Moyle 2013
Lavinia exilicauda harengus	Monterey hitch		Special	Vulnerable - Moyle 2013
Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Orthodon microlepidotus	Sacramento blackfish			Least Concern - Moyle 2013
Ptychocheilus grandis	Sacramento pikeminnow			Least Concern - Moyle 2013
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	Special Concern	Vulnerable - Moyle 2013
HERP				

Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Anaxyrus boreas halophilus	California Toad			ARSSC
Anaxyrus californicus	Arroyo Toad	Endangered	Special Concern	ARSSC
Pseudacris cadaverina	California Treefrog			ARSSC
Pseudacris hypochondriaca	Baja California Treefrog			
Pseudacris regilla	Northern Pacific Chorus Frog			
Rana boylei	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC
Spea hammondi	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Taricha torosa	Coast Range Newt		Special Concern	ARSSC
Thamnophis hammondi hammondi	Two-striped Gartersnake		Special Concern	ARSSC
Thamnophis sirtalis infernalis	California Red-sided Gartersnake			Not on any status lists
Thamnophis sirtalis sirtalis	Common Gartersnake			
INSECT & OTHER INVERT				
Acentrella spp.	Acentrella spp.			
Agabus spp.	Agabus spp.			
Ambrysus mormon				Not on any status lists
Antocha spp.	Antocha spp.			
Argia emma	Emma's Dancer			
Argia lugens	Sooty Dancer			
Argia spp.	Argia spp.			
Argia vivida	Vivid Dancer			
Baetidae fam.	Baetidae fam.			
Baetis spp.	Baetis spp.			

Berosus punctatissimus				Not on any status lists
Berosus spp.	Berosus spp.			
Callibaetis spp.	Callibaetis spp.			
Centroptilum spp.	Centroptilum spp.			
Chaetarthria bicolor				Not on any status lists
Chaetarthria ochra				Not on any status lists
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus spp.	Chironomus spp.			
Cladotanytarsus spp.	Cladotanytarsus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Corisella spp.	Corisella spp.			
Corixidae fam.	Corixidae fam.			
Cricotopus spp.	Cricotopus spp.			
Dicrotendipes spp.	Dicrotendipes spp.			
Dytiscidae fam.	Dytiscidae fam.			
Enallagma civile	Familiar Bluet			
Enallagma cyathigerum				Not on any status lists
Enochrus carinatus				Not on any status lists
Enochrus cristatus				Not on any status lists
Enochrus piceus				Not on any status lists
Enochrus pygmaeus				Not on any status lists
Enochrus spp.	Enochrus spp.			
Ephemerella spp.	Ephemerella spp.			
Ephemerellidae fam.	Ephemerellidae fam.			
Ephydriidae fam.	Ephydriidae fam.			
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Graptocorixa spp.	Graptocorixa spp.			
Gyrinus spp.	Gyrinus spp.			
Helichus spp.	Helichus spp.			
Helicopsyche spp.	Helicopsyche spp.			
Hetaerina americana	American Rubyspot			
Hydrochus spp.	Hydrochus spp.			
Hydrophilidae fam.	Hydrophilidae fam.			
Hydroporus spp.	Hydroporus spp.			
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydryphantidae fam.	Hydryphantidae fam.			

Ischnura spp.	Ischnura spp.			
Laccobius ellipticus				Not on any status lists
Laccobius spp.	Laccobius spp.			
Laccophilus maculosus				Not on any status lists
Lepidostoma spp.	Lepidostoma spp.			
Leptoceridae fam.	Leptoceridae fam.			
Libellula saturata	Flame Skimmer			
Limnophyes spp.	Limnophyes spp.			
Liodessus obscurellus				Not on any status lists
Macromia magnifica	Western River Cruiser			
Malenka spp.	Malenka spp.			
Microcyloopus spp.	Microcyloopus spp.			
Microtendipes spp.	Microtendipes spp.			
Nectopsyche spp.	Nectopsyche spp.			
Ochthebius spp.	Ochthebius spp.			
Ophiogomphus bison	Bison Snaketail			
Optioservus spp.	Optioservus spp.			
Oreodytes spp.	Oreodytes spp.			
Paracloeodes minutus	A Small Minnow Mayfly			
Paracymus spp.	Paracymus spp.			
Paratanytarsus spp.	Paratanytarsus spp.			
Peltodytes spp.	Peltodytes spp.			
Phaenopsectra spp.	Phaenopsectra spp.			
Plathemis lydia	Common Whitetail			
Postelichus spp.	Postelichus spp.			
Procladius spp.	Procladius spp.			
Pseudochironomus spp.	Pseudochironomus spp.			
Psychodidae fam.	Psychodidae fam.			
Rheotanytarsus spp.	Rheotanytarsus spp.			
Rhyacophila spp.	Rhyacophila spp.			
Sigara mckinstryi	A Water Boatman			Not on any status lists
Sigara spp.	Sigara spp.			
Simuliidae fam.	Simuliidae fam.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Sperchontidae fam.	Sperchontidae fam.			
Stictotarsus spp.	Stictotarsus spp.			
Sweltsa spp.	Sweltsa spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tipulidae fam.	Tipulidae fam.			
Tremea lacerata	Black Saddlebags			
Tricorythodes spp.	Tricorythodes spp.			

Wormaldia spp.	Wormaldia spp.			
MAMMAL				
Castor canadensis	American Beaver			Not on any status lists
MOLLUSK				
Gyraulus spp.	Gyraulus spp.			
Lymnaea spp.	Lymnaea spp.			
Menetus opercularis	Button Sprite			CS
Physa spp.	Physa spp.			
Pisidium spp.	Pisidium spp.			
Planorbidae fam.	Planorbidae fam.			
PLANT				
Alnus rhombifolia	White Alder			
Ammannia coccinea	Scarlet Ammannia			
Anemopsis californica	Yerba Mansa			
Azolla filiculoides	NA			
Baccharis salicina				Not on any status lists
Bolboschoenus maritimus paludosus	NA			Not on any status lists
Callitriche heterophylla bolanderi	Large Water-starwort			
Callitriche marginata	Winged Water-starwort			
Castilleja minor minor	Alkali Indian-paintbrush			
Castilleja minor spiralis	Large-flower Annual Indian-paintbrush			
Cotula coronopifolia	NA			
Crassula aquatica	Water Pygmyweed			
Crypsis vaginiflora	NA			
Cyperus erythrorhizos	Red-root Flatsedge			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis parishii	Parish's Spikerush			
Epilobium campestre	NA			Not on any status lists
Epilobium cleistogamum	Cleistogamous Spike-primrose			
Eryngium spinosepalum	Spiny Sepaled Coyote-thistle		Special	CRPR - 1B.2
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle			Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Helenium puberulum	Rosilla			
Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort			
Juncus dubius	Mariposa Rush			
Juncus effusus effusus	NA			

Juncus luciensis	Santa Lucia Dwarf Rush		Special	CRPR - 1B.2
Juncus macrophyllus	Longleaf Rush			
Juncus xiphioides	Iris-leaf Rush			
Limosella aquatica	Northern Mudwort			
Marsilea vestita vestita	NA			Not on any status lists
Mimulus guttatus	Common Large Monkeyflower			
Mimulus latidens	Broad-tooth Monkeyflower			
Mimulus pilosus				Not on any status lists
Montia fontana fontana	Fountain Miner's-lettuce			
Navarretia prostrata	Prostrate Navarretia		Special	CRPR - 1B.1
Paspalum distichum	Joint Paspalum			
Persicaria lapathifolia				Not on any status lists
Persicaria maculosa	NA			Not on any status lists
Phacelia distans	NA			
Pilularia americana	NA			
Plagiobothrys acanthocarpus	Adobe Popcorn-flower			
Plantago elongata elongata	Slender Plantain			
Platanus racemosa	California Sycamore			
Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads			
Ranunculus aquatilis diffusus				Not on any status lists
Rorippa curvisiliqua curvisiliqua	Curve-pod Yellowcress			
Rumex conglomeratus	NA			
Rumex salicifolius salicifolius	Willow Dock			
Salix exigua exigua	Narrowleaf Willow			
Salix laevigata	Polished Willow			
Salix lasiolepis lasiolepis	Arroyo Willow			
Schoenoplectus americanus	Three-square Bulrush			
Schoenoplectus pungens longispicatus	Three-square Bulrush			
Schoenoplectus pungens pungens	NA			
Schoenoplectus saximontanus	Rocky Mountain Bulrush			
Typha domingensis	Southern Cattail			

Typha latifolia	Broadleaf Cattail			
Veronica anagallis-aquatica	NA			
Veronica catenata	NA			Not on any status lists

Attachment D



IDENTIFYING GDEs UNDER SGMA Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). The California Department of Water Resources (DWR) has provided the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online (<https://gis.water.ca.gov/app/NCDataSetViewer/>) to help Groundwater Sustainability Agencies (GSAs) identify GDEs within a groundwater basin. The NC Dataset is a compilation of 48 publicly available State and Federal agency datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California⁵.

The NC Dataset indicates the vegetation and wetland features that are good indicators of a GDE. The NC dataset is a starting point, and it is the responsibility of GSAs to utilize best available science and local knowledge on the hydrology, geology, and groundwater levels to verify its presence or absence, as well as whether a connection to groundwater in an aquifer exists (Figure 1)⁶. Detailed guidance on identifying GDEs within a groundwater basin from the NC dataset is available⁷. This document highlights six best practices that GSAs and their consultants can apply when using local groundwater data to confirm a connection to groundwater for the NC Dataset.

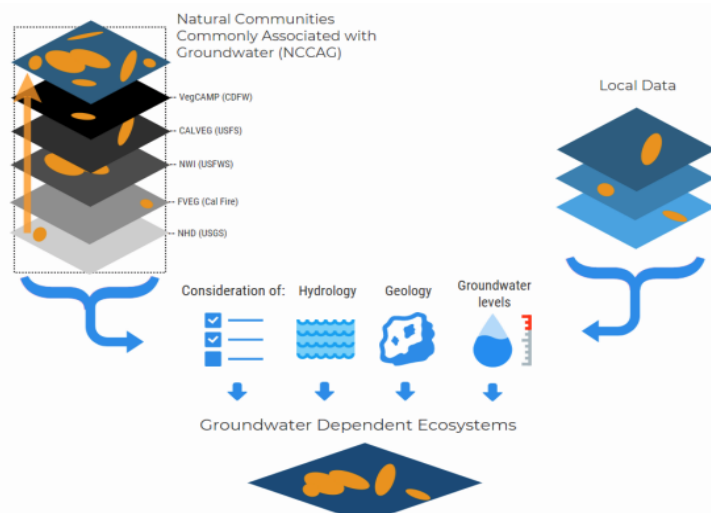


Figure 1. Considerations for GDE identification.
Source: DWR²

⁵ For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf

⁶ California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Documents.pdf>

⁷ "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at <https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/>

BEST PRACTICE #1. Connection to an Aquifer

Groundwater basins can be comprised of one continuous aquifer or multiple aquifers stacked on top of each other. Basins with a stacked series of aquifers may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, and groundwater dependent ecosystems (Figure 2). This is because the goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits, and while groundwater pumping may not be currently occurring in a shallower aquifer, it could be in the future. For example, if a shallow perched aquifer is currently not being pumped due to poor water quality resulting from irrigation return flow, producing this water will become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should be done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided and a GSA's legal risk be minimized. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

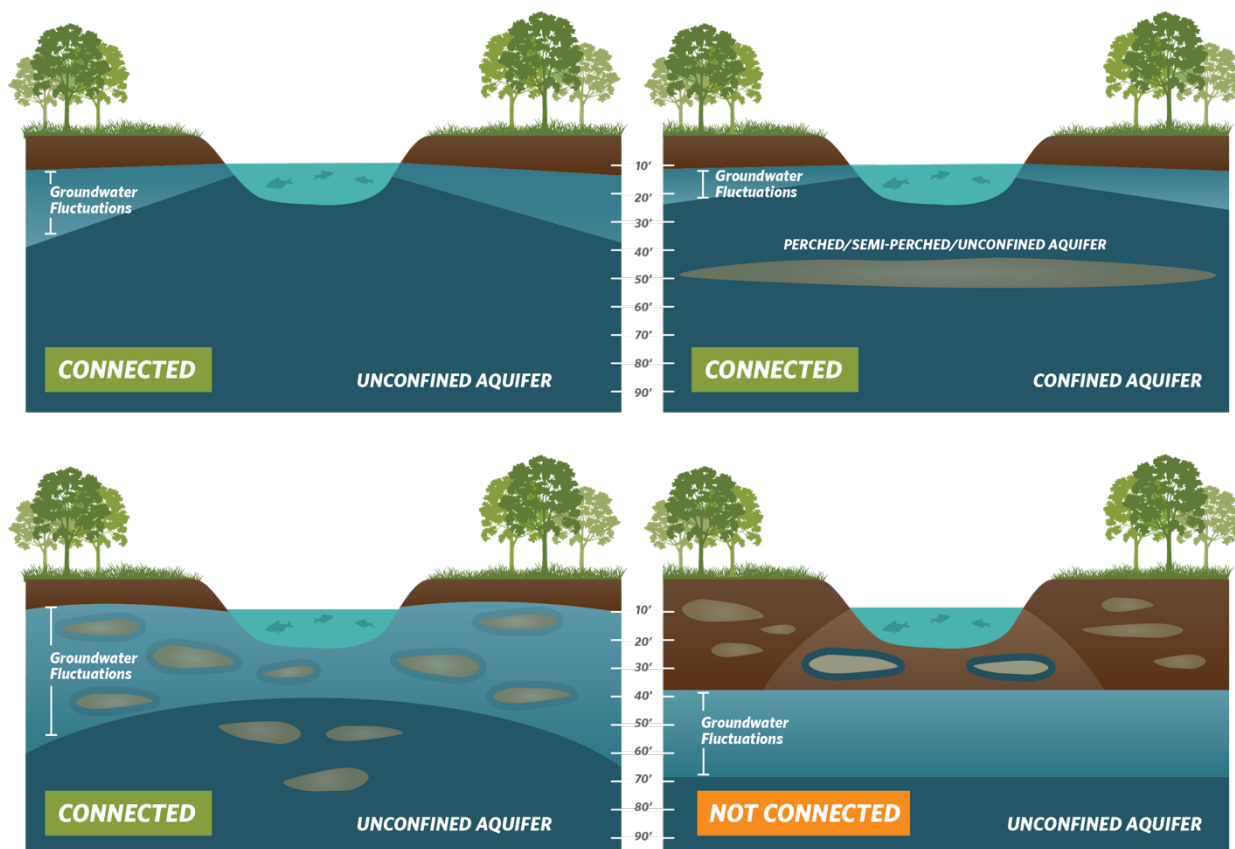


Figure 2. Confirming whether an ecosystem is connected to groundwater in a principal aquifer. Top: (Left) Depth to Groundwater in the aquifer under the ecosystem is an unconfined aquifer with depth to groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(Right)** Depth to Groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (Left)** Depth to groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystems connection to groundwater. **(Right)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under surface water feature.

BEST PRACTICE #2. Characterize Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth to groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability (i.e., wet, average, dry, and drought years) that is characteristic of California's climate. DWR's Best Management Practices document on water budgets⁸ recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline⁹ could be determined based on data between 2005 and 2015.

GDEs existing on the earth's surface depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach¹⁰ for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in the GDE guidance document², one of the key factors to consider when mapping GDEs is to contour depth to groundwater in the aquifer that is in direct contact with the ecosystem.

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however, if these groundwater conditions are prolonged adverse impacts to GDEs can result. While depth to groundwater levels within 30 feet² are generally accepted as being a proxy for confirming that polygons in the NC dataset are connected to groundwater, it is highly advised that fluctuations in the groundwater regime are taken into consideration and to characterize the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer¹¹. However, if insufficient data are available to describe groundwater conditions within polygons from the NC dataset, it is highly advised that they be included in the GSP until data gaps are reconciled in the monitoring network (See Best Practice #6).

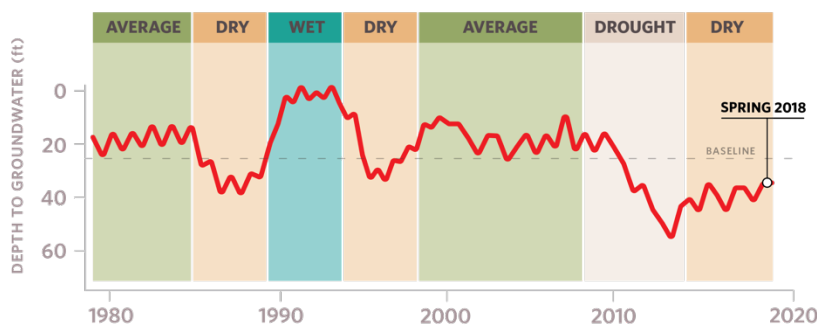


Figure 3. Example seasonality and interannual variability in depth to groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

⁸ DWR. 2016. Water Budget Best Management Practice. Available at:

https://water.ca.gov/LegacyFiles/groundwater/sqm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

⁹ Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

¹⁰ Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs - link in footnote above).

¹¹ SGMA Data Viewer: <https://sgma.water.ca.gov/webqis/?appid=SGMADataViewer>

BEST PRACTICE #3. Ecosystems Can Rely on Both Surface and Groundwater

GDEs can rely on groundwater for all or some of its requirements, using multiple water sources simultaneously and at different temporal or spatial scales. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around NC polygons does not preclude the possibility that a connection to groundwater exists. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth to groundwater data should be used to identify whether NC polygons are connected to groundwater and should be considered GDEs.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and would not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

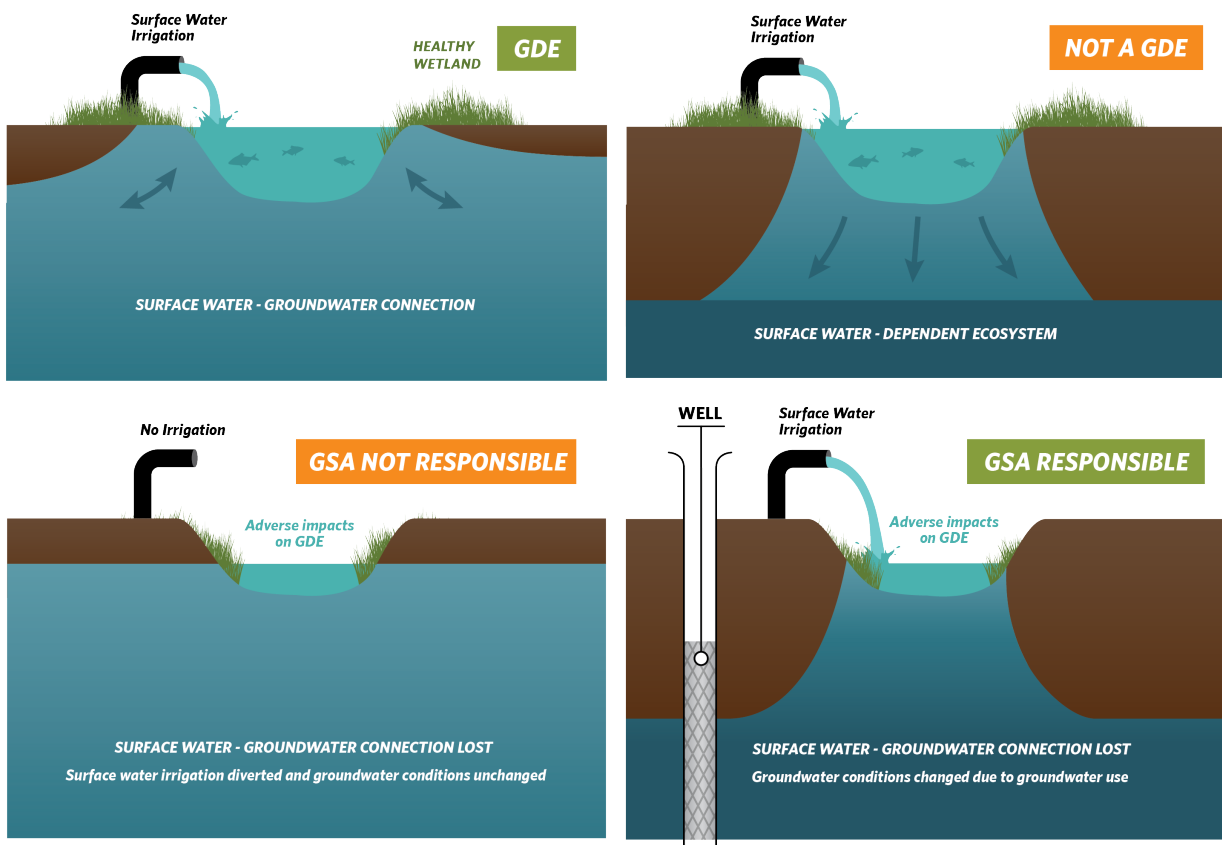


Figure 4. Ecosystems can depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, such that a connection to groundwater exists for the ecosystem. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water and groundwater connection, but then loses this connection due to surface water diversions would not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems in places where a surface water – groundwater connection existed, but then lose that connection due to groundwater pumping would be the GSA's responsibility.

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin require that groundwater conditions are characterized to confirm whether polygons in the NC dataset are connected to an underlying aquifer. Once an aquifer has been identified, representative groundwater wells are necessary to characterize groundwater conditions (Figure 5). It is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of the NC Dataset polygons, and more likely to reflect the local conditions relevant to the ecosystem. NC dataset polygons that are farther than 5 km from a well should not be excluded because of interpolated groundwater depth conditions, as there is insufficient information to make that determination. Instead, they should be retained as potential GDEs until there is sufficient data to determine whether or not the NC Dataset polygon is connected to groundwater and is a GDE.
- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.
- Avoid relying on wells that have insufficient well information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer.

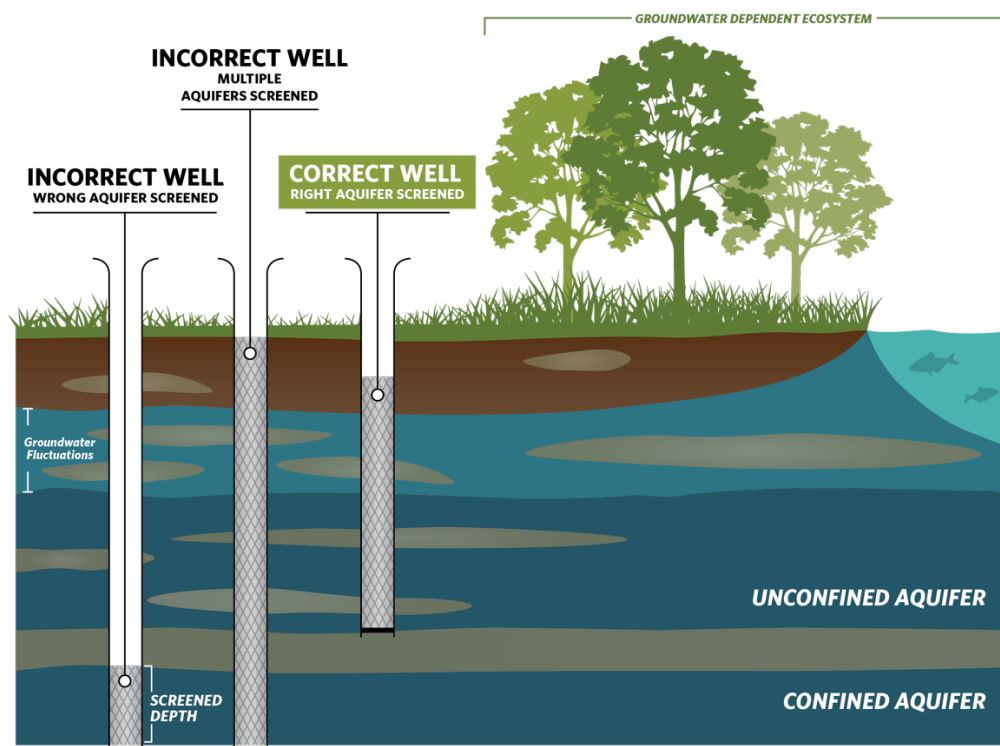


Figure 5. Selecting representative wells to characterize groundwater conditions in the aquifers directly connected with GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

A common, but error prone practice, to contour depth to groundwater over a large area is to interpolate depth to groundwater measurements at monitoring wells. This practice causes errors when the land surface contains features like streams and wetlands depressions because it assumes the land surface is constant across the landscape and depth to groundwater is constant below these low-lying areas (Figure 6). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get an estimate of groundwater elevation across the landscape. This layer can then be subtracted from the land surface elevation from a Digital Elevation Model (DEM)¹² to estimate depth to groundwater contours across the landscape (Figure 7). This will provide a much more accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

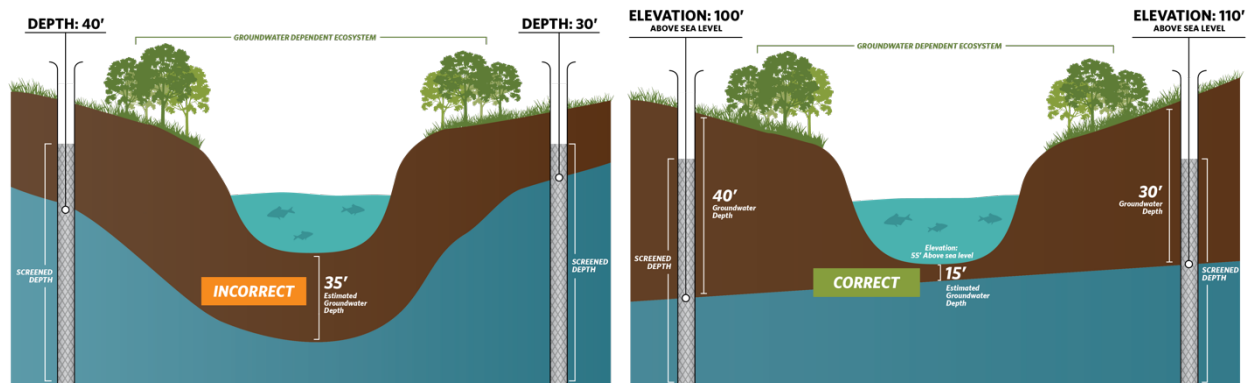


Figure 6. Contouring depth to groundwater around surface water features and GDEs. (Left) Groundwater level interpolation using depth to groundwater data from monitoring wells. **(Right)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

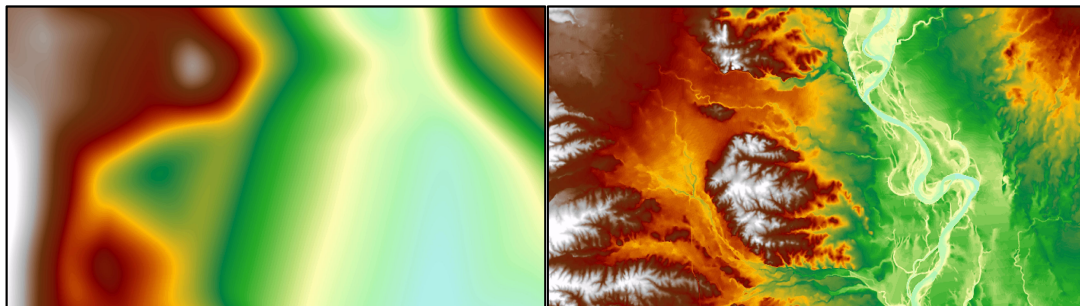


Figure 7. Depth to Groundwater Contours in Northern California. (Left) Contours were interpolated using depth to groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth to groundwater contours. The image on the right shows a more accurate depth to groundwater estimate because it takes the local topography and elevation changes into account.

¹² Digital Elevation Model data is available at: <https://catalog.data.gov/dataset/usgs-national-elevation-dataset-ned-1-meter-downloadable-data-collection-from-the-national-map>

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. 23 CCR §341(g)(1)

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. 23 CCR §351(m)

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. 23 CCR §351(o)

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. 23 CCR §351(aa)

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Comments of Chapter 6,7 & 8

I would like to submit the following comments on these Chapters.

Minimum Thresholds

I am against using the 2017 well level reading as the Minimum Thresholds. This will put the GSP at risk of going below the minimums before the GSP even starts to implement actions in the Basin. The two Water Districts, S/SJ and EPC have looked at a number of alternatives and I urge the CC Technical Staff to address this issue and set Minimum Thresholds below the 2017 levels.

Criteria for Defining Undesirable Results, 8.4.4.1

The current Chapter 8 suggest 15% as a trigger for management actions because of undesirable results. With only 12 wells in the GSP at this point, 15% of 12 wells is one perhaps two wells and is not a large enough of a sample to make decisions. I believe the number threshold of 15% is way too low. 30% might be a more realistic number. Also, as the number of wells increases in the monitoring network, the CC Technical Staff might consider a more refined methodology for determining exceedances.

The Number of Well in the Monitoring Network

It is my understanding that only 12 wells are included in the Monitoring Network at this point. Clearly this number is way too small. I am aware that Shandon/San Juan WD is working to increase this number in their area. EPC WD is also working with our Hydrologist, Paul Sorenson, to identify wells in the EPC area that can become candidates for monitoring well. EPC hopes to identify a dozen new wells that can be included. I would hope that the County GSA works on this as well.

Sustainability Goals, 8.2

The primary components of creating a Sustainability Plan for the Paso Robles Groundwater Basin are reduced extraction of groundwater and the availability of new sources of water.

It is my hope that these Chapters as well as Chapters 9 & 10 will include active management actions, programs, and recommendations that will incent pumpers to change their practices and pump less water or provide financial encouragement to farmers to fallow land which has become economically marginal.

In addition, it is my hope the CC and the GSP will help to create a political and social environment that will allow the Basin to pursue sources of 'new' water that are economically viable. The ability to have new supplemental water to offset the pumping deficit will be essential to maintaining agriculture as the economic pillar of our Basin and Community. We all use the same water and we must all participate in the solutions necessary for our Basin's health.

Policy and Survey Results

Early in the process, the CC conducted a survey of interested landowners and water users. The results were interesting but not meaningful for setting policy. The Survey was not scientific and with a small number of respondents. Questions were asked in a vacuum. It's easy to say yes to the question of would you like to see groundwater levels maintained or rise. But without consideration of the corresponding tradeoffs, the answer is meaningless.

I would encourage the CC to base their deliberations on facts and science and not preferences.

Equal Treatment

I would encourage the CC to make sure that all classes of 'extractors' are treated the same within their class and regardless of what jurisdiction they are in. Classes might be such things as agricultural pumpers, rural resident pumpers (de minimis), commercial pumpers and others. Also, any requirements of reporting usage and limits on extraction should also be the same within each class.

Access versus Availability of Groundwater

This is a simple but important distinction to these two aspects of groundwater. Access means how does a person get access to groundwater or more basically what kind of a well does one have. Availability means how much water is readily available in the Basin.

Agricultural pumpers solve their access problem on a routine basis by lowering their pumps, enhancing their equipment, drilling new wells or other efforts. It's just the price of doing business. On the other hand, agricultural users have an availability problem. How much water can our Basin support for agricultural use? That's what SGMA and GSP are all about.

De minimis users have the reverse situation. They have an access problem but not an availability problem. Because de minimis users use a relatively small amount of water, the Basin should be able to provide for their needs in the future.

However, some de minimis users do have a real access problem, their wells are going dry and this problem will likely continue until the Basin is stabilized. Many rural residents have older and/or shallow wells and groundwater levels have been declining.

I encourage the CC and the GSP to address the 'access' problem of rural residents with proposals for projects, managements actions and other efforts. A rural water company could be a cost-effective solution to wells going dry. Rural residents along with all pumpers of groundwater share the responsibility of a sustainable basin and should participate in the solutions. A GSP that does not address the needs and solutions of rural residents could be viewed as an incomplete plan.

Jerry Reaugh, personal comments, not EPC WD comments
April 15, 2019

3/15/85

P.R. Pines

The main topic of conversation currently is the **WEATHER**. Many people are interested in the **rainfall** of past years so we are publishing our **113-year record**.

Season	Inches	Season	Inches	Season	Inches
1869-70	11.83	1907-08	15.31	1945-46	12.05
1870-71	12.97	1908-09	24.21	1946-47	10.26
1871-72	27.02	1909-10	17.39	1947-48	10.47
1872-73	12.97	1910-11	26.64	1948-49	10.60
1873-74	20.52	1911-12	12.37	1949-50	13.74
1874-75	19.69	1912-13	8.06	1950-51	9.97
1875-76	30.12	1913-14	22.02	1951-52	18.09
1876-77	8.15	1914-15	24.96	1952-53	11.99
1877-78	30.60	1915-16	21.54	1953-54	11.22
1878-79	11.66	1916-17	18.51	1954-55	11.05
1879-80	25.12	1917-18	14.37	1955-56	17.77
1880-81	23.69	1918-19	11.91	1956-57	10.92
1881-82	7.66	1919-20	12.81	1957-58	25.10
1882-83	8.00	1920-21	13.70	1958-59	8.93
1883-84	42.40	1921-22	21.81	1959-60	9.56
1884-85	17.59	1922-23	15.45	1960-61	8.66
1885-86	19.20	1923-24	6.38	1961-62	17.23
1886-87	9.59	1924-25	12.74	1962-63	17.78
1887-88	14.30	1925-26	14.79	1963-64	10.25
1888-89	15.84	1926-27	21.91	1964-65	13.49
1889-90	30.57	1927-28	11.49	1965-66	11.83
1890-91	16.42	1928-29	9.82	1966-67	24.90
1891-92	11.93	1929-30	10.96	1967-68	8.76
1892-93	22.55	1930-31	12.13	1968-69	31.85
1893-94	5.94	1931-32	10.59	1969-70	9.17
1894-95	18.92	1932-33	9.62	1970-71	11.10
1895-96	13.14	1933-34	11.62	1971-72	7.69
1896-97	17.96	1934-35	20.77	1972-73	23.15
1897-98	4.77	1935-36	18.17	1973-74	17.42
1898-99	11.53	1936-37	20.26	1974-75	12.79
1899-00	11.66	1937-38	26.04	1975-76	5.66
1900-01	22.80	1938-39	7.51	1977-78	26.79
1901-02	12.75	1939-40	15.80	1798-79	13.95
1902-03	11.24	1940-41	30.64	1979-80	19.45
1903-04	14.51	1941-42	16.69	1980-81	12.31
1904-05	19.89	1942-43	13.37	1981-82	14.78
1905-06	15.23	1943-44	13.24	1982-83	22.63
1906-07	22.00	1944-45	13.01		

113 YEARS OF RAINFALL — the above chart was compiled from several different sources. Seasons 1869-70 to 1880-81 were taken from a chart compiled by the Chamber of Commerce. Seasons 1881-82 and 1882-83 were found in Myron Angel's History of San Luis Obispo County. 1883-84 to 1886-87 were from the Chamber of Commerce chart. Years 1887-88 to 1929-30 were archived in a government pamphlet, A Climatic Summary of the United States. Years 1930-31 to 1945-46 were from the Chamber of Commerce list and 1946-47 to present were from the city water works records.

Paso Robles Subbasin GSP
Chapter 9
Draft of May 15, 2019
Required Corrections

9.1 Introduction

- Water budgets Add: Reference should be made to the court mandated reduction in pumping by the City of Paso Robles, et al and the positive impact that will have on the current level of pumping.

Removed lined out portions:

To stop persistent declines in groundwater levels, ~~achieve the sustainability goal by 2040 and avoid undesirable results through 2070~~ as required by SGMA regulations, groundwater pumping reductions will be needed. In most cases, a reduction in groundwater pumping will occur as a result of management actions, except where a new water supply is provided and used instead of pumping groundwater. ~~Projects to bring in new water supplies included in this chapter are based on previous vetted feasibility studies.~~

Note: the goal to reach sustainability should be 2030. To achieve sustainability a reduction in overall pumping will be required.

9.2 Implementation Approach

Add:

- Expand and improve monitoring networks, e.g., the SLO County GSA will monitor water levels at public wells.

Remove:

- ~~Track the development of water supply projects.~~

Page 3:

- Present information on management actions and ~~projects~~ including

Add:

Because the amount of groundwater pumping in the Sub-basin is more than the estimated sustainability yield of about 61,000 AFY

Note: the methodology of determining 61,000 AFY needs to be described in a footnote.

Page 3 continued:

In general, management actions will be implemented in all areas ~~before projects because projects take many years to complete.~~

3rd line from the bottom of page3:

~~.....funds for alternative approaches such as purchasing and following cropland and contributing to projects that bring in new water supplies to offset groundwater demand.~~

Page 4 Bottom Paragraph: Remove entire paragraph.

~~Any rules,under this GSP.~~

9.3 Level 1 Management Actions

Level 1 management actions may include:

- ~~● Initiate an interference program that includes~~
 - ~~○ Rotating groundwater pumping on agreed schedules to optimize and reduce groundwater use.~~
 - ~~○ Well spacing requirements~~

9.3.1.3 Circumstances for implementation

BMPs and related outreach will be promoted ~~and implemented~~ soon after adoption of the GSP.

9.3.1.4 Public Noticing top of page 8

~~The BMPs will be promoted through a focused outreach campaign.~~

9.3.1.6 Implementation Schedule

~~Implementing BMPs will begin immediately after the GSP is adopted and when funds become available.~~

9.3.1.8 Estimated Cost

The estimated costMonitoring of BMPs will have an estimated cost of \$25,000 to \$50,000.

9.3.2 Interference Mitigation Program

- Minimum well spacing requirements for new wells will be considered by SLO County.

9.3.2.1 Relevant Measurable Objectives

Remove this section

9.3.2.2. Expected Benefits and Evaluation of Benefits

The first paragraph comes out. Begins The primary benefit and ends with the expected benefits.

The last sentence in the second paragraph (page 9) comes out. Begins Isolating the effect of and ends in the subbasin.

9.3.2.3 Circumstances for implementation

Remove this section

9.3.2.4 Public Noticing

Remove this section

9.3.25 Permitting and Regulatory Process

Remove this section

9.3.2.6 Implementation Schedule

Remove this section

9.3.2.7 Legal Authority

Remove this section comes out

9.3.2.8 Estimated Cost

The existing paragraph comes out and in its place the following is inserted.

The interference mitigation program has been estimated at up to \$750,000, which is deemed too expensive. Accordingly, the program components will be reviewed and revised in order to bring the cost down below \$200,000.

9.3.3 Promote Stormwater Capture

First paragraph second line: Change “could” be promoted to “will” be promoted

9.3.3.1 Relevant Measure Objectives

Replace: Stormwater capture “may” benefit with “will” benefit

9.3.4 Voluntary Fallowing of Agriculture Land

Change the first sentence to: The GSAs may consider promoting voluntary fallowing of crop land to reduce overall groundwater demand.

Remove all 5 bullet points.

9.3.4.1 Relevant Measurable Objectives

The voluntary fallowing program would benefit.....

9.3.4.2 Expected Benefits and Evaluation of Benefits

Remove all of this section

9.3.4.3 Circumstances for Implementation

Remove all of this section

9.3.4.4 Public Notice

Remove all of this section

9.3.4.5 Permitting and Regulatory Process

The land fallowing program is subject to CEQA, but only if it is a “formal program.”

9.3.4.8 Estimated Cost

Remove all of this section as the estimated cost of a formal program is too expensive.

9.3.5 Groundwater Pumping Fees

Paragraph one. Add the concepts: 1) that pumping fees would be tiered, 2) that one of the goals is to reduce overall pumping in the subbasin, & 3) CASGEM data will be used as appropriate to avoid duplication.

Note: \$500,000 is too expensive for the development of a fee structure lower this cost!

Page 14: ~~If needed, each GSA shall enact fees by ordinance or resolution that is materially comparable to similar levels and classes of use to the ordinance of the other GSAs.~~

9.4 Level 2 Management Actions

Remove second bullet point “Developing funding.....the same reductions.

Remove last bullet point “Retirement ofgroundwater pumping.

9.4.1 Mandatory pumping reductions in specific areas

In the second line “decline ranges from 25 – 65%.

Note: How was this range determined? Requires a footnote to explain the numbers. Moreover, don’t we need to know water levels first?

Items:

1. Determination of baseline pumping in specific areas based on:
 - a. Area specific declines and estimated yield in that area
 - b. Historical use Explain how will historic use be determined and what evidence will be required over what period of time?
 - c. Land uses and corresponding irrigation requirements
2. Remove this item.
3. Change to: The GSP should target achieving sustainability in the area of 2030 not use 2040 as the target.

The paragraph below item 3 on page 15:

Is the concept of “sustainable Yield” still being used? The rumor circulating is that it is not being used any longer.

In critical areas of the subbasin there should be an immediate ramp down of pumping.

4th line from the bottom of the paragraph – 2040 should be changed to 2030

9.4.2 Groundwater Conservation Program

The paragraphs at the bottom of page 15 & top of page 16:

These paragraphs are completely unacceptable and need to be eliminated or re-written.

The bullet points below the second paragraph on page 16:

- A tiered pumping rate structure is OK. The remainder of that point is out.
- Third bullet point is out.
- Fifth bullet point is out.
- Sixth bullet point is out.
- Seventh bullet point is out.
- Eighth bullet point is out. *de minimis* pumpers are exempt!

9.4.2.1 Tiered Pumping Fee Structure

The first and second paragraphs are out and replaced by the following:

A tiered pumping fee structure should be implemented. The thresholds that define each tier along with the fee charged for each tier would be determined in hearings, public outreach and be subject to final Board approval. The tiers and fees will be established to address areas where reduced pumping is needed. Individual groundwater pumpers may choose to switch to less water intensive crops, or implement water use efficiencies.

The fee structure and allowances may not be uniform across the Subbasin in the final groundwater conservation program. Portions of the Subbasin with localized groundwater decline may be subject to different fee structures.

9.4.2.2 Site Specific Carryover

Remove all of this section as it is unacceptable

9.4.2.3 Re-location and Transfer of Pumping Allowances

Remove all of this section as it is unacceptable

9.4.2.4 Non-Irrigated Land

Remove all the existing language and insert the underlined paragraph:

Note: This section needs to take into consideration those landowners who will achieve Quiet Title within the next several weeks some of which may or may not currently farm irrigated crops.

Owners of land that is not under irrigation will be surveyed prior to when the GSP is adopted to determine if they have plans to plant an irrigated crop or crops and, if so, would be assigned a two year provisional pumping allowance. If the landowner has not planted within two years the provisional allowance would expire; however, such landowners would have overlying rights to the reasonable beneficial use of groundwater on their parcels.

9.4.2.5 Relevant Measurable Objectives

Add the use of CASGEM data in determining the progress toward objectives.

9.4.3 Agriculture Land and Pumping Allowance Retirement

Remove all of this section on pages 20 & 21

Note: This approach leads to Owen's Valley type results.
It is in SLO County's interest to keep water with the land on which it is pumped.
Who represents the local property owners in this plan?

9.4.3.1 Relevant Measurable Objectives

Remove the second sentence.

9.4.3.2 Expected Benefits and Evaluation of Benefits

Remove the first paragraph.

9.4.3.3 Circumstances for Implementation

Remove this section entirely.

9.4.3.4 Public Noticing

Remove this section entirely.

9.4.3.5 Permitting and Regulatory Process

Remove this section entirely.

9.4.3.6 Implementation Schedule

Remove this section entirely – this is a bad program!

9.4.3.7 Legal Authority

Remove – this is superfluous!

9.4.3.8 Estimated Cost

Remove entirely.

9.5 Projects

Remove first paragraph entirely.

Add: Projects must not involve public funds, but private funds only. The projects presented in this GSP 1) rely on five potential sources of water for direct delivery only, and 2) cannot involve direct injection into the groundwater basin, as direct injection opens the issue of groundwater ownership.

Retain project numbers: 1, 3, 4, 5, & 6 – remove project number 2 SWP water

Add: /Stormwater capture to item 6

9.5.1 Overview of Project Types

1. Direct delivery for irrigation or municipal use only.

9.5.1.1 In-Lieu Recharge through Direct Delivery

1. Add: in lieu of groundwater pumping.
2. Direct Delivery water may be stored above ground only.
3. Imported water MAY NOT be injected into the Subbasin.

9.5.1.2 Direct Recharge through Recharge Basins

Add: Recharge Basins will be used only for the percolation of Stormwater capture into alluvial areas. Direct recharge through injection wells is not acceptable due to the possibility of contamination and the issue of ownership of injected groundwater.

9.5.2 General Project Provisions

Remove the last sentence: ~~This section assumesfor illustrative purposes.~~

9.5.2.1 Summary of Permitting and Regulatory Processes

Remove the last paragraph.

9.5.3 Conceptual Projects

Add: a Stormwater Capture project where topographical conditions are compatible and where captured water can reasonably be diverted to alluvial or sandy soil can be used for percolation.

Note: The concept is that with a robust Stormwater capture program the need for any imported water will be obviated. Moreover, if groundwater pumping is reduced through the implementation of best farming practices the subbasin can achieve sustainability well before 2040.

Note: Stormwater capture and percolated into the aquifer is becoming popular in many areas of California to recharge groundwater basins.

9.5.4 Substitute Projects

Remove 9.5.4 and related sections on substitute projects

Note: First, Recharge Basins utilizing purchased or imported water are unacceptable.

The benefits described in 9.5.4 can easily be exceeded though a robust program of Stormwater capture and percolation.

9.8 Management of Groundwater Extractions and Recharge and Mitigation of Overdraft

Replace existing with the following:

This GSP is designed to mitigate the current moderate annual over drafting of the Subbasin through a combined program of management actions designed to promote a reduction in pumping and provide authority for mandatory pumping reductions as necessary.

A three-way program made up of 1) robust capture and percolation of annual Stormwater, 2) the utilization of recycled water (RW) where appropriate, and 3) the rational use of groundwater, for irrigated farming and commercial and domestic use, will result in subbasin sustainability well within the deadline of 2040.

Within a relatively short period of time overall pumping should be reduced to a level not exceeding annual natural recharge while respecting the correlated rights of all subbasin overlayers. Also on a forward basis the current level of over pumping will be moderately reduced as a result of the Quiet Title litigation judgment and the required reduction in pumping by the litigation defendants.

In summary, this GSP will soon bring annual subbasin pumping in balance with the natural recharge of the subbasin thus achieving sustainability.

Comments received on Paso Basin GSP Draft Chapters 9-12 from the June 18, 2019 City of Paso Robles Council/GSA Meeting. To view the agenda for this meeting, please click [here](#).

1. Dale Gustin: "As we all know this came about during the drought that hit all of California except maybe Sacramento, and since then, has there been any studies done to see if after the current rainfall, I mean I have a lot out at Oak Shores, and we can't even use our bottom parking lot because the lake is up so high. So that water basin has got to be not in overdraft at this point. Has anybody done a study to find that out?"
2. Gary Dunnivan: "I was just curious, how much water do the vineyards around here take away from us, out of our water basin? And that would be very interesting to me to find out. You know we have to cut back and cut back and people did a wonderful job of cutting back. With the vineyards I drive out in the country and water is blowing everywhere. So, we're all out of the same basin right?"
3. Cody Ferguson: "There is one thing I'd like to establish here is the fourteen thousand acre feet per year. That's truth or consequences. That'll come out eventually when the final report is issued. There is one important thing, the previous speaker on another subject mentioned the court case that is going on over quiet title. Completely unnecessary court case, nonetheless it has been adjudicated, and during that court case people, one of them being Christopher Alakel, were asked a question on the stand under oath "are we in overdraft." The answer from both he and Courtney Howard, who is in charge of the water stuff for the County, (and of course Mr. Alakel was recognized as a City employee doing the same type of work) was 'no, we are not in overdraft.' And I don't want that coming out of this meeting that we're in overdraft. In fact, there is truth or consequences going on, manipulation going on, people are trying to fight over this water all the time. And some of these things get offered up and they aren't exactly true, but they will be when they are finished. But the one important thing I want you to take to the bank is, it's been testified to in court by both the City and the County you are not in overdraft.
4. Patty Smith: My concern is the water. There is a constant barrage of complaining we don't have enough water. Yet Mayor Strong can tell us we have excellent amount of water out of Lake Nacimiento. The flooding this year has been unreal, yet all we as residents get to hear about is cut back, cut back, cut back. Yet every vineyard out there... I understand that Paso Robles is becoming a wine town but at what cost to the people who live here, and are trying to raise families here? You know we've got the issue with the water, we have issues with the vineyards, we have the issue with the short term rentals. At what point does the City Council take the people, the residents, people who live here, into consideration and stop cowering to the vineyards and the wineries?

Windfall Farms

Chair Supervisor Arnold
County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

Re: Comments on April 17, 2019 Draft of Chapter 9 of the Paso Robles Basin Groundwater Sustainability Plan

Chair Supervisor Arnold:

This is Lee Nesbitt, General Manager of Windfall Farms, a landowner overlying the Paso Robles Groundwater Basin. Windfall Farms and its predecessors in interest have relied on the basin since 1983 and before for numerous beneficial uses of the land. I have reviewed the April 17, 2019 Draft of Chapter 9 of the Paso Robles Sub-basin Groundwater Sustainability Plan (“Plan”) and submit these comments on it for the Cooperative Committee’s consideration.

1. The Plan should be corrected to make clear that any restrictions on pumping will be consistent with common law water rights. As drafted, Chapter 9 suggests that the burden of pumping restrictions could be geographically discriminatory.¹ This approach is inconsistent with the physically interconnected nature of the basin and with common law water rights.² Rather, the Plan should make clear that there will not be disparate treatment of pumpers based on physical location within the basin and that all pumpers on equal legal footing with regard to water rights must bear similar financial responsibility for solving the basin’s challenges. Moreover, even “area-specific” responsive management actions must be specifically associated with avoiding undesirable results identified in the Plan. If pumping by a discrete area or growers must be physically restricted, that burden must be shared basin-wide by implementation of a physical solution that distributes that burden legally and equitably among all pumpers according to their allocations.

2. New and expanded groundwater production should be prohibited. Consistent with Water Code § 10720.5, the Plan should provide that no new or expanded production, in excess of

¹ See Plan, p. 14 (“a pumping reduction of approximately 18% will be needed across the basin to reduce pumping to the sustainable yield. Larger pumping reductions will likely be necessary in specific areas to arrest groundwater level declines.”); p. 15 (“the rate of ramp down would depend on when the program starts and projections of how long lower pumping rates are required in specific areas in order to achieve sustainability by 2040.”); and p. 17 (expanding this concept to differential fees for pumping in “portions of the subbasin with localized groundwater decline.”). (Emphasis added.)

² We recognize that actual physical pumping restrictions may be required in particular locations to address acute undesirable results. However, the Plan should expressly distinguish between such physical pumping restrictions and allocation of financial burden for reductions necessary to achieve sustainability. The basin is a hydrologically connected unit; pumping in one location affects others over time. Thus, if groundwater rights are determined, they will be determined on a basin-wide basis. (See Water Code § 10721(b); Civ. Proc. Code § 832 (indicating that a comprehensive groundwater adjudication will be made on a basin-wide basis, with “basin” being the hydrogeologic unit defined by Bulletin 118).)

Windfall Farms

historical production, after January 1, 2015 will count toward any groundwater production allocations implemented to advance Level 2 PMAs. This would put all pumpers on notice that if they initiate new or expanded pumping, they do so at their own risk, and may need to acquire pumping allocation from others or pay surcharges to maintain such production.

3. The Plan should encourage voluntary fallowing/reductions in pumping. To encourage voluntary fallowing/reductions in pumping without risk of potential loss of water rights, the Plan rightfully provides, but should confirm, that historical pumping need not be maintained or continued to support a water right claim based on historical pumping from the basin.

4. The Plan should not delay implementation of Level 2 Proposed Management Actions if required. The Level 1 proposed management actions (“PMAs”) are a valuable first step, may not be sufficient to achieve sustainability. If implementation of Level 2 PMAs are delayed, the impacts on groundwater pumpers may be significantly greater – i.e., more restrictive, more expensive, etc. – than would be the case if the Level 2 PMAs had commenced sooner. The Plan should provide a date (post 2020) for anticipated introduction of Level 2 PMAs **IF** Level 1 PMAs do not achieve sustainability goals.

5. Implementation of Level 2 PMAs should be based on, and tied to, adaptive management principles based on evolving science. The Plan should make clear that as the Plan is implemented, our technical understanding of the basin will continue to be evaluated and that target metrics will be refined accordingly.

6. Level 2 PMAs require allocations and allocations necessarily implicate water rights. The plan should recognize that implementation of any Level 2 PMAs will necessarily require determinations of pumping allocations across the basin, which necessarily implicates a pumper’s water right claim. The Plan should acknowledge that it cannot determine or alter water rights (Water Code § 10720.5). Further, the Plan should anticipate that upon any determination that Level 2 PMAs are required, such PMAs may not go into effect during the pendency of any litigation.

7. The Plan should include a process by which allocations necessary for Level 2 PMAs are determined. In an effort to best anticipate the allocation determination process and streamline it, the Plan could provide that upon a determination that Level 2 PMAs are required, a structured and facilitated process will commence to engage stakeholders and seek a negotiated resolution. Ideally, the Plan would highlight the scope, stages, and timing of such a process, based on input from facilitators with relevant experience. By providing a process by which allocations may be determined, the Plan may ameliorate concerns about the Plan’s impacts on water right.

Windfall Farms

We write these comments as part of the community of the Creston/Paso Robles. While this topic can always be a difficult one to discuss, we believe that positive dialogue with solutions based in science and law with a bit of reasonableness thrown in works best for all concerned. I want to thank you for your consideration of these comments. We look forward to continuing to work with you and the Cooperative Committee to develop a GSP that satisfies SGMA's regulatory requirements and benefits the basin as a whole.

Sincerely,

Lee Nesbitt-General Manager
Windfall Farms

I appreciate the changes made to Chapter 9, especially Section 9.3.4. In addition, I have the following comments and questions about, and recommendations for Chapter 9 of the proposed Paso Robles Groundwater Area Sub-basin Management Plan:

Section 9.2

Modify the criteria for inclusion in the well-monitoring network; monitoring needs to be extended to wells that do not meet all the current criteria for being included in the monitoring network. All wells, to the extent feasible, should be in the network.

Define “individual entities” who ... “may choose to develop programs that would raise funds for alternative approaches...”

Section 9.3

Define by whom “Level 1 management actions will be developed and implemented”

Section 9.3.1:

Define “ET estimates”

Section 9.3.1.4

I request that this section, and all subsequent relevant sections, be re-titled “Public Notification,” as “noticing” has other connotations, and “notification” is unequivocal.

Section 9.3.2

Define “well interference.”

Section 9.3.3

Will “temporary diversions of storm flows from streams” require California Department of Fish and Wildlife approval? Will SLO County or GSA’s have protocols for obtaining, or for helping obtain, such approval, and for designing said diversions?

Section 9.3.4

I most earnestly ask The Committee to adopt this section. This proposal will save water by not forcing users to pump from the basin when land is fallowed or when planted to a crop with less water demand. Also, it provides protection of irrigation rights for landowners, whom for whatever reasons, have decreased their water demand compared to their historical use.

Section 9.4.1

I reiterate here my request that more wells be monitored.

Section 9.4.2

Define “exempt” and “non-exempt” groundwater pumpers.

Section 9.4.2.3

I am adamantly opposed to permanent transfer/relocation of pumping allowances. Permanent removal of pumping rights from a property is the equivalent of condemnation. Previously productive sites will be unusable, and will become the equivalent of rural slums.

Temporary transfer/relocation of irrigation rights should be allowed only on neighboring or near-neighboring properties, as physical transfer of the water itself does not actually take place. Transferring **credits** to an area with historically low groundwater will not put more water into the sub-basin of that low-water area, and therefore will not reduce withdrawal pressure or basin depletion in that area.

Section 9.4.2.4

I am strongly against any interpretation of this section that does not comply with Section 9.3.4. I would agree to this section if it pertains only to land that has never been irrigated.

Section 9.4.2.9

Is it possible to include a brief summary of the requirements of Propositions 218 and 26 referred to?

Section 9.4.3

I feel very strongly that productive farmland should remain productive farmland. Once it is lost to even low-density development, the increased price per acre will prevent its return to agriculture, and small acreages are almost never dedicated to production. While I recognize that housing for an ever-increasing human population lags behind demand, productive land is all the more necessary to sustain that population. Marginally productive or non-productive land should be the highest priority for development.

Section 9.5

I do not support, and I doubt that the general public would support, general funding of any project that benefits mainly one or two growers.

The six potential sources for groundwater recharge or in-lieu use are highly suspect:

- State Water Project water is completely allocated.
- Nacimiento Water Project water is near complete allocation and has no infrastructure for individual delivery.
- Salinas Dam/Santa Margarita Reservoir water is needed to recharge the Salinas River. Communities at the northern end of the river are experiencing salt water intrusion, and less water delivered to the delta means more salt water in one of the nation's most productive growing areas.
- No infrastructure exists for private delivery of recycled water from either Paso Robles or San Miguel.
- Flood flows from local rivers and streams is subject to CA DFW regulation

Section 9.5.3.3.3

One monitoring well is entirely insufficient to trigger implementation of any project. Furthermore, no project should be initiated for the benefit of only one user. Allowing one monitoring well to be the trigger gives no incentive to reduce groundwater pumping if that user will then have the benefit of pooled funds to build a private delivery system. San Miguel CSD may improve the quality the town's waste effluent, but use thereof should benefit the entire community.

I, personally, would like to know the location and ownership of monitoring well 25S/12E-1605 and why it merits such individual consideration. Indeed, if pooled funds are to be used for this project, then the public has the right to know this information.

Section 9.5.3.3.5

Do Montgomery and Associates and The Committee expect the public to pay for bonds that benefit only one or two users?

Section 9.5.3.4

This proposal is pure pork. If Figure 9-14 shows the route of the proposed delivery line, the route is nowhere near the confluence of the Salinas and Estrella. In addition, the three wells in the figure are south, southeast, and farther southeast of the confluence. Since both rivers run north, I fail to see how such delivery would recharge the areas of the wells. To top it off, I KNOW WHO OWNS THE PROPERTY situated at the confluence. NEVER ONCE HAS THE LANDOWNER BEEN QUESTIONED ABOUT THE NEED FOR SUCH A PROJECT. Indeed, the immediate Salinas River corridor appears to be a high-recharge area, with little fluctuation in groundwater levels. Again I am compelled to ask who devised this project, to whom the three listed wells belong, and who stands to benefit.

Section 9.5.3.4.3

Many more wells need to be monitored in any proposed project area to trigger implementation. Also, having the prospect of increased water delivery does not appear to be an incentive to decrease groundwater pumping. It seems to reward those who have been injudicious.

Section 9.5.3.6

I have the same objections as listed in Sections 9.5.3.3.3 and 9.5.3.4.3

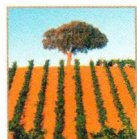
Section 9.5.3.7

As above in Section 9.5.3.6. Additionally, this ain't gonna happen. Any alteration of Salinas Dam will be initiated by SLO County, and subject to years of study and permitting.

I think the first, best step for diminishing groundwater depletion is capping irrigation in historically non-irrigated locations at perhaps 80% of current usage. All wells pumping in such areas would be tested prior to the initiation of such measures, and again after one year, and pumping limits would be adjusted accordingly.

Thank you for your attention to my considerations.

dosrios



J. LOHR
VINEYARDS, INC.

June 28, 2019

The Honorable John Peschong
San Luis Obispo County Supervisor, District 1
County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

RE: Comments on Chapter 9 of the Paso Robles Basin Groundwater Sustainability Plan

Dear Supervisor Peschong,

I think it is quite clear that Paso Robles Groundwater Basin's (PRB) declining water levels are currently unsustainable. Reductions in groundwater pumping will be required and hopefully new sources of water (supplemental water) will become available through successful "Projects". The public and agricultural pumpers have heard some about this, but actions may not be taken until pumping ramp downs are required or threatened. This might cause litigation. Litigation can be a long and unproductive process during which time water levels continue to fall and the eventual remedial cost becomes much greater. The GSP is our best opportunity to reach accord amongst all stakeholders and avoid litigation.

Chapter 9 is about Management Actions and Projects.

Management Actions are "non-structural programs or policies that are intended to reduce or optimize local groundwater use". Some of the Management Actions under consideration are the following and I encourage the GSP Cooperative Committee to make specific policy recommendations in these areas and provide clear direction for Basin users.

1. Metering, water usage reporting, flowmeter program
2. Better understanding of Basin science
3. Basin best management practices
4. Pumping Allowance System
5. Well monitoring network and additional reference wells
6. Pumping fees and excessive pumping penalties
7. Fallowing both temporary and permanent
8. Restricting new groundwater pumping
9. The endorsement by the GSP of specific Projects "involving new or improved infrastructure to import or develop new water supplies".

I believe Chapter 9 should identify and endorse "projects" that are feasible and can have immediate impact on Basin Sustainability.

At J. Lohr, we have long practiced efficient use of irrigation water. In line with our interest in optimal farming practices, J. Lohr Vineyards and Wines have set a meeting for our growers on July 10, 2019 to discuss currently available research and best practices for vineyard irrigation. We have always taken a proactive approach to best practices and have supported research in farming practices for decades.

Supplemental Water should be the cornerstone of the Paso Robles Groundwater Sustainability Plan. Agricultural and rural water users are totally dependent on groundwater and the choices for these users is to either reduce pumping or find sources of supplemental water or both.

J. Lohr Vineyards and Wines has been working since 2014 to obtain supplemental irrigation water from the Nacimiento pipeline (NPW). Since 2015 we have been working very constructively with the City of Paso Robles to purchase recycled water (RW) from the City. We and other local vineyard owners have formed an LLC, have a State of California approved Mutual Water Company, retained many of the necessary consultants, and the project team is well along with a comprehensive design for the Blended Supplemental Water Project (BSWP). The project entails purchasing RW from Paso Robles and NPW from the Nacimiento Commission and blending and distributing the water through 6 miles of pipeline to areas northeast of Paso Robles and west and north of the Paso Robles airport. This system has the ability to deliver thousands of acre feet of supplemental water to users of the Basin's groundwater which will result in actual reduction in groundwater pumping. This project will have 3 phases:

1. Design, approvals and obtaining commitments to purchase public water for the benefit of the Basin
2. Funding and Construction
3. Providing blended water to offset groundwater pumping and the opportunity for pumpers to purchase in-lieu pumping credits to supplement their water needs.

The design and approval phase of this BSWP is being privately financed through the LLC and can be completed in the next 6 months to a year.

The funding and construction phase will not be able to start prior completion of the first phases of the GSP/SGMA process in which comprehensive landowners pumping allowances and potential cutbacks have been decided in a series of public meetings. Once cutback levels have been established and pumpers understand impacts on their operations, pumpers will be able to assess the need and value of supplemental water and their ability to purchase supplemental water. Commitments by pumpers to buy into the use of supplemental water will determine the funding mechanisms to construct the BSWP Pipeline. Private investors may initiate the funding but ultimately users of groundwater who benefit from the use of supplemental water will have to pay for the BSWP. This can be done without public funding.

I encourage the GSA's to include the Blended Supplemental Water Project as an integral part of the Paso Robles Groundwater Basin's Sustainability Plan. It is vital that the GSP addresses the issues of responsible basin management as well as exploring sources of new supplemental water. Without a balance between these factors and without meaningful options for groundwater users, the threat of litigation looms even larger.

Thank you for your consideration.

Regards,



Jerome J Lohr

Founder J. Lohr Vineyards and Wines

J. LOHR VINEYARDS, INC.

2021 THE ALAMEDA, SUITE 145, SAN JOSE, CA 95126 + 408.984.3355 + F 408.918.2188 + JLOHR.COM

May 23, 2019

Supervisor Peschong

1055 Monterey Street Room D430

San Luis Obispo, Ca 93408

Dear Supervisor Peschong,

I would like to thank you for taking the time to listen to my concerns last night after the Paso Robles Basin Cooperative Committee meeting. As I told you last night, our company is based in Coalinga Ca. but we own 2,680 acres south east of the city of Shandon. We have farmed the property in the past but currently run cattle on the land. We are large Farmers in the Central Valley and have put our efforts into developing our properties in Fresno, Kings, and Kern Counties. It has always been our plan to someday drill a well or two on the Shandon property that we have owned for almost forty years. We have already hired a Geologist to evaluate the property. He has designated several prime locations that water wells might be drilled.

I am writing you to express our strenuous opposition to any GSP that fails to recognize our overlying ground water rights or our right to pump water in the future. We have been good neighbors and good stewards of the land. We have not had a negative effect on the land or contributed to any over draft that may be occurring in that area. I hope that our conservative land practices will not be held against us during the GSP process. We feel that we have a right to access the water that is beneath our property in a thoughtful and sustainable way. Anything less would be an improper taking and would greatly diminish the value of our land. Again I would like to thank you for your time and input.

Sincerely

Craig Finster

William and Doris Land and Energy Co, LLC

June 28, 2019

The Honorable John Peschong
San Luis Obispo County Supervisor, District 1
County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

Chapter 9 Concepts and Policy

I am writing these comments as an interested and involved participant in groundwater issues in the Paso Robles Basin for many years. My comments have formed as a result of my extensive participation in the Paso Robles Basin. I have been retained by J. Lohr Vineyards and Wines as a Water Consultant and I am a Board Member of the Estrella-El Pomar-Creston Water District. However, these comments do not represent an official position of the EPC Water District. My comments are generally consistent with J. Lohr Vineyards and Wines opinions.

It is my understanding that the current Chapter 9 that was presented in April, 2019 at the Cooperative Committee Meetings is under review and likely to undergo substantial changes. Rather than comment on specifics of the current version of Chapter 9, I would like to present the following conceptual framework that addresses significant policy issues that must be resolved before Chapter 9 can move forward with its Management Actions and Projects. I believe these critical policy decisions must be resolved now in order to move forward. Without broad agreement on policy, details of implementation are impossible. These important policy decisions need to be made in open public discussions now and not buried in future regulations.

1. **Flow Meter Program** - It would be difficult to consider any GSP to be a comprehensive plan without a mechanism to measure groundwater production. Metering and reporting groundwater pumping should be the obvious first action of the GSP. Requiring the registration of wells and reporting of groundwater pumping will be an indication of the seriousness of the GSP. We can't manage what we don't measure. Also, any allocation system resulting in reductions in pumping will have to be based on observable numbers.

The GSP should make metering mandatory and reporting of all wells other than domestic wells. This should be required by the end of 2020. Reporting of all groundwater extraction should be required starting in the calendar year of 2021 and reported early in the calendar year 2022.

The GSP should develop its own database of wells and collect and maintain well information. Owners should be required to register their well(s) and provide such information as the APN Number, GPS location of the well, well size and depth, owners names and contact information, responsible person's name and contact information, information on the measuring device used

and other information as needed. The GSP will need to develop a robust management structure to collect and maintain the Basin's well information as well as to enforce the requirements of the GSP. Communal data such as well information should be maintained in one location and administered uniformly across the Basin.

There should be a significant annual penalty for not registering wells and for not reporting groundwater production.

When an allocation system is implemented by the GSP using a crop load factor, then those landowners who do not report groundwater production to the GSP should be assumed to be using **double** the crop load duty factor. This assigned usage may be used to calculate extraction fees that may be implemented by the GSP and also the extraction penalty fees for those over producing more water than their allocated amount.

2. **No New Plantings** – the GSP must work closely with the County and the County's Land-use authority to ensure that there will be no new plantings.
3. **Base Pumping Fees** – should be implemented immediately or at least when pumping data is available, see item #1 above. The fees should be in the nominal range of \$20 to \$80 per AF of groundwater produced in any given year. These fees would be used to fund operation of the GSP and could cover such expenditures as Model refinements, Model Runs, hydrological studies, professional consultants, monitoring wells, well monitoring network, and GSP operations.
4. **Projects** – projects are important tools that can help bring the Basin into sustainability. By their very nature, project will take time, therefore projects need to be started sooner rather than later. Raising the Salinas Dam may take a decade or more, so the GSP must actively embrace this project along with other projects that represent real solutions by bringing supplemental water to the Basin, reduce pumping in the basin or enhance groundwater recharge. Viable projects must be endorsed and supported by the GSP. Projects should not be trivialized by relegating them to an Appendix.

Specific tangible projects should be recognized and included as an integral component of Chapter 9.

Cutbacks in groundwater pumping should not be considered until projects are implemented or at least started. A GSP that ignores projects that offer real opportunities to reduce groundwater pumping will be marginalized.

Projects may take the form of private or public projects. Under either circumstance, the GSP will need to endorse the various projects and provide leadership, public support and outreach and the seek the political will to make them be successful.

5. **In-lieu Water Credits Exchange** – The GSP will need to provide provisions for the exchange of in-lieu ‘water credits’ resulting from the use of supplemental water.
6. **Mandatory Pumping Reductions and an Allocation System Based on County’s Crop Type Factor** – pumping cutbacks seem to be a certainty in the future. The GSP will need to develop a system to determine the baseline pumping ‘allowances’ for groundwater users. These pumping allowances will likely be less than current pumping production and will represent the cutbacks necessary to bring the Basin into sustainability. Pumping allowances should be based on the County’s Crop Type Factor and not on historical usage. The County Crop Type Factors are a more equitable way of allocation of water allotments by leveling the playing field rather than historical usage. Historical usage would tend to reward the over users and penalize the frugal users. Historical usage may also present a fundamental inequity between groundwater users.

The GSP will grant groundwater users an annual allowance for groundwater production and the GSP will need to be able to verify compliance with these allowances in pumping through its groundwater pumping reporting and monitoring program.

7. **Significant Penalties for Over Production** – to meet the sustainability goals that SGMA mandates, pumpers in the Paso Robles Groundwater Basin will have to reduce groundwater pumping. It is the obligation of the GSP to ensure that groundwater users play fairly and operate within the prescribed limits set by the GSP. Whether by omission, indifference, or calculation by groundwater users, the GSP needs to make sure that over production of groundwater is economically unattractive. Chronic over production should not be tolerated. Over production should not be allowed as an on-going method of operation.

The GSP should institute meaningful penalties for over production of water. Enforcement of groundwater usage rules will be an additional responsibility of the GSP.

Users will have the choice of reducing pumping, securing supplemental water or face severe penalties.

8. **Basin Managed as Whole** – DWR’s Bulletin 118 defines groundwater basins from a hydrological point of view. The Paso Robles Groundwater Basin should be managed as a single basin. All users share the benefits of the Basin and all users should participate in and share the responsibilities of maintaining the health and sustainability of the Basin on an equal basis.

For consistency and conformity, all data gathering and storage should be in a repository maintained by the GSP. The GSP should also have one methodology for enforcement.

9. **Minimum Threshold Levels, Chapters 8** - should be based on 2017 levels, using prior year’s levels could result in severe, unrealistic and disruptive cut backs.
10. **Fallowing** –both temporary and permanent fallowing should be supported by the GSP. The GSP should not acquire land in order to permanently fallow land but rather just buyout the pumping allocations.

Voluntary, temporary fallowing should be encouraged and the GSP should support landowners choosing this path by allowing the land to go fallow without the landowner losing their allowances.

Finally, I am concerned about the autonomy granted to GSA's in the current version of Chapter 9. This could profoundly undermine the structure and decision-making process that the current MOA provides. SGMA requires multiple GSP's within a basin to have cooperating agreements. The current structure presented by Chapter 9 seems to be missing any substantial 'cooperating' language between GSA's. The GSP seems to be leaving all major policy decisions to the future and without providing any sort of supporting organizational structure.

Regards,

A handwritten signature in cursive script, appearing to read "Jerry Reaugh".

Jerry Reaugh

July 1, 2019

County Government Center
1055 Monterey Street, Room 206
San Luis Obispo, CA 93408

Submitted online via: [https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-\(SGMA\)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx](https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-(SGMA)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx)

Re: Chapters 9-11 of the Paso Robles Subbasin Draft GSP

Dear Angela Ruberto,

The Nature Conservancy (TNC) appreciates the opportunity to comment on Chapters 9-11 of the Paso Robles Subbasin Draft Groundwater Sustainability Plan (GSP) being prepared under the Sustainable Groundwater Management Act (SGMA). Please note that we have previously submitted comments dated 15 April 2019 on Chapters 4-8 and Appendix B of the Paso Robles Subbasin Draft GSP.

TNC is a global, nonprofit organization dedicated to conserving the lands and waters on which all life depends. We seek to achieve our mission through science-based planning and implementation of conservation strategies. For decades, we have dedicated resources to establishing diverse partnerships and developing foundational science products for achieving positive outcomes for people and nature in California. TNC was part of a stakeholder group formed by the Water Foundation in early 2014 to develop recommendations for groundwater reform and actively worked to shape and pass SGMA. We believe that the success of SGMA depends on bringing the best available science to the table, engaging all stakeholders in robust dialog, providing strong incentives for beneficial outcomes and rigorous enforcement by the State of California.

Our specific comments related to Chapters 9-11 of the Draft GSP are provided in detail in **Attachment B** and are in reference to the numbered items in **Attachment A**. **Attachment C** provides a list of the freshwater species located in the Paso Robles Subbasin. **Attachment D** describes six best practices that GSAs and their consultants can apply when using local groundwater data to confirm a connection to groundwater for DWR's Natural Communities Commonly Associated with Groundwater Dataset². **Attachment E** provides an overview of a new, free online tool that allows GSAs to assess changes in groundwater-dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data.

Thank you for fully considering our comments as you develop your GSP.

Best Regards,



Sandi Matsumoto
Associate Director, California Water Program
The Nature Conservancy

Attachment A

Considering Nature under SGMA: A Checklist

The Nature Conservancy is neither dispensing legal advice nor warranting any outcome that could result from the use of this checklist. Following this checklist does not guarantee approval of a GSP or compliance with SGMA, both of which will be determined by DWR and the State Water Resources Control Board.

GSP Plan Element*		GDE Inclusion in GSPs: Identification and Consideration Elements	Check Box
Admin Info	2.1.5 Notice & Communication 23 CCR §354.10	Description of the types of environmental beneficial uses of groundwater that exist within GDEs and a description of how environmental stakeholders were engaged throughout the development of the GSP.	1
Planning Framework	2.1.2 to 2.1.4 Description of Plan Area 23 CCR §354.8	Description of jurisdictional boundaries, existing land use designations, water use management and monitoring programs; general plans and other land use plans relevant to GDEs and their relationship to the GSP.	2
		Description of instream flow requirements, threatened and endangered species habitat, critical habitat, and protected areas.	3
		Summary of process for permitting new or replacement wells for the basin, and how the process incorporates protection of GDEs	4
Basin Setting	2.2.1 Hydrogeologic Conceptual Model 23 CCR §354.14	Basin Bottom Boundary: Is the bottom of the basin defined as at least as deep as the deepest groundwater extractions?	5
		Principal aquifers and aquitards: Are shallow aquifers adequately described, so that interconnections with surface water and vertical groundwater gradients with other aquifers can be characterized?	6
		Basin cross sections: Do cross-sections illustrate the relationships between GDEs, surface waters and principal aquifers?	7
	2.2.2 Current & Historical Groundwater Conditions 23 CCR §354.16	Interconnected surface waters:	8
		Interconnected surface water maps for the basin with gaining and losing reaches defined (included as a figure in GSP & submitted as a shapefile on SGMA portal).	9
		Estimates of current and historical surface water depletions for interconnected surface waters quantified and described by reach, season, and water year type.	10
		Basin GDE map included (as figure in text & submitted as a shapefile on SGMA Portal).	11
		If NC Dataset was used: Basin GDE map denotes which polygons were kept, removed, and added from NC Dataset (Worksheet 1, can be attached in GSP section 6.0).	12

			The basin's GDE shapefile, which is submitted via the SGMA Portal, includes two new fields in its attribute table denoting: 1) which polygons were kept/removed/added, and 2) the change reason (e.g., why polygons were removed).	13
			GDEs polygons are consolidated into larger units and named for easier identification throughout GSP.	14
		If NC Dataset <i>was not</i> used:	Description of why NC dataset was not used, and how an alternative dataset and/or mapping approach used is best available information.	15
		Description of GDEs included:		16
		Historical and current groundwater conditions and variability are described in each GDE unit.		17
		Historical and current ecological condition and variability are described in each GDE unit and adequate to describe baseline as of 2015.		18
		Each GDE unit has been characterized as having high, moderate, or low ecological value.		19
		Inventory of species, habitats, and protected lands for each GDE unit with ecological importance (Worksheet 2, can be attached in GSP section 6.0).		20
	2.2.3 Water Budget 23 CCR §354.18	Groundwater inputs and outputs (e.g., evapotranspiration) of native vegetation and managed wetlands are included in the basin's historical and current water budget.		21
		Potential impacts to groundwater conditions due to land use changes, climate change, and population growth to GDEs and aquatic ecosystems are considered in the projected water budget.		22
Sustainable Management Criteria	3.1 Sustainability Goal 23 CCR §354.24	Environmental stakeholders/representatives were consulted.		23
		Sustainability goal mentions GDEs or species and habitats that are of particular concern or interest.		24
		Sustainability goal mentions whether the intention is to address pre-SGMA impacts, maintain or improve conditions within GDEs or species and habitats that are of particular concern or interest.		25
	3.2 Measurable Objectives 23 CCR §354.30	Description of how GDEs were considered and whether the measurable objectives and interim milestones will help achieve the sustainability goal as it pertains to the environment, beneficial uses and managed areas.		26
	3.3 Minimum Thresholds 23 CCR §354.28	Description of how GDEs and environmental uses of surface water were considered when setting minimum thresholds for relevant sustainability indicators:		27
		Will adverse impacts to GDEs and/or aquatic ecosystems dependent on interconnected surface waters (beneficial user of surface water) be avoided with the selected minimum thresholds?		28
		Are there any differences between the selected minimum threshold and state, federal, or local standards relevant to the species or habitats residing in GDEs or aquatic ecosystems dependent on interconnected surface waters?		29
	3.4 Undesirable Results 23 CCR §354.26	For GDEs, hydrological data are compiled and synthesized for each GDE unit:		30
		If hydrological data <i>are available</i> within/nearby the GDE	Hydrological datasets are plotted and provided for each GDE unit (Worksheet 3, can be attached in GSP Section 6.0).	31
			Baseline period in the hydrologic data is defined.	32
			GDE unit is classified as having high, moderate, or low susceptibility to changes in groundwater.	33

			Cause-and-effect relationships between groundwater changes and GDEs are explored.	34
		If hydrological data <i>are not available</i> within/nearby the GDE	Data gaps/insufficiencies are described.	35
			Plans to reconcile data gaps in the monitoring network are stated.	36
		For GDEs, biological data are compiled and synthesized for each GDE unit:		37
		Biological datasets are plotted and provided for each GDE unit, and provide baseline conditions for assessment of trends and variability.		38
		Data gaps/insufficiencies are described.		39
		Plans to reconcile data gaps in the monitoring network are stated.		40
		Description of potential effects on GDEs, land uses and property interests:		41
		Cause-and-effect relationships between GDE and groundwater conditions are described.		42
		Impacts to GDEs that are considered to be "significant and unreasonable" are described.		43
		Known hydrological thresholds or triggers (e.g., instream flow criteria, groundwater depths, water quality parameters) for significant impacts to relevant species or ecological communities are reported.		44
		Land uses include and consider recreational uses (e.g., fishing/hunting, hiking, boating).		45
		Property interests include and consider privately and publicly protected conservation lands and opens spaces, including wildlife refuges, parks, and natural preserves.		46
Sustainable Management Criteria	3.5 Monitoring Network 23 CCR §354.34	Description of whether hydrological data are spatially and temporally sufficient to monitor groundwater conditions for each GDE unit.		47
		Description of how hydrological data gaps and insufficiencies will be reconciled in the monitoring network.		48
		Description of how impacts to GDEs and environmental surface water users, as detected by biological responses, will be monitored and which GDE monitoring methods will be used in conjunction with hydrologic data to evaluate cause-and-effect relationships with groundwater conditions.		49
Projects & Mgmt Actions	4.0. Projects & Mgmt Actions to Achieve Sustainability Goal 23 CCR §354.44	Description of how GDEs will benefit from relevant project or management actions.		50
		Description of how projects and management actions will be evaluated to assess whether adverse impacts to the GDE will be mitigated or prevented.		51

* In reference to DWR's GSP annotated outline guidance document, available at:
https://water.ca.gov/LegacyFiles/groundwater/sqm/pdfs/GD_GSP_Outline_Final_2016-12-23.pdf

Attachment B

TNC Evaluation of Chapters 9 - 11 of the Paso Robles Subbasin Draft GSP

This attachment summarizes our comments on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. In this section, we refer to our previous comments, dated 15 April 2019, on Chapters 4-8 and Appendix B of the Draft GSP.

Chapter 9 Management Actions and Projects [Checklist Items #50-51]:

- As stated in TNC's previous comments in our previous letter on Chapter 8, Sections 8.4 and 8.9, interconnected surface waters (ISWs) *do* exist in the Paso Robles Subbasin, and thus there is a need to establish sustainable management criteria for ISWs in the basin and minimum thresholds for these ISWs. After identifying these minimum thresholds, **please include ISWs as a specific sustainability indicator to be addressed by management actions and projects as described in Chapter 9.** For the management actions and projects already identified, state how ISWs will be benefited or protected. If ISWs will not be adequately protected by those listed, please include and describe additional management actions and projects.
- Page 1 states that the most important sustainability indicator used in development of the management actions and projects is the stabilization of groundwater levels. However, an important data gap already recognized is the lack of publicly available groundwater elevation data in the Alluvial Aquifer. As discussed in TNC's previous comments on Chapter 8, Section 8.4, a scientifically robust methodology must be proposed for establishing the initial minimum thresholds for the Alluvial Aquifer. **In light of the data gap regarding Alluvial Aquifer groundwater data, please be more specific in stating how GDEs and ISWs would benefit from management actions and projects, and how actions and projects will be evaluated to assess whether adverse impacts to GDEs will be mitigated or prevented:**
 - Well Interference Mitigation Program (Page 8): This management action could be expanded to benefit GDEs and ISWs by choosing wells for the rotation or well spacing program that are screened in the alluvial aquifer and located in close proximity to rivers and streams, thus spreading out potential drawdown effects.
 - Promote Stormwater Capture (Page 10): Please describe how recharge from unallocated storm flows will be evaluated to assess benefits to GDEs and ISWs.
 - Mandatory Pumping Reductions (Page 14): Please discuss the data gap for wells screened in the alluvial aquifer and the data gap for vertical gradient between the alluvial aquifer and Paso Robles Formation, since most wells are screened in the Paso Robles aquifer. When these data gaps are resolved, it will become clearer how mandatory pumping reductions could also benefit GDEs and ISWs.

- Agricultural Land and Pumping Allowance Retirement (Page 21): Retirement of agricultural land may include land near rivers and streams, which could impact GDEs and ISWs by decreasing surface runoff and flow, or by decreasing recharge from deep percolation of irrigation water. Conversely, retirement of agricultural land would increase local groundwater levels in the pumped aquifers. The potential benefit or impact of agricultural retirement on GDEs needs to be evaluated.
- Conceptual Projects (Pages 27-56): Most of the conceptual projects involve in-lieu recharge for the direct use of recycled wastewater. Thus, the recycled water would replace pumped groundwater. Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs.
- Substitute Project 4 (Page 73): The capture of 10 cfs of Salinas River flood flows for recharge in a basin should include investigation to see if there is an effect on any instream species, GDEs or wetland habitats located on the Salinas River or hydraulically connected to the river. How this diversion will affect instream flow requirements that are currently being met by dam releases should also be described. **Please state the impact of the diversion of 10 cfs Salinas River flow on freshwater species in the Paso Robles Subbasin (see Attachment C).**
- For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website:
<https://groundwaterresourcehub.org/case-studies/recharge-case-studies/>

Section 10.2.1.1 Improve Monitoring Network (p. 10-11)
[Checklist item #47-49]:

- **Please further describe the expansion of the monitoring program and specify what types of monitoring will be done to identify impacts to GDEs. Be more specific in describing wells and screened intervals that represent the water levels of both the Alluvial Aquifer and Paso Robles Formation Aquifer.**

Section 10.2.5 Evaluating Interconnected Surface Water (p. 14-15)
[Checklist Item #48]:

- The text states "*As discussed in Chapter 5, the consensus among local groundwater experts is that there is no interconnection between surface water and groundwater in the Subbasin.*" (p. 14) This sentence is contradictory to the ISW mapping conducted in Chapter 5 (Figure 5-17). Per TNC's previous comments on Chapter 5, interconnected surface waters *do* exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1. Therefore, sustainable management criteria and an associated monitoring network for interconnected surface water and groundwater *do* need to be developed in the GSP, as stated in our comments on Chapter 9 above, and depletion of ISWs should be monitored. The Draft GSP states that an initial hydrogeologic investigation will be conducted. **Please provide sufficient detail for the investigation and monitoring program including stream gauges, screened intervals and**

aquifers of the shallow wells and frequency of monitoring, in order to describe monitoring of both the extent of ISWs and the quantity of surface water depletions from ISWs.

- Wells should be selected that are at varying distances from the river to capture vertical gradients from one aquifer to the other and to determine the ISWs and monitor any depletion in ISWs. As stated in TNC's previous comments in our previous letter on Chapter 7, **there is a need to enhance monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands.** Ideally, co-locating stream gauges with clustered wells that can monitor groundwater levels in both the Alluvial and Paso Robles Formation aquifers would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surface water and groundwater.
- As stated in TNC's previous comments in our previous letter on Chapter 7, the Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing *what* is being impacted, nor is possible to monitor ISWs in a way that can "identify adverse impacts on beneficial uses of surface water". For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in **Attachment C. Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap and explain how this data gap will be filled.**

Chapter 11 Notice and Communications (including separate Communications and Engagement Plan)

[Checklist Item #1]:

- Section 3.0 of the Communications and Engagement Plan (Page 6) lists aquatic ecosystems as a beneficial groundwater use. However, no details are given as to the types and locations of environmental uses and habitats supported, or the designated beneficial environmental uses of surface waters that may be affected by groundwater extraction in the subbasin. **To identify environmental users, please refer to the following:**
 - Natural Communities Commonly Associated with Groundwater dataset (NC Dataset) - <https://gis.water.ca.gov/app/NCDatasetViewer/>
 - The list of freshwater species located in the Paso Robles Subbasin in **Attachment C** of this letter. Please take particular note of the species with protected status.
 - Lands that are protected as open space preserves, habitat reserves, wildlife refuges, etc. or other lands protected in perpetuity and supported by groundwater or ISWs should be identified and acknowledged.

Attachment C

Freshwater Species Located in the Paso Robles Subbasin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result “depletion of interconnected surface waters”, Attachment C provides a list of freshwater species located in the Paso Robles Subbasin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the Paso Robles groundwater basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015¹. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife’s BIOS² as well as on The Nature Conservancy’s science website³.

Scientific Name	Common Name	Legally Protected Status		
		Federal	State	Other
BIRD				
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	SSC	BSSC - First priority
Aix sponsa	Wood Duck			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya collaris	Ring-necked Duck			
Aythya valisineria	Canvasback		SSC	
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			

¹ Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoS ONE, 11(7). Available at: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710>

² California Department of Fish and Wildlife BIOS: <https://www.wildlife.ca.gov/data/BIOS>

³ Science for Conservation: <https://www.scienceforconservation.org/products/california-freshwater-species-database>

<i>Calidris mauri</i>	Western Sandpiper			
<i>Chen caerulescens</i>	Snow Goose			
<i>Chen rossii</i>	Ross's Goose			
<i>Chroicocephalus philadelphia</i>	Bonaparte's Gull			
<i>Cistothorus palustris palustris</i>	Marsh Wren			
<i>Egretta thula</i>	Snowy Egret			
<i>Fulica americana</i>	American Coot			
<i>Gallinago delicata</i>	Wilson's Snipe			
<i>Gallinula chloropus</i>	Common Moorhen			
<i>Geothlypis trichas trichas</i>	Common Yellowthroat			
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird of Conservation Concern	Endangered	
<i>Icteria virens</i>	Yellow-breasted Chat		SSC	BSSC - Third priority
<i>Lophodytes cucullatus</i>	Hooded Merganser			
<i>Megaceryle alcyon</i>	Belted Kingfisher			
<i>Mergus merganser</i>	Common Merganser			
<i>Mergus serrator</i>	Red-breasted Merganser			
<i>Numenius americanus</i>	Long-billed Curlew			
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron			
<i>Oxyura jamaicensis</i>	Ruddy Duck			
<i>Pandion haliaetus</i>	Osprey		Watch list	
<i>Pelecanus erythrorhynchos</i>	American White Pelican		SSC	BSSC - First priority
<i>Phalacrocorax auritus</i>	Double-crested Cormorant			
<i>Podiceps nigricollis</i>	Eared Grebe			
<i>Podilymbus podiceps</i>	Pied-billed Grebe			
<i>Porzana carolina</i>	Sora			
<i>Rallus limicola</i>	Virginia Rail			
<i>Recurvirostra americana</i>	American Avocet			
<i>Riparia riparia</i>	Bank Swallow		Threatened	
<i>Setophaga petechia</i>	Yellow Warbler			BSSC - Second priority
<i>Tachycineta bicolor</i>	Tree Swallow			
<i>Tringa melanoleuca</i>	Greater Yellowlegs			
<i>Tringa solitaria</i>	Solitary Sandpiper			
<i>Vireo bellii</i>	Bell's Vireo			
<i>Vireo bellii pusillus</i>	Least Bell's Vireo	Endangered	Endangered	

Xanthocephalus xanthocephalus	Yellow-headed Blackbird		SSC	BSSC - Third priority
CRUSTACEAN				
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	SSC	IUCN - Vulnerable
Cyprididae fam.	Cyprididae fam.			
Hyalella spp.	Hyalella spp.			
Pacifastacus spp.	Pacifastacus spp.			
FISH				
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	SSC	Vulnerable - Moyle 2013
Catostomus occidentalis mnioltus	Monterey sucker			Least Concern - Moyle 2013
Catostomus occidentalis occidentalis	Sacramento sucker			Least Concern - Moyle 2013
Cottus gulosus	Riffle sculpin		SSC	Near-Threatened - Moyle 2013
Entosphenus tridentata ssp. 1	Pacific lamprey		SSC	Near-Threatened - Moyle 2013
Lavinia exilicauda exilicauda	Sacramento hitch		SSC	Near-Threatened - Moyle 2013
Lavinia exilicauda harengus	Monterey hitch		SSC	Vulnerable - Moyle 2013
Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Orthodon microlepidotus	Sacramento blackfish			Least Concern - Moyle 2013
Ptychocheilus grandis	Sacramento pikeminnow			Least Concern - Moyle 2013
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	SSC	Vulnerable - Moyle 2013
HERP				
Actinemys marmorata marmorata	Western Pond Turtle		SSC	ARSSC

<i>Ambystoma californiense californiense</i>	California Tiger Salamander	Threatened	Threatened	ARSSC
<i>Anaxyrus boreas boreas</i>	Boreal Toad			
<i>Anaxyrus boreas halophilus</i>	California Toad			ARSSC
<i>Anaxyrus californicus</i>	Arroyo Toad	Endangered	SSC	ARSSC
<i>Pseudacris cadaverina</i>	California Treefrog			ARSSC
<i>Pseudacris hypochondriaca</i>	Baja California Treefrog			
<i>Pseudacris regilla</i>	Northern Pacific Chorus Frog			
<i>Rana boylei</i>	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	SSC	ARSSC
<i>Rana draytonii</i>	California Red-legged Frog	Threatened	SSC	ARSSC
<i>Spea hammondi</i>	Western Spadefoot	Under Review in the Candidate or Petition Process	SSC	ARSSC
<i>Taricha torosa</i>	Coast Range Newt		SSC	ARSSC
<i>Thamnophis hammondi hammondi</i>	Two-striped Gartersnake		SSC	ARSSC
<i>Thamnophis sirtalis infernalis</i>	California Red-sided Gartersnake			Not on any status lists
<i>Thamnophis sirtalis sirtalis</i>	Common Gartersnake			
INSECT & OTHER INVERT				
<i>Acentrella</i> spp.	<i>Acentrella</i> spp.			
<i>Agabus</i> spp.	<i>Agabus</i> spp.			
<i>Ambrysus mormon</i>	Creeping water bug			Not on any status lists
<i>Antocha</i> spp.	<i>Antocha</i> spp.			
<i>Argia emma</i>	Emma's Dancer			
<i>Argia lugens</i>	Sooty Dancer			
<i>Argia</i> spp.	<i>Argia</i> spp.			
<i>Argia vivida</i>	Vivid Dancer			
Baetidae fam.	Baetidae fam.			
<i>Baetis</i> spp.	<i>Baetis</i> spp.			
<i>Berosus punctatissimus</i>	Water scavenger beetles			Not on any status lists
<i>Berosus</i> spp.	<i>Berosus</i> spp.			
<i>Callibaetis</i> spp.	<i>Callibaetis</i> spp.			

Centroptilum spp.	Centroptilum spp.			
Chaetarthria bicolor	Water Scavenger Beetles			Not on any status lists
Chaetarthria ochra	Water Scavenger Beetles			Not on any status lists
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus spp.	Chironomus spp.			
Cladotanytarsus spp.	Cladotanytarsus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Corisella spp.	Corisella spp.			
Corixidae fam.	Corixidae fam.			
Cricotopus spp.	Cricotopus spp.			
Dicrotendipes spp.	Dicrotendipes spp.			
Dytiscidae fam.	Dytiscidae fam.			
Enallagma civile	Familiar Bluet			
Enallagma cyathigerum	Common blue damselfly			Not on any status lists
Enochrus carinatus	Water Scavenger Beetles			Not on any status lists
Enochrus cristatus	Water Scavenger Beetles			Not on any status lists
Enochrus piceus	Water Scavenger Beetles			Not on any status lists
Enochrus pygmaeus	Water Scavenger Beetles			Not on any status lists
Enochrus spp.	Enochrus spp.			
Ephemerella spp.	Ephemerella spp.			
Ephemerellidae fam.	Ephemerellidae fam.			
Ephydriidae fam.	Ephydriidae fam.			
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Graptocorixa spp.	Graptocorixa spp.			
Gyrinus spp.	Gyrinus spp.			
Helichus spp.	Helichus spp.			
Helicopsyche spp.	Helicopsyche spp.			
Hetaerina americana	American Rubyspot			
Hydrochus spp.	Hydrochus spp.			
Hydrophilidae fam.	Hydrophilidae fam.			
Hydroporus spp.	Hydroporus spp.			
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydryphantidae fam.	Hydryphantidae fam.			
Ischnura spp.	Ischnura spp.			
Laccobius ellipticus	Water scavenger beetles			Not on any status lists
Laccobius spp.	Laccobius spp.			

Laccophilus maculosus	Dingy Diver			Not on any status lists
Lepidostoma spp.	Lepidostoma spp.			
Leptoceridae fam.	Leptoceridae fam.			
Libellula saturata	Flame Skimmer			
Limnophyes spp.	Limnophyes spp.			
Liodessus obscurellus	Predacious Diving Beetle			Not on any status lists
Macromia magnifica	Western River Cruiser			
Malenka spp.	Malenka spp.			
Microcyloopus spp.	Microcyloopus spp.			
Microtendipes spp.	Microtendipes spp.			
Nectopsyche spp.	Nectopsyche spp.			
Ochthebius spp.	Ochthebius spp.			
Ophiogomphus bison	Bison Snaketail			
Optioservus spp.	Optioservus spp.			
Oreodytes spp.	Oreodytes spp.			
Paracloeodes minutus	A Small Minnow Mayfly			
Paracymus spp.	Paracymus spp.			
Paratanytarsus spp.	Paratanytarsus spp.			
Peltodytes spp.	Peltodytes spp.			
Phaenopsectra spp.	Phaenopsectra spp.			
Plathemis lydia	Common Whitetail			
Postelichus spp.	Postelichus spp.			
Procladius spp.	Procladius spp.			
Pseudochironomus spp.	Pseudochironomus spp.			
Psychodidae fam.	Psychodidae fam.			
Rheotanytarsus spp.	Rheotanytarsus spp.			
Rhyacophila spp.	Rhyacophila spp.			
Sigara mckinstryi	A Water Boatman			Not on any status lists
Sigara spp.	Sigara spp.			
Simuliidae fam.	Simuliidae fam.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Sperchontidae fam.	Sperchontidae fam.			
Stictotarsus spp.	Stictotarsus spp.			
Sweltsa spp.	Sweltsa spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tipulidae fam.	Tipulidae fam.			
Tramea lacerata	Black Saddlebags			
Tricorythodes spp.	Tricorythodes spp.			
Wormaldia spp.	Wormaldia spp.			
MAMMAL				
Castor canadensis	American Beaver			Not on any status lists

MOLLUSK				
Gyraulus spp.	Gyraulus spp.			
Lymnaea spp.	Lymnaea spp.			
Menetus opercularis	Button Sprite			CS
Physa spp.	Physa spp.			
Pisidium spp.	Pisidium spp.			
Planorbidae fam.	Planorbidae fam.			
PLANT				
Alnus rhombifolia	White Alder			
Ammannia coccinea	Scarlet Ammannia			
Anemopsis californica	Yerba Mansa			
Azolla filiculoides	Mosquito Fern			
Baccharis salicina	Willow Baccharis			Not on any status lists
Bolboschoenus maritimus paludosus	Saltmarsh Bulrush			Not on any status lists
Callitriche heterophylla bolanderi	Large Water-starwort			
Callitriche marginata	Winged Water-starwort			
Castilleja minor minor	Alkali Indian-paintbrush			
Castilleja minor spiralis	Large-flower Annual Indian-paintbrush			
Cotula coronopifolia	Brass Buttons			
Crassula aquatica	Water Pygmyweed			
Crypsis vaginiflora	African Prickle Grass			
Cyperus erythrorhizos	Red-root Flatsedge			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis parishii	Parish's Spikerush			
Epilobium campestre	Smooth Boisduvalia			Not on any status lists
Epilobium cleistogamum	Cleistogamous Spike-primrose			
Eryngium spinosepalum	Spiny Sepaled Coyote-thistle		SSC	CRPR - 1B.2
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle			Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Helenium puberulum	Rosilla			
Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort			
Juncus dubius	Mariposa Rush			
Juncus effusus effusus	Common Bog Rush			
Juncus luciensis	Santa Lucia Dwarf Rush		SSC	CRPR - 1B.2
Juncus macrophyllus	Longleaf Rush			
Juncus xiphioides	Iris-leaf Rush			

<i>Limosella aquatica</i>	Northern Mudwort			
<i>Marsilea vestita vestita</i>	Hairy Waterclover			Not on any status lists
<i>Mimulus guttatus</i>	Common Large Monkeyflower			
<i>Mimulus latidens</i>	Broad-tooth Monkeyflower			
<i>Mimetanthe pilosa</i>	Snouted Monkey Flower			Not on any status lists
<i>Montia fontana fontana</i>	Fountain Miner's-lettuce			
<i>Navarretia prostrata</i>	Prostrate Navarretia		SSC	CRPR - 1B.1
<i>Paspalum distichum</i>	Joint Paspalum			
<i>Persicaria lapathifolia</i>	Common Knotweed			Not on any status lists
<i>Persicaria maculosa</i>	Spotted Ladysthumb			Not on any status lists
<i>Phacelia distans</i>	Common Phacelia			
<i>Pilularia americana</i>	Pillwort			
<i>Plagiobothrys acanthocarpus</i>	Adobe Popcorn-flower			
<i>Plantago elongata elongata</i>	Slender Plantain			
<i>Platanus racemosa</i>	California Sycamore			
<i>Psilocarphus brevissimus brevissimus</i>	Dwarf Woolly-heads			
<i>Ranunculus aquatilis diffusus</i>	Whitewater Crowfoot			Not on any status lists
<i>Rorippa curvisiliqua curvisiliqua</i>	Curve-pod Yellowcress			
<i>Rumex conglomeratus</i>	Green Dock			
<i>Rumex salicifolius salicifolius</i>	Willow Dock			
<i>Salix exigua exigua</i>	Narrowleaf Willow			
<i>Salix laevigata</i>	Polished Willow			
<i>Salix lasiolepis lasiolepis</i>	Arroyo Willow			
<i>Schoenoplectus americanus</i>	Three-square Bulrush			
<i>Schoenoplectus pungens longispicatus</i>	Three-square Bulrush			
<i>Schoenoplectus pungens pungens</i>	Common Threesquare			
<i>Schoenoplectus saximontanus</i>	Rocky Mountain Bulrush			
<i>Typha domingensis</i>	Southern Cattail			
<i>Typha latifolia</i>	Broadleaf Cattail			
<i>Veronica anagallis-aquatica</i>	Water Speedwell			

Veronica catenata	Chain Speedwell			Not on any status lists
Notes: ARSSC = At-Risk Species of Special Concern BSSC = Bird Species of Special Concern CRPR = California Rare Plant Rank CS = Currently Stable SSC = Species of Special Concern				

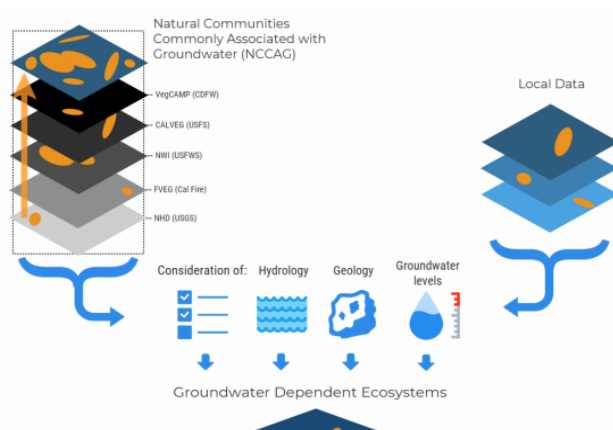
Attachment D



IDENTIFYING GDEs UNDER SGMA Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online⁴ to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)⁵. This document highlights six best practices for using local groundwater data to confirm whether a potential GDE identified in the NC dataset is supported to groundwater.

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California⁶. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset⁷ on the Groundwater Resource Hub, a website dedicated to GDEs⁸.



⁴ NC Dataset Online Viewer is available at: <https://gis.water.ca.gov/app/NCDatasetViewer/>

⁵ California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf>

⁶ For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf

⁷ "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at <https://groundwaterresourcehub.org/qde-tools/gsp-guidance-document/>

⁸ The Groundwater Resource Hub is available at: www.GroundwaterResourceHub.org

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2A) or multiple aquifers stacked on top of each other (Figure 2B). In unconfined aquifers (Figure 2A), using the depth to groundwater and the rooting depth of the vegetation is a reasonable method to determine groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2D). However, it is important to consider local conditions (soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2C). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2B) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and groundwater dependent ecosystems (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should be done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer.*

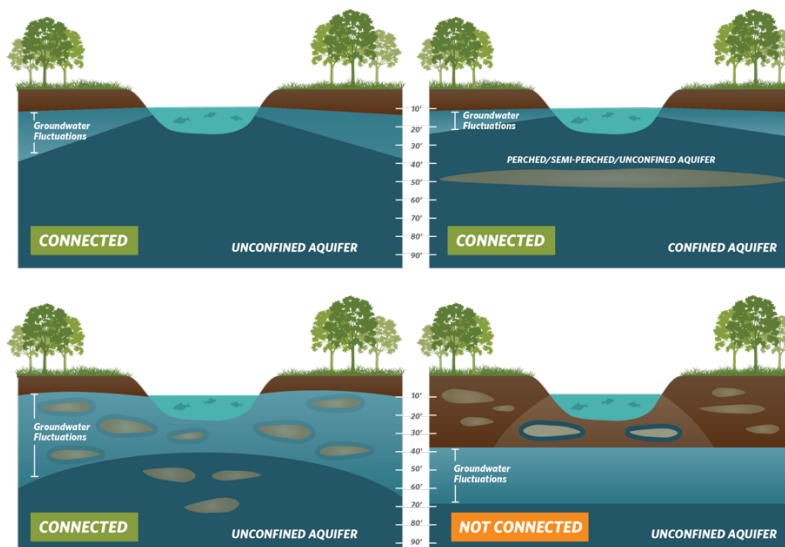


Figure 2. Confirming whether an ecosystem is connected to groundwater in a principal aquifer. Top: (Left) Depth to Groundwater in the aquifer under the ecosystem is an unconfined aquifer with depth to groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(Right)** Depth to Groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (Left)** Depth to groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(Right)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under surface water feature. These areas typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets⁹ recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline¹⁰ could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach¹¹ for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document⁴, one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (See Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however, if these groundwater conditions are prolonged adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet⁴ are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer¹². However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP until data gaps are reconciled in the monitoring network (See Best Practice #6).

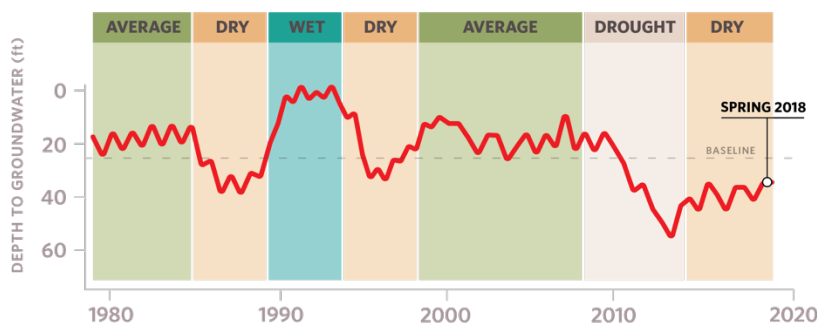


Figure 3. Example seasonality and interannual variability in depth to groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

⁹ DWR. 2016. Water Budget Best Management Practice. Available at:

https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

¹⁰ Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

¹¹ Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs - link in footnote above).

¹² SGMA Data Viewer: <https://sgma.water.ca.gov/webqis/?appid=SGMADataViewer>

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around NC polygons does not preclude the possibility that a connection to groundwater exists. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals¹³, which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

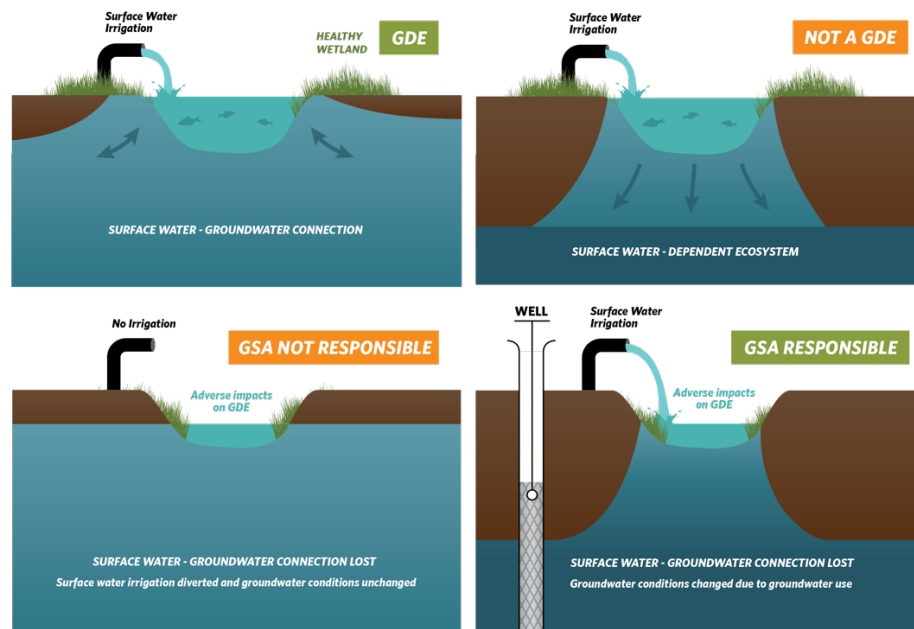


Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

¹³ For a list of environmental beneficial users of surface water by basin, visit: <https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/>

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.
- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.
- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

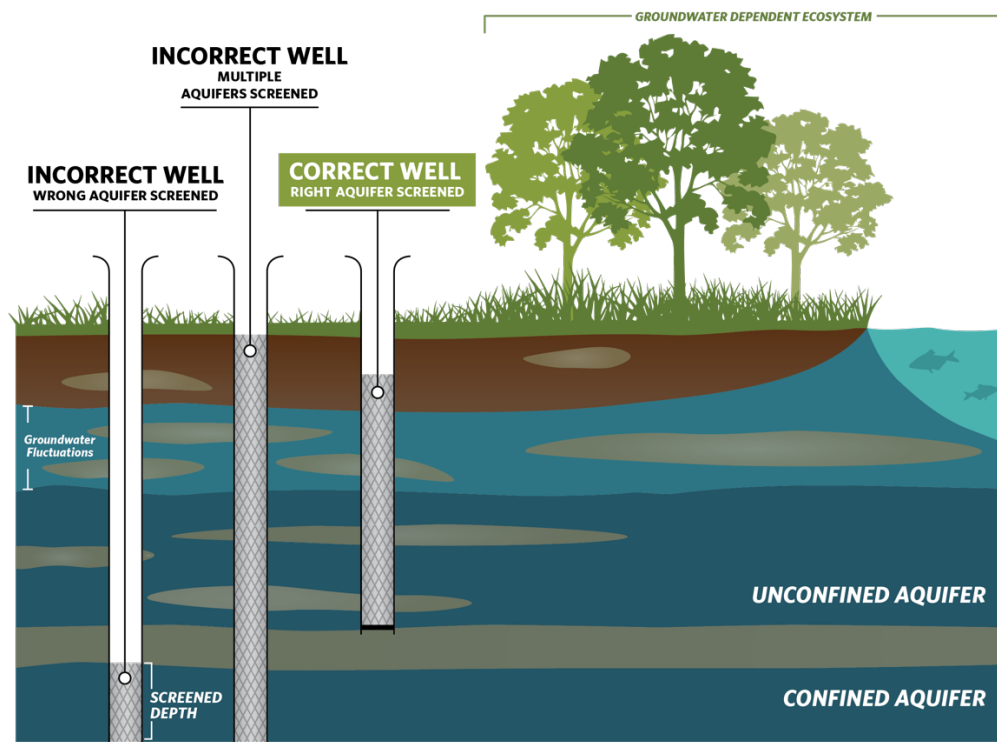


Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like streams and wetlands depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6 - left panel). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get an estimate of groundwater elevation across the landscape. This layer can then be subtracted from the land surface elevation from a Digital Elevation Model (DEM)¹⁴ to estimate depth to groundwater contours across the landscape (Figure 6 - right panel; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

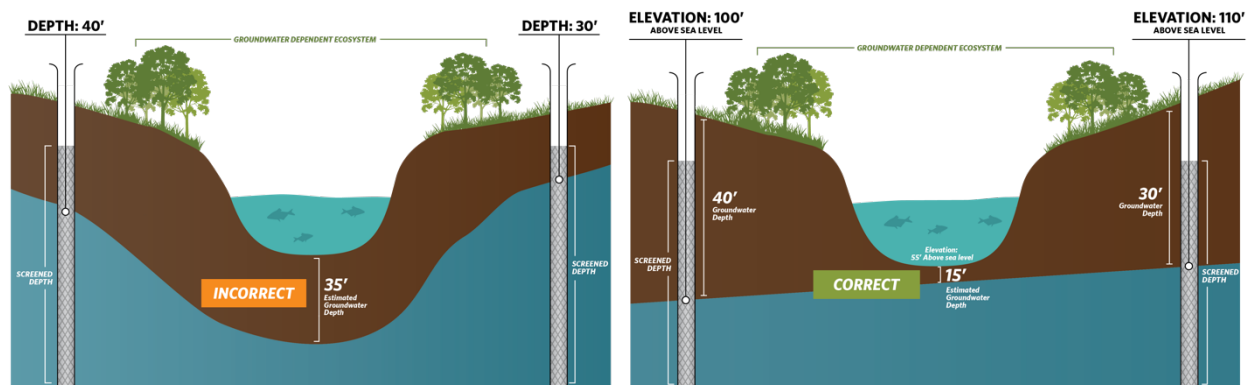


Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (Left) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(Right)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

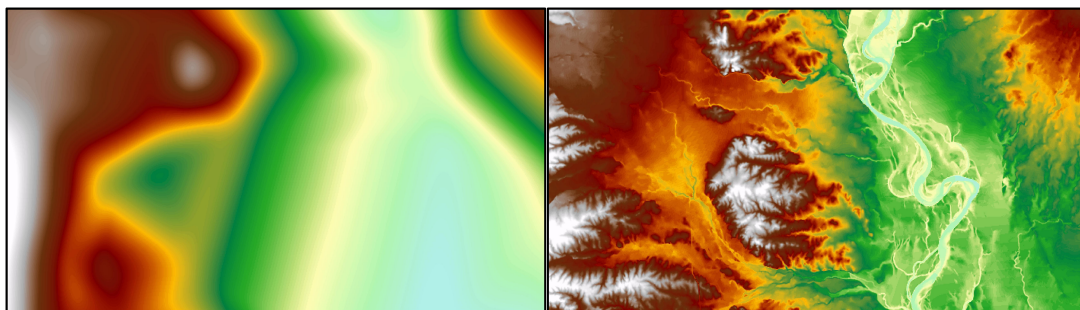


Figure 7. Depth to Groundwater Contours in Northern California. (Left) Contours were interpolated using depth to groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth to groundwater contours. The image on the right shows a more accurate depth to groundwater estimate because it takes the local topography and elevation changes into account.

¹⁴ USGS Digital Elevation Model data products are described at: <https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services> and can be downloaded at: <https://viewer.nationalmap.gov/basic/>

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. 23 CCR §341(g)(1)

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. 23 CCR §351(m)

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. 23 CCR §351(o)

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. 23 CCR §351(aa)

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

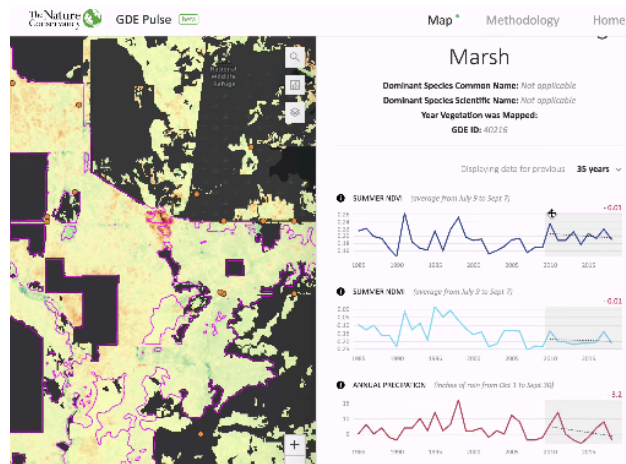
Attachment E

GDE Pulse

A new, free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data.



Visit
<https://gde.codefornature.org/>



Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset¹⁵. The following datasets are included:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset¹⁶. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

¹⁵ The Natural Communities Commonly Associated with Groundwater Dataset is hosted on the California Department of Water Resources' website: <https://gis.water.ca.gov/app/NCDataSetViewer/#>

¹⁶ The PRISM dataset is hosted on Oregon State University's website: <http://www.prism.oregonstate.edu/>

STEVE LOHR

CEO, J. LOHR VINEYARDS & WINES

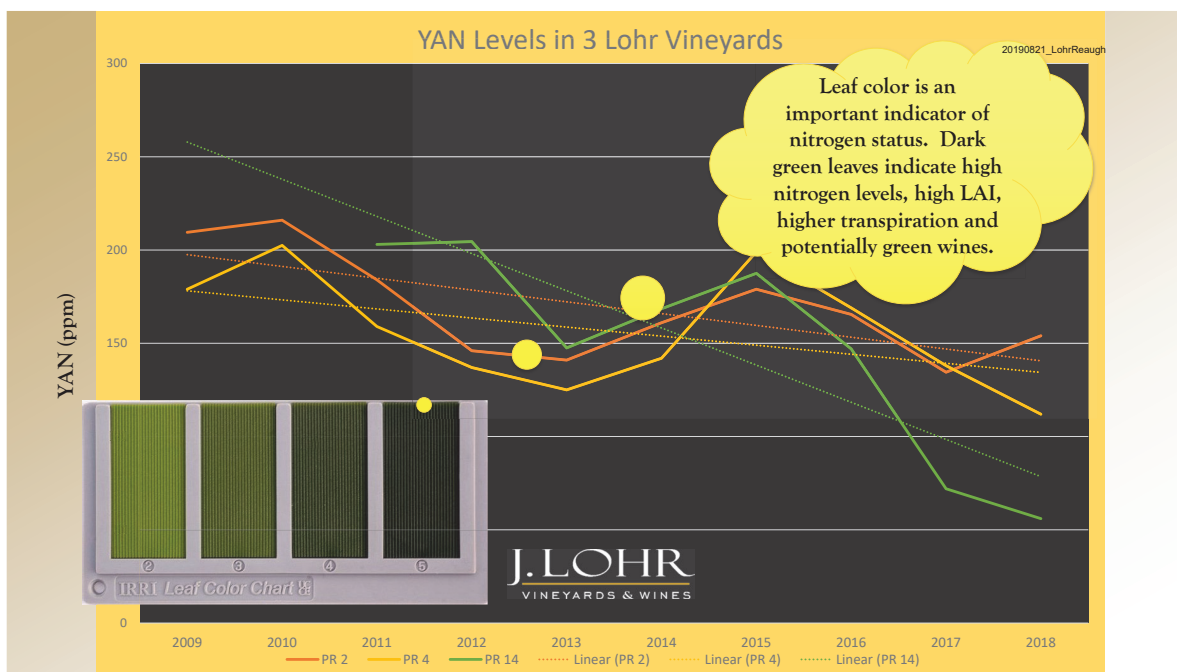
J. LOHR
VINEYARDS & WINES

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GROWER STRATEGIES TO INCREASE COLOR AND OPTIMIZE YIELDS

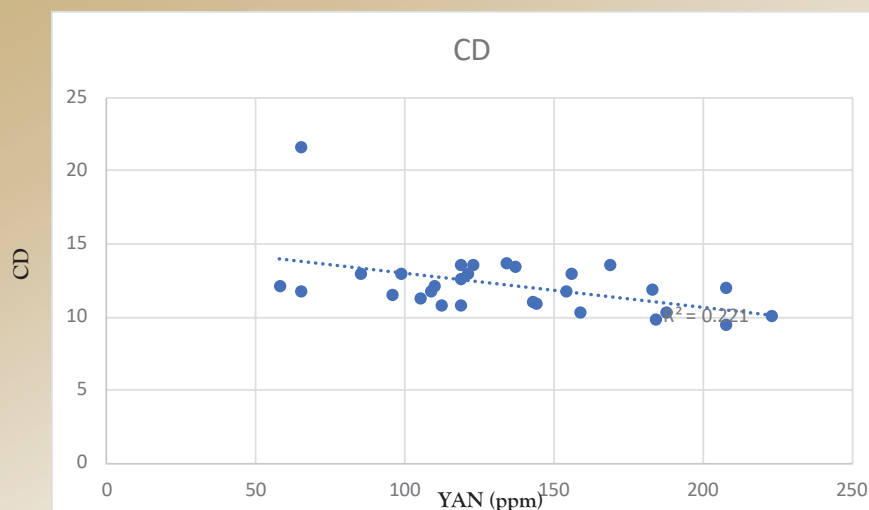


J. LOHR
VINEYARDS & WINES



SURVEY OF 2018 CABERNET MUST YAN VS CD FROM ESTRELLA & SAN MIGUEL SUB-AVA'S

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J. LOHR
VINEYARDS & WINES

SUMMARY COMMENTS

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- Vineyard derived Cabernet color (CD) is a focus (quality over quantity)
 - Likely CD Enhancers –
 - Pressure bomb guided irrigation (higher stress set points)
 - Lower nitrogen status (lower than current recommended levels?)
 - Appropriate fruit zone light environment
 - CD Diminishers
 - Elevated juice YAN's (increase in green flavors)
 - High density canopies (increase in green flavors)
 - Well watered vines

J. LOHR
VINEYARDS & WINES

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JERRY REAUGH

WATER CONSULTANT, J. LOHR VINEYARDS & WINES

J. LOHR
VINEYARDS & WINES

Supplemental Water

Essential Element to Achieve
Sustainability

BVB Blended Water Project

J. LOHR
VINEYARDS & WINES

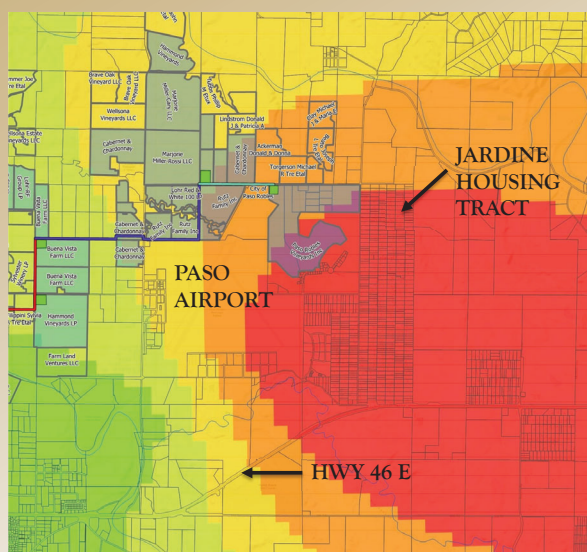
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There is Available Water **Today!**

- Paso Robles Treated Water
 - 1,000 - 1,500 AFY maybe more
- NACI Water
 - 4,000 - 6,000 AFY maybe more
- Blended Water to reduce salts

J. LOHR
VINEYARDS & WINES

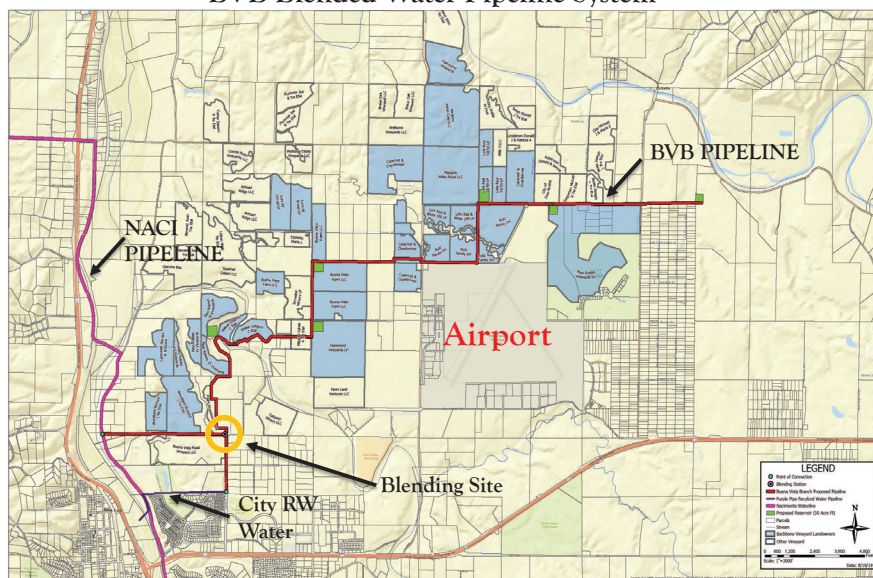
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BVB Blended Water Pipeline System

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OHR
VINEYARDS & WINES

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Amazing Benefits of Supplemental Water

- Red & Orange Zone pumpers greatly reduce groundwater pumping by **50%** to **80%**
- Red & Orange Zone pumpers irrigate with Supplemental Water
- Supplemental Water a hedge against negative impact on pumpers and to the local economy
- The entire Basin benefits, costs will be shared, all pumpers will remain under GSP Allocation

J. LOHR
VINEYARDS & WINES

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Help us
build this
Project!

We can do this together.

J. LOHR
VINEYARDS & WINES

JERRY LOHR

FOUNDER AND CFO, J. LOHR VINEYARDS & WINES

J. LOHR
VINEYARDS & WINES

J. LOHR GROWER SEMINAR — JULY 10, 2019

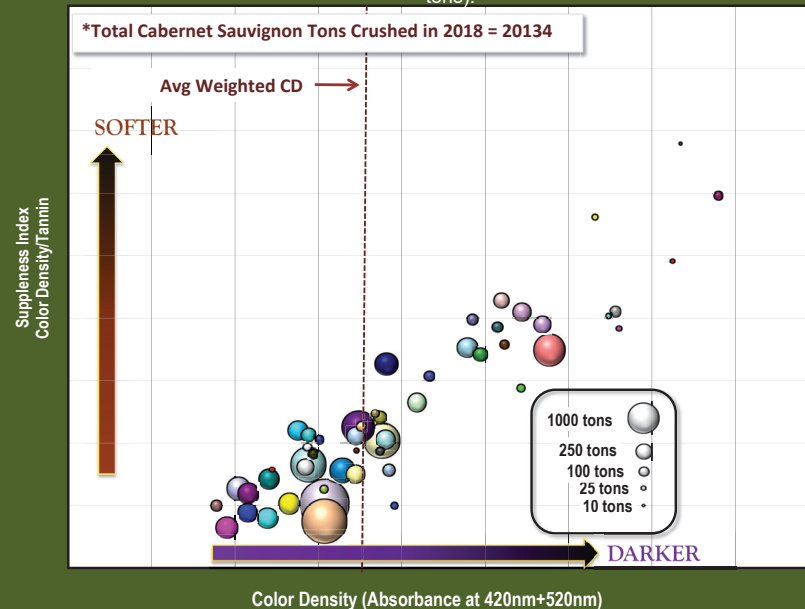
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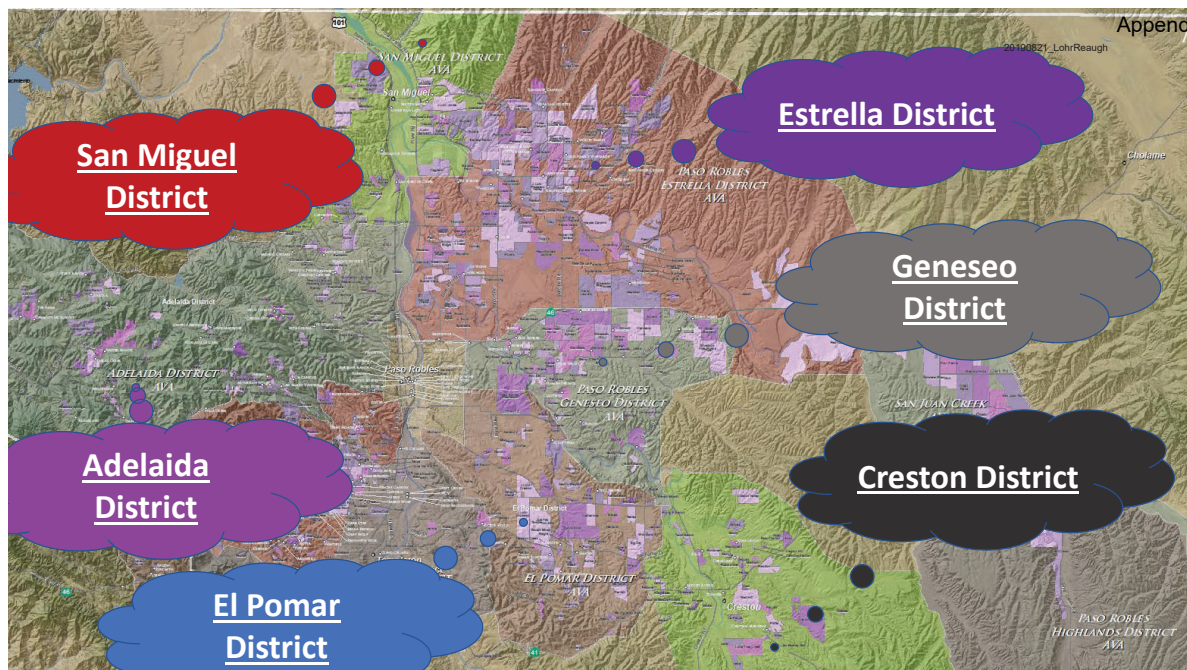
J. LOHR
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2018 Cabernet Sauvignon Vineyards Color (bubble size represents total tons).

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J. LOHR
VINEYARDS & WINES





Paso Basin Aerial Groundwater Mapping Pilot Study



Paso Basin to Utilize Electromagnetic Measuring Technique to Map Local Aquifer System

The San Luis Obispo County Flood Control and Water Conservation District will conduct a survey of our local aquifer systems using the Aerial Electromagnetic (AEM) method starting mid-October 2019 in the Paso Robles Basin. This will provide a more complete picture of the groundwater basin for more informed decisions with our water in the future.

The surveying method uses instruments mounted on a helicopter, which will fly approximately 497 line-miles in a strategic pattern approximately 100 feet above the ground to collect measurements down to 1,000 feet below the land surface. The survey will send and receive signals that maps out the subsurface geology and groundwater locations in the Paso Robles Basin. The 3 to 5 day study will take place in two areas of the Paso Robles Basin, on the east side of the valley, and the area near Highway 46 and Highway 229 by Creston and Whitley Gardens.

Informational Presentations

8/13/2019, 9:00 AM: Board of Supervisors Meeting

8/21/2019, 4:00 PM: Paso Basin Cooperative Committee

8/21/2019, 7:00 PM: Creston Advisory Body

8/28/2019, 7:00 PM: San Miguel Advisory Council

9/4/2019, 7:00 PM: Shandon Advisory Committee



Current Status and Next Steps

- In August and September 2019, the District is providing an informational overview on the Pilot Study, meeting dates and times are listed above.
- The flight path will avoid metallic structures (causes interference in the data set); hence the flight areas will avoid urban areas, vineyards, powerlines, etc.
- This project does not pose a risk to health or safety.
- The very low magnetic field is comparable to standing 1 foot away from your toaster for a few seconds, as the helicopter flies over.
- Survey results will be presented in 2020. Stay tuned!

To get involved please visit: SLOCounty.ca.gov/PW/PasoBasinPilotStudy

September 27, 2019

San Luis Obispo County Paso Robles Groundwater Subbasin GSA

County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

Dear SLO County Paso Robles Subbasin GSA,

Re: Comments from the Estrella-El Pomar-Creston Water District regarding the Paso Robles Groundwater Subbasin GSP

In 2017, the Estrella El Pomar-Creston Water District (EPCWD) was established under the California Water Code (Water Code §§ 34000 et seq) to contribute to the solutions needed to address the Paso Robles Groundwater Subbasin overdraft. EPCWD's primary purpose was to become a Groundwater Sustainability Agency (GSA) and participate in the Groundwater Sustainability Plan (GSP) process.


Not only were the members of the EPCWD committed to help bring the Paso Subbasin into Sustainability, they also committed themselves, through self-assessment, to pay for a major portion of the GSP development. The graphic below shows EPC's commitment to pay for 29% of the costs.

Paso Basin MOA Terms		
GSA	Recommended Voting / Cost Share	
	Current GSAs/ Without EPCWD	With EPCWD/ Upon County Action
County of SLO	61%	32%
City of Paso Robles	15%	15%
Shandon-San Juan Water District	20%	20%
San Miguel CSD	3%	3%
Heritage Ranch CSD	1%	1%
If formed: Estrella-El Pomar-Creston Water District	--	29%
TOTAL	100%	100%

Minimum Voting Threshold: 67% Affirmative

* *Exceptions requiring unanimous vote*

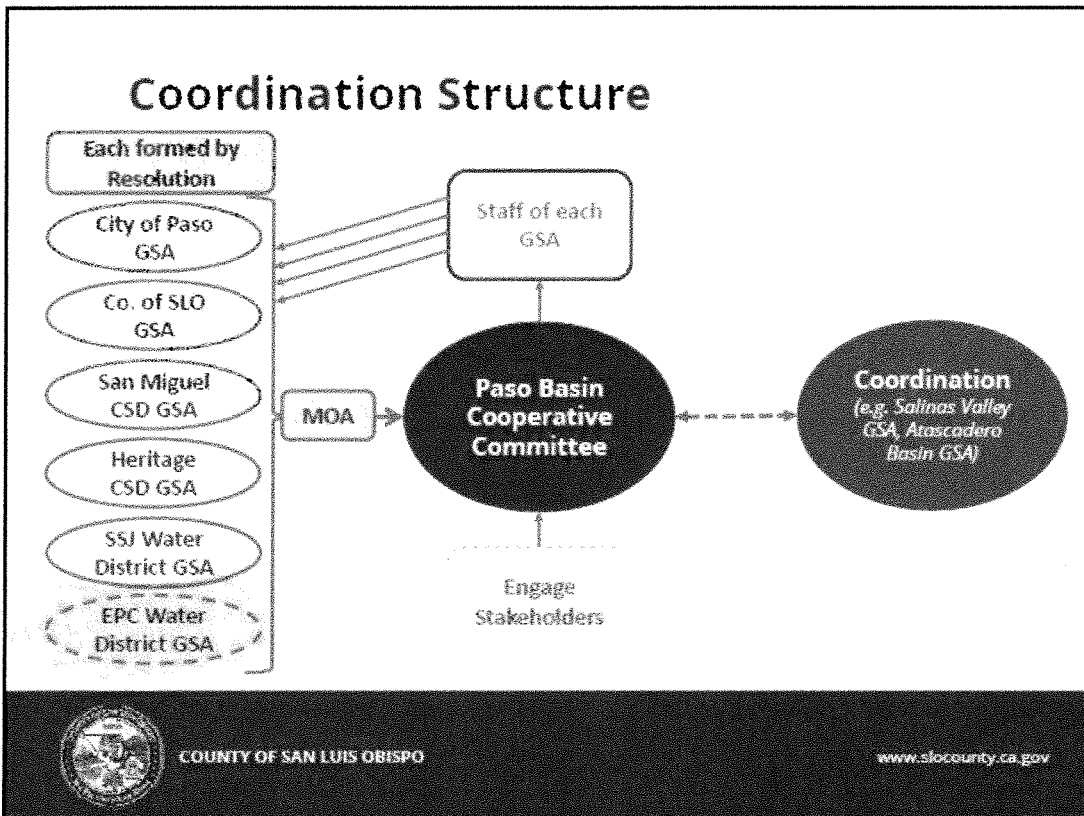
- * Recommendation to amend MOA
- * Recommendation to adopt GSP



COUNTY OF SAN LUIS OBISPO

www.slocounty.ca.gov

In September 2016, a group of “Eligible Entities” started meeting to determine how the Paso Robles Groundwater Subbasin was going to prepare the GSP required by the State of California. It was well understood at the time that the EPCWD was forming with the intention of becoming a GSA. For eight months the “Eligible Entities” met on a regular basis. Dana Merrill and Jerry Reaugh, representing the forming EPCWD, were invited to these meetings, participated extensively in these meetings and helped craft the document now known as the Memorandum of Agreement (MOA). The graphic below, from a SLO County presentation, is indicative of EPCWD’s inclusion in the process.



EPCWD intends to document in this letter the intentional exclusion of our Water District from the GSP process and the complete failure of the County GSA to satisfy the outreach and dialogue requirement with agricultural pumpers. It is important to address our concerns now as the GSP moves towards adoption and implementation. Real choices and actions will be made in the implementation process and it is essential that those who will be asked to sacrifice the most will be included in the decision-making process.

The GSP as proposed in its final draft is a vague document which postpones any meaningful decisions and actions to the future. The organizational structure necessary for the future implementation of the GSP is absent and the various GSAs are granted much autonomy. Some agricultural interests are

represented by the Shandon/San Juan Water District which accounts for 34% of agricultural pumping in the Subbasin¹. What about the other 66% of agricultural pumping in the Subbasin?

Agricultural pumpers must have a “seat at the table”.

The Estrella-El Pomar-Creston Water District is concerned about the systematic, intentional and perhaps predatory exclusion by County officials of a legitimate and consequential stakeholder group from the GSP Process. EPCWD represents 44% of agricultural pumping in the Subbasin and is the largest group of pumpers.

Attachment A chronicles the long history of EPCWD’s commitment to the GSP and the County’s support for EPCWD being included as a GSA. Initially, the County Board of Supervisors was supportive of our work and even encouraged the district formation. The EPC was listed as a party to the MOA. County Supervisors voted at least three times (5-0) in support of EPC becoming as GSA. After considerable effort and expense (over \$200,000 of our members funds) EPCWD was formed in December, 2017 as a California Water District. EPCWD met all the requirements of the MOA to become a GSA.

Up until 2018, our EPCWD efforts aligned with San Luis Obispo County established policies. The County said repeatedly, “The County acknowledges that landowners and/or registered voters may prefer to form an eligible entity to ensure their representation on a GSA. The County supports landowner driven eligible entity formation processes”.² Yet in the final hours, the San Luis Obispo Board of Supervisors reversed direction and voted to deny EPCWD GSA status and consequently excluded the largest group of groundwater pumpers from the GSP Process.

Since formation, EPCWD has operated as a water district with our members successfully self-accessing ourselves by passing two Prop 218 votes, raising over \$300,000. These funds have allowed EPCWD to hire, in cooperation with the Shandon-San Juan Water District, a hydrogeologist who has participated in and contributed to the GSP technical committee. Both Districts have also jointly funded an economic study that will evaluate the potential economic impact the GSP might have on our local economy and community. EPCWD has remained engaged in the GSP process but with limited opportunity to influence decision making.

Attachment B reveals the extent of County official’s effort to target and exclude the EPCWD. These terms were imposed on EPCWD as conditions for EPC’s continued existence as a water district. It is clear that this was a predatory, overt and systematic effort to deny EPCWD and its members the right to represent their interests in determining how the Paso Robles Groundwater Subbasin is going to be managed for decades to come. It appears the EPC’s misconduct was to try to be a GSA and to work alongside the rest of Subbasin stakeholders to bring the Subbasin into sustainability.

Even more egregious than EPCWD’s exclusion, the County GSA has neglected all agricultural pumpers within their purview. The County GSA has failed its obligation to actively seek the involvement of agricultural stakeholders. This is contrary to the intentions of the SGMA Law and particularly troublesome when considering that the so-called County “white-areas”, which includes the EPCWD area, represent 66% of groundwater pumpers. The County has never held an outreach meeting with the irrigated agriculture community. Not a single meeting or open forum for free discussion among irrigated

¹ Agricultural pumping accounts for 90% of all groundwater pumping in the Subbasin, GSP Chapter 6, Table 6-5

² SLO County SGMA Strategy, revised March 7, 2017, Policy Statement 3b. Membership and Participation on Governing Boards, 2nd bullet point

agricultural stakeholders and public officials has been held by our GSA. A 3-minute speaking time slot during “public comment periods” at Cooperative Committee Meetings does not constitute outreach. County officials have never attended a single EPCWD meeting. One of the cornerstones of SGMA is stakeholder involvement and the necessity of an inclusionary process.

In their own words, the County says, “the County advocates for fair and equitable representation in the decision making process”.³ “Fair and equitable representation could be accomplished in a number of ways, such as through inclusion of appointed seats on a GSA Board for certain beneficial user interests ... or through a robust public process and formation of representative advisory committees, and should be negotiated by the eligible entities in each basin.”⁴ When an advisory position representing irrigated agriculture was proposed, County officials opposed.

We have not been given one meeting in which the County GSA has met with the Ag Community, no committees, no open forum or dialogue, and no advisory position. The irrigated Ag Community in the County’s GSA has been ignored.

EPCWD believes that the County Flood Control District operating as one of the Paso Robles Groundwater Subbasin’s GSAs, has been derelict in their obligation to engage the irrigated Ag Community and make sure that the irrigated agriculture community interests have been addressed.

EPCWD feels that those who are going to be affected the most must be included in the process.

Agricultural pumpers must have a “seat at the table”.

Regards,

A handwritten signature in black ink, appearing to read 'Dana Merrill', with a long horizontal line extending to the right.

Dana Merrill
President
Estrella-El-Pomar-Creston Water District

³ SLO County SGMA Strategy, revised March 7,2017, Policy Statement 3b. Membership and Participation on Governing Boards, 3rd bullet point

⁴ SLO County SGMA Strategy, revised March 7,2017, Policy Statement 3b. Membership and Participation on Governing Boards, 4th bullet point

Attachment A

Chronology:

- **Spring 2016** – Landowners in the Shandon/San Juan Area start organizing to form their own opt-in, Water District with the intention of being a GSA.
- **August 2016** –SLO County forms “Paso Basin Eligible Entities GSA Meetings”. This group includes all agencies that might want to become a GSA. This group included City of Paso Robles, SLO County, Heritage Ranch, San Miguel CSD, Atascadero Mutual Water Company, Templeton CSD, Monterey County, and the proposed Shandon San Juan WD and along with other interested parties.
- **September 2016** – the emerging Estrella-EL Pomar-Creston Water District is invited to join the Paso Basin Eligible Entities GSA Meetings.
- **October 2016** – LAFCO approves the formation of the Shandon/San Juan Water District, SSJ WD. This Water District is a voluntary, opt-in, California Water District.
- **October 2016 through May 2017** – the Paso Basin Eligible Entities GSA Meetings continues to meet with participation of both of the proposed WD’s. The MOA, Memorandum of Agreement, is drafted and finalized after considerable work and many revisions. Members from both Water Districts participate extensively in the drafting and re-drafting of the proposed MOA.
- **March 7, 2017** – SLO County updates its SGMA Strategy Document which recognizes both SSJWD and EPCWD as potential participants in the MOA. Quote from SLO County proceedings, “the County supports landowner driven eligible entity formation processes”.
- **April 2017** – LAFCO approves the formation of Estrella-EL Pomar-Creston Water District (EPCWD). This Water District is a voluntary, opt-in, California Water District. The vote was 5-2 in favor.

- **May 16, 2017** – SLO County Board of Supervisors votes 5 to 0 to become a GSA. Supervisor Compton was part of this vote. Language in their resolution includes several references to EPC becoming a Water District and the County relinquishing GSA control over EPCWD's lands.
- **May, 29 2017** – The Basin MOA, Memorandum of Agreement, is finalized. The MOA forms a "Cooperative Committee" that will be responsible for creating a single GSP for the Paso Robles Groundwater Basin. It has five members: City of Paso, SLO County, Shandon/San Juan Water District, San Miguel CSD, Heritage Ranch CSD. The EPC Water District is not initially part of the MOA as it is not yet a Water District or a GSA. The MOA includes detailed provisions that will allow EPCWD to join the MOA once EPCWD becomes a GSA. For EPCWD to become a GSA, the EPCWD must be formed as a Water District by December 31, 2017 and SLO County Supervisors will have to vote to relinquish their authority over the lands that are in the EPCWD. This passes the Board of Supervisors by a vote of 5-0.
- **June 2017** – The proposed Shandon/San Juan Water District becomes a California Water District and applies successfully to DWR to become a GSA before the DWR deadline of June 30, 2017.
- **July & August 2017** – The five eligible agencies approve and sign the MOA including the County of San Luis Obispo.
- **October 18, 2017** – The Cooperative Committee holds its first meeting.
- **December 8, 2017** – EPCWD completes its district formation process and LAFCO files the Certificate of Completion. This formation meets the requirements established by the MOA.
- **January 2018** – EPCWD applies to the State DWR to become a GSA. The application is denied by DWR until SLO County relinquishes control.
- **March 6, 2018** – SLO County Supervisors votes 3 to 2 to **NOT** relinquish GSA authority, thus denying EPCWD GSA status and reversing months of understanding

and support for EPCWD to become a GSA. Supervisor Compton, as a LAFCO Commissioner, voted to approve formation of EPCWD whose primary purpose was to become a GSA. Compton then reversed her position and voted against EPCWD becoming a GSA.

- **January through December 2018** – EPC Water District conducts normal water district activities including numerous Board Meetings, holding joint Board Meetings with the Shandon/San Juan Water District, signing a Cooperation Agreement with the Shandon/San Juan Water District, partnering with the S/SJ WD to hire a hydrogeologist as a consultant, and most significantly funds the District with Prop 218 assessments of over \$200,000. The 2019 Prop 218 Assessment of Members has also been completed raising an additional \$100,000.
- **November 15, 2018** – LAFCO holds an extensive hearing to review EPCWD's status and to determine if EPCWD has met its Conditions of Approval. EPCWD presents numerous documents and public testimony in support of EPCWD's successfully meeting LAFCO's Condition of Approval. LAFCO Staff also supported the Conditions of Approval had been met. Several LAFCO Commissioners expressed their belief that EPCWD has not met its Condition of Approval and that EPC WD should be dissolved. A further Hearing was scheduled.
- **Winter, 2018/2019** – EPCWD attorneys and LAFCO Attorney have several meetings, communications and negotiations. LAFCO demands that EPCWD submit to very restrictive terms, otherwise LAFCO will dissolve the Water District. These terms are presented in Appendix A.
- **February 21, 2019** – LAFCO holds its second Hearing. Several Commissioners wanted the Water District dissolved. EPCWD acquiesced to the new conditions imposed by LAFCO. LAFCO voted 4-3 to approve EPCWD continuing as a Water District.

Attachment B

Replacement Language to Condition 11

1. The EPCWD shall be a district as allowed under the California Water District Law Code (Water Code §§ 34000 et seq.) and as determined by and subject to LAFCO's approval (Resolution 2017-02).
2. The LAFCO approval does not grant to EPCWD any additional power or authority beyond the law.
3. The EPCWD shall not become a Groundwater Sustainability Agency (GSA) as provided for in the Sustainable Groundwater Management Act ("SGMA", Water Code §§ 10720 et seq.) prior to the approval by the State Department of Water Resources ("DWR") of the Groundwater Sustainability Plan ("GSP") or January 31, 2022, whichever is earlier.
4. The EPCWD shall not become a party to the Memorandum of Agreement ("MOA") entered into by the GSAs within the Paso Robles Groundwater Basin in September 2017 prior to the approval by the DWR of the GSP or January 31, 2022, whichever is earlier.
5. The EPCWD shall not become a member of the Paso Basin Cooperative Committee established under the current MOA.
6. The District shall comply with SGMA and the subsequent GSP as implemented by the existing GSA with authority in its service area.



Paso Robles Groundwater Cooperative Committee

September 26, 2019

Dear Committee Members:

A great thank you is in order to the Paso Robles Subbasin representatives and other GSA's for the tremendous amount of work that has been put in to drafting the GSA. Creston Valley Vineyards has been a local SIP Certified grower in this community for over 20 years and active member in the Estrella-El Pomar-Creston Water District (EPC WD). As a SIP Certified vineyard, water conservation is of the utmost importance. Pumping reports are submitted annually and succession plans are made for future use. Along with the rest of the Agriculture community, we find it is the responsibility of all groundwater users in the basin to help eliminate the overdraft and ensure long-term groundwater sustainability. The purpose of this letter is to suggest possible improvements to the GSP that will increase its effectiveness, increase the likelihood that the Department of Water Resources will approve the GSP, and reduce the risk of a future groundwater adjudication. Thank you in advance for reading through the following comments and suggestions.

1. As a whole, the GSP is unclear as to what exactly the GSAs will tangibly do to ensure the elimination of the current overdraft in the Paso Robles Basin. This not only risks the health of the basin, but it increases the chances that the California Department of Water Resources will not approve the GSP. The GSP needs to clearly state what and how the GSAs will act.
2. A hallmark of SGMA is the call for including all stakeholders in the decision-making process. The County GSA, however, did not hold any outreach meetings with the Ag Community. Since the EPC WD represents 44% of the agriculture based pumped water, there should be more active involvement in developing the GSP. Successfully reducing the Ag pumping to benefit the groundwater basin will have to include the understanding and support of the Ag Community.
3. Groundwater pumping allocations, monitoring, and enforcement need to be clearly planned out. The implementation process will be doomed to failure if those who must sacrifice are not included in the decision to cutback pumping. Water use should be measured by meters to ensure accuracy. Violations must be enforced through both civil orders and penalties.
4. Most of the projects listed in the current GSP are purely conceptual. Moving forward, the GSP needs to explain how it will ensure and promote the construction of projects generating significant new useable water.
5. The risk of growth in *de minimis* groundwater users needs to be fully addressed. The GSP notes that the current number of *de minimis* users is significant and that their growth could warrant regulation in the future, but it does not say how it will ensure that the growth will not eat into the rights of other existing users. Perhaps a cap should be placed on the total number of *de minimis* users, requiring that any growth is acquired voluntarily from others.



In closing, it is our hope here to help better develop the drafted GSP so that all parties involved may have appropriate representation. If there are any questions or points that need clarifying, we would be more than happy to continue this dialogue. All of your efforts are greatly appreciated.

Sincerely,

A handwritten signature in blue ink, appearing to read "C. Collins", with a long, sweeping horizontal line extending to the right.

Carter Collins
General Manager
Creston Valley Vineyards



Paso Robles Groundwater Cooperative Committee

September 26, 2019

Dear Committee Members:

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Sincerely,

A handwritten signature in blue ink, appearing to read "CA", followed by a long, horizontal, wavy line.

Carter Collins
General Manager
Paso Robles Vineyards, Inc.



Paso Robles Groundwater Cooperative Committee

September 26, 2019

Dear Committee Members:

A great thank you is in order to the Paso Robles Subbasin representatives and other GSA's for the tremendous amount of work that has been put in to drafting the GSA. Collins Vineyard has been a local SIP Certified grower in this community for over 20 years and active member in the Estrella-El Pomar-Creston Water District (EPC WD). As a SIP Certified vineyard, water conservation is of the utmost importance. Pumping reports are submitted annually and succession plans are made for future use. Along with the rest of the Agriculture community, we find it is the responsibility of all groundwater users in the basin to help eliminate the overdraft and ensure long-term groundwater sustainability. The purpose of this letter is to suggest possible improvements to the GSP that will increase its effectiveness, increase the likelihood that the Department of Water Resources will approve the GSP, and reduce the risk of a future groundwater adjudication. Thank you in advance for reading through the following comments and suggestions.

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VITICULTURAL MANAGEMENT INC.

In closing, it is our hope here to help better develop the drafted GSP so that all parties involved may have appropriate representation. If there are any questions or points that need clarifying, we would be more than happy to continue this dialogue. All of your efforts are greatly appreciated.

Sincerely,

A handwritten signature in blue ink, appearing to read "C. Collins", followed by a long, horizontal, slightly wavy line.

Carter Collins
General Manager
Collins Vineyard Inc.

September 26, 2019

**Paso Robles Groundwater Sub-basin Cooperative Committee
San Luis Obispo County Paso Robles Groundwater Sub-basin GSA**

1055 Monterey Street
San Luis Obispo, CA, 93408

Hello SLO County GSA

Re: Comments to the Paso Robles Groundwater Sub-basin GSP

On behalf of the Independent Grape Growers of the Paso Robles Area(IGGPRA), with almost 200 wine grape growers, wineries and business associates, I appreciate the opportunity to make some comments for the final version of the Paso Robles Groundwater Sub-basin GSP.

Introduction

In 2001, IGGPRA was formed by a group of wine grape growers to help small to medium size vineyard owners understand how to plant and cultivate high quality grapes for sale to the wineries. At the time, there were about 60 wineries in the area, while there are now over 300. Today, the Association is dedicated to the advancement of superior grape growing in the Paso Robles Viticultural Area. Through our 8 Seminars per year, marketplace listing service and other critical services, we are able to provide our members with important grape growing methods, best practices and updates on how to most effectively use the water resources we have available.

IGGPRA is NOT a political organization and we do not entertain speakers with political affiliations or agendas. However, our wine grape growers and wineries will be strongly affected by any decisions made about the restrictions on groundwater use. WE ONLY ASK THAT THE AG COMMUNITY BE ADEQUATELY REPRESENTED IN ANY COMMITTEE MEETING AND DECISIONS.

So far, that does not appear to be the case

With thousands of planted acres, our growers have a large stake in the economic impact of any decisions made.

Comments on the GSP

1. With an approx.. 14,000 Acre feet per year of over draft, there is no clear picture of what the GSP plans to do about it. The Paso Robles Blended Water Project is an example of how a local community is trying to reduce the over draft, but with no involvement or support from the County.
2. There are other “real” projects that could be implemented in the area, but we have heard nothing from the GSP on proposed solutions. The County remains silent.
3. The County’s so called “white area” accounts for 66% of agricultural pumping. This significant group of groundwater pumpers have many issues that need to be addressed

by the GSP. HOW WILL THESE ISSUES BE HEARD, IF THERE IS NO AG REPRESENTATION??!!

4. The GSP, so far, appears to be full of conjecture, concepts and very few concrete plans for sustainability. Every year, groundwater levels will continue to decline, so “pushing the ball down the road” is not going to solve the problem

Suggested/Needed Actions

- A. First and foremost, there needs to be Agricultural representatives “at the table” of decision making. Ie. People who understand Ag, wine grape growing and the economic effects they have on the community
- B. The GSP must have specific and actionable plans for use of:
 - a. Available local water resources – Nacimiento allocation, Blended Water Project
 - b. Accessing State Water Project resources to recharge the aquifer
 - c. Reasonable, economically viable, water conservation requirements
- C. Provide clear direction on how well water pumping will be monitored -- either by metering, crop type/acreage or formula.
- D. The GSP needs to have timeframes for each action that will be taken. Keeping water stakeholders in limbo for too long could well cause a major exodus from the area and affect the overall economy.

I trust my points of concern and suggestions have been clear. The Ag community just wants to be part of the GSP process and decision making. Adding our Voice will only help the GSA make more informed decisions and represent a broader part of the community.

Thank you for this opportunity to submit comments.

Best Regards

Joe Irick

President

Independent Grape Growers of the Paso Robles Area

A 501c3 non profit organization



Comments on Paso Robles Basin GSP 9/26/19

Dana Merrill, Personal comments

The GSP process has a number of structural deficiencies which put agricultural landowners at a severe disadvantage that is disproportionate to their needs and use of groundwater. Economically viable agricultural is by necessity in the Paso Robles Basin “irrigated”; dryland agriculture cannot produce sufficient economic return. Irrigated lands can and often do generate significant income to owners, operators, cities and government entities. Pumping cutbacks will impact that income without sound strategies.

The GSP in process is too heavily dependent on cuts to agricultural pumpers and barely mentions projects for supplemental water. This despite the fact that property owners have paid to reserve rights to State Water for many years, have had rights to Lake Nacimiento water which to date has been allocated by the County to urban entities nearly exclusively and while other projects such as raising the San Luis Reservoir on the upper Salinas River have been mentioned, little in the way of progress has been made to actually take action to obtain its water. The newest positive development comes from private efforts by landowners interacting with the City of Paso Robles to utilize its recycled water, which may include blending with Nacimiento water that will further extend the supply as well as mitigate quality issues with the source if used as in lieu agricultural pumping. It has been frustrating to see no County Water Resources efforts to get projects going and even more frustrating to see some of our Boards of Supervisors actually seek to shut down efforts to form water districts, who have pledged funding as well, to take on the job.

At this point the GSP may be within months of being completed, subject to be approved by the four GSAs and submitted to the State. Whether it is sufficiently robust to be approved is anyone’s guess at this point and the SGMA law is so new, there is no historical standard of actual approval. Reading through hundreds of pages it is clear that there is much work to do in future years even with approval. A few that come to mind :

1. Increase the number of observation and monitoring wells: A number of the wells listed are very shallow by today’s standards and are unlikely to be viable and still being used a decade from now. Dedicated, smaller diameter wells used only for monitoring and not commercial pumping has been mentioned for years by County Water Resources, yet none to my knowledge have ever been drilled. Follow up on areas with data gap, many of us have worked to help sign up production wells that could contribute data without delay.
2. Subareas are poorly understood and undefined generally. Just where are the boundaries if it may be that pumping limits are to be imposed that are not equal across the entire basin?
3. Political decisions have impacted pumping. The original emergency ordinance dating back to 2012 introduced government action as a major force in the process. In the intervening years, times when the ordinance lapsed saw significant new irrigated lands developed by landowners

fearful that it was the last chance to do so. This essentially set aside supply and demand forces for irrigate crop development and made reacting to government policy the main motivator

4. The GSP has had no economic analysis component which would examine what our economy could pay for supplemental water and could help establish where the cost becomes simply higher than what economic return is generated. The economic impact extends far beyond the specific irrigators' interests as many other industries ranging from equipment sales to tourism to property and sales taxes will be impacted by pumping cutbacks. Cutbacks may have to be part of the resolution but their impact should be quantified economically.
5. The future must have more inclusion of those stakeholders left out of the process thus far. That includes most of the irrigated agricultural community. There was not one meeting held in the County GSA for the benefit of its landowners or irrigators. Other required meetings of the multiple GSAs and the comment period at the beginning of County supervisor meetings were judged adequate. This approach leaves out those impacted the most and calls into question how successful a GSP can be if the majority of the pumpers had no role in the process. It also leaves out significant expertise in water related matters that our world class agriculturists would bring to the table.
6. A word must be said about irrational fear of conspiracies by many in charge of the process. Ranging from fear of water export (which is banned by regulation and the GSP law itself in the Paso Robles Basin) has hurt chances for a positive, collaborative approach among stakeholders. This needs resolution beyond simply banishing a majority of agricultural pumpers from the process as has been done thus far. Encouraging "buy in" is what is needed, not expulsion from the process, for SGMA to be effective.
7. Creativity in solutions needs to be expanded. Incentivize short term and long term fallowing that allows individual landowners to utilize and mechanisms for their compensation for doing so. Utilize market forces so that low economic return discourages use while it encourages conservation and efficient use. Remove requirements to irrigate in order to maintain pumping rights which is still in effect as a regulation. If it costs more to irrigate a higher use crop, then let the farmer decide whether it is economically justified, do not ask more efficient water use crops to subsidize those that require more irrigation.
8. State Water Bulletins dating back to the early 1950's identified the likely need for supplemental water. In many respects, we actually have required less water that was projected in those years. Water use was projected to exceed 200,000 acre feet per year in the combined Paso Robles and Atascadero Basin and we have pumped less than half that annual total it appears. It is fortunate as it turned out but the fact that the area was projected to develop economically on many fronts led to forecasts of more water supply needs. It was not a surprise that water use increased.

Although I can go on listing deficiencies in the GSP and its process, the job remains to be done. If we have the cumulative will to succeed and work more collaboratively in the future, we can find a way to

balance our Basin. Hopefully a new start can be made in 2020 for more inclusion and collaboration. If not, it is hard to see how our SGMA effort will ultimately be successful.

September 24, 2019

TO: The Paso Basin Cooperative Committee

RE: Comments to be considered for the final draft of the PBCC

My family has been a landowner in the Paso Robles Groundwater Basin for over a decade. We have been closely following the development of the SGMA-directed Groundwater Sustainability Plan.

The irrigated agricultural community has been largely excluded from the process. The County GSA represents 66% of irrigated agriculture and the County GSA has completely failed its responsibility to seek agriculture's involvement in the GSP Process. The County failed to create any sort of ag advisory position in their GSP process. The County has not held a single outreach meeting with the Ag community. County officials have attended none of the EPC WD meetings and very few if any of the SSJ WD meetings. Also, the County has targeted and specifically excluded the EPC WD from participating directly in the GSP. Irrigated Ag needs a "seat at the table".

The GSP is a weak document that defers meaningful actions and decisions to the future. It's not clear how and when the GSP implementation process will begin and who will run it. There is no sense of urgency. Do we want the Subbasin continue to decline as we ponder what to do?

There is no clear management framework for how implementation decisions are going to be made. Who gets to vote? Who gets to veto? Who gets to cutback pumping?

Pumping cutbacks are coming but we don't know where, when, or how much. Predictable and stable rules are essential for farmers to plan and make informed decisions.

The GSP provides little direction on how users in the Subbasin are going to reduce groundwater pumping and/or pursue additional sources of new water. It seems that projects are left for folks other than our water authorities to do. Why have these agencies if they are unwilling to do anything?

There seems to be no urgency in pursuing and gathering the essential data necessary for informed decisions about basin management.

Best regards,
Anthony Riboli

- Riboli Family of San Antonio Winery

The GSP needs to have strong monitoring, reporting and enforcement regulations. Reporting of groundwater pumping should be measured by water meters, should be mandatory and should start immediately.

De minimis users are largely give a pass in the GSP. However, the GSP should address how to prevent unlimited growth of this class of pumpers and require this group to acquire their own sources of water.



SAN LUIS OBISPO COUNTY FARM BUREAU

4875 MORABITO PLACE, SAN LUIS OBISPO, CA 93401

® PHONE (805) 543-3654 ▪ FAX (805) 543-3697 ▪ www.slofarmbureau.org

September 27, 2019

Paso Basin Cooperative Committee
City of Paso Robles
San Miguel Community Services District
County of San Luis Obispo
Shandon-San Juan Water District

Submitted via pasogcp.com

RE: Draft Paso Robles Groundwater Sustainability Plan

Dear Committee Members & Staff:

San Luis Obispo County Farm Bureau (Farm Bureau) thanks committee members and staff for their continued work to create a plan under the complex Sustainable Groundwater Management Act (SGMA). As you know, many of the 800 Farm Bureau members we represent will be directly impacted by the Paso Robles Groundwater Sustainability Plan (GSP). The \$1 billion in annual crop and livestock sales produced in San Luis Obispo County drives our local economy, and the GSP must reflect an understanding by our local leaders that partnering with agriculture is essential to make meaningful progress towards sustainability.

Farm Bureau acknowledges that the Basin, or parts of the Basin, are in decline, and that workable, targeted solutions will come best from collaboration with all stakeholders. Clearly, there is no one, all-inclusive project, requirement, or regulation that can solve the overdraft conditions within the Basin.

We believe the Basin needs to be better defined by gathering more scientific data throughout different areas of the Basin over an extended period of time. It is not possible to address the Basin's challenges without accurate data, and we recognize the GSP as the framework for gathering data needed to develop real solutions. The GSP is a "roadmap" that must be flexible and able to change over time as new data becomes available. Currently, there are simply many unknowns, such as needed watershed data. Recognizing that a perfect picture of the Basin may never be attained, we still recommend the continuation of geographical data collection and analysis so that the Basin is as accurately defined as possible. This will help ensure groundwater users in noncritical areas do not incur unsubstantiated cuts that will potentially be economically disastrous yet do nothing to solve the problem.

As an organization made up of diverse interests, Farm Bureau knows first-hand the importance of having everyone at the table for discussion and especially when it comes to action. Exclusion of affected parties is a recipe for failure, and never more so than when it comes to water. This GSP, understandably, focuses on the largest water users, agriculture, but does not clearly bring them to the discussion. We strongly recommend that there be an open seat for irrigated agriculture on the Paso Basin Cooperative Committee, and ultimately, on whatever agency is charged with implementing the GSP. If all of agriculture is committed to working together, we are confident that meaningful solutions will be uncovered. But, if the responsibility to address the Basin's water issues is placed solely on agriculture, or on any single segment of agriculture, it will cripple the economic vitality of Paso Robles and the region.

There can be viable solutions achieved in the GSP through a combination of more data on pumping practices, increased adoption of Best Management Practices at the farm level, and the inclusion of realistic projects to introduce new water to the basin. In addition to the supply of potential existing resources like Nacimiento and State Water, and municipal recycling projects being developed, the development of streamflow capture projects

could be key components in the journey towards basin balance. It is crucial to have water supply portfolio diversification and cooperative efforts among agencies to develop water sources. Agriculture is dedicated to doing our part, but we alone cannot solve the problem.

Farm Bureau looks forward to continuing being a partner in and helping to improve and refine the GSP so that all agriculture can continue to contribute to the economic vitality of the region.

Sincerely,

A handwritten signature in black ink, appearing to read "Hilary Graves", is written over a light gray rectangular background.

Hilary Graves, President
San Luis Obispo County Farm Bureau

Background:

During the last thirty years the City of Paso Robles has experienced substantial population growth associated with an expanse of residential subdivisions accompanied by significant growth in hotel development and historic growth in both retail businesses along with business serving tourist activities. Moreover, developed irrigated agriculture expanded by 30% during the same period.

The growth and expanded development of the city of Paso Robles has resulted in greater consumption of water resources along with the conversion of undeveloped land area into greater use of land for roads and infrastructure. Thus reducing the historic volume of water percolating underground.

Also during this period the rapid growth of irrigated agriculture has converted largely grazing land and dry farmed land into irrigated land. Unfortunately, even after accounting for percolation there has been a net increase in the use of groundwater to accommodate the increase in irrigated Ag acreage.

Offsetting Activity:

A robust program of stormwater capture and percolation into the groundwater would significantly offset the excessive pumping of groundwater associated with the growth of the City of Paso Robles and the introduction of significantly greater irrigated agriculture.

The outline of a plan for a stormwater capture and percolation ponding system must be added to the GSP. The plan must identify the areas where stormwater capture would be diverted and identify the best locations for percolation ponds. Lastly, the plan must identify the cost of developing, creating, and operating the plan. Ideally the County Flood Control and Water Conservation District would manage and operate the plan.

Consider

The Paso Robles Area Sub-basin consists of 436,157 acres.

Assume that 30% of the area is conducive to stormwater capture, which rounded equals 131,000 acres.

Assume that average rainfall over the 131,000 acres is 12 inches on average annually, which would produce 131,000 acre feet of water.¹

Assume only 20% of the average rainfall can be easily captured each year and 30% of that is lost to evaporation in the percolation ponding process. This produces a net of 26,000 AFY of water on average per year percolating into groundwater.

Conclusion

Montgomery & Associates indicates that 14,000 AFY in excess of the annual safe yield is pumped from the Paso Robles Area Sub-basin each year. Conservatively, a well-designed stormwater project would essentially put the Sub-basin in modest annual surplus as long as overall pumping activity is not allowed to grow beyond the availability of the resource.

An essential element of a robust stormwater capture and percolation program is the necessity to properly maintain the receptiveness of the creeks and rivers in order to facilitate capture and percolation. The creeks will need to be properly maintained in order to accommodate the transmission of stormwater into the larger tributaries; and the larger rivers must be relieved of excess sand in order to expose the alluvium layer, which is conducive to percolation. Also, the creeks and rivers must be cleared of excess brush and tree growth. Lastly, as appropriate percolation ponds must be created and maintained. A stormwater capture program must be actively managed and maintained in order to optimize effectiveness.

For Section 3 as appropriate

In 1972 the SWRCB amended the City of SLO's Salinas Dam Permit to impose a "live stream" requirement. This amendment was designed to override certain diversionary rights to ensure minimum flows for fish in the Salinas River. However, in reality the minimum flows have rarely been seen and the actual result, after the amendment, was less water being released from the Dam annually than had been the case under the voluntary release system. With SLO County managing a stormwater capture and percolation program not only will the Salinas River be healthier, but the recharge process would be enhanced. It should be noted that historically the Salinas River as well as lesser rivers and streams were noteworthy for their ability to "flush" our tributaries, but to enhance the level of groundwater. The management of the sub-basin needs to return to this type of activity, which was proved to be essential.

¹ 12 inches per year on 30% of the subject area is conservative in that areas with hills and low mountainous terrain typically produces more measurable rain than flatter terrain.

- All Sections** Early in the GSP drafting process the issue of the lack of explanatory footnotes in various chapters was identified. At that point Montgomery and Associates committed to the inclusion of appropriate footnotes. However, the absence of essential detailed footnotes continues unabated.
- General** The legal definitions of “Overlier” and “Purveyor” relative to groundwater need to be added early in the GSP document.
- Table 3.4** The source of the land use data needs to be identified and footnoted.
- Section 3.4.1** The outcome of the quiet title Court action on June 7, 2019 is important to outline within the GSP as it limits the ability of the defendant purveyors to pump ground water.

<u>Defendant</u>	<u>Perfected Prescriptive Rights</u>
City of El Paso de Robles	1,267.70 AFY
County of San Luis Obispo	310 AFY
San Miguel CSD	177.03 AFY
Templeton CSD	308.9 AFY
Combined	2,063.63 AFY

- Section 3.5** The number of agricultural and domestic wells should be identified and added to this section. This data should be available from SLO County records. Additionally, the number of domestic wells owned by de-Minimus pumpers should be revealed.

The City of Paso Robles Urban Water management Plan (2016) should be reviewed and critiqued in detail - in particular the representations regarding the water rights claimed by the City need to be corrected. Moreover, the very modest annual groundwater rights awarded to the City as a result of the Quiet Title litigation, in which the City was a defendant needs to be disclosed. Additionally, the City of Paso Robles Urban Water Management Plan should be modified in keeping with the judgment rendered by the Superior Court.

The County has land use authority in the unincorporated areas of the county. Accordingly, the GSP must follow the existing water offset ordinance.

Reference is made to the Salinas River Live Stream agreement: This section should include data from the last three years indicating the results of recorded observations. Antidotal observations indicate that recent Salinas River Live Stream observations have been unsatisfactory, and have not involved the release of reservoir water. Also, the GSAs cannot use SGMA to ignore or “skirt” SLO County regulations.

Section 4.7 Identifies areas which are receptive for natural recharge shown on Figure 4-16.

However, this chapter does not discuss the benefits of developing a robust stormwater capture program where feasible.

Moreover, the annual rainfall data are available for the last 100 years and should be added to the GSP document.

Section 5.4 Describes the issue of Land Subsidence. However, the Draft GSP does not indicate how the issue of subsidence measurement should be approached.

Moreover, several months ago Montgomery & Associates committed to providing the Cooperative Committee with the cost of engaging USGS to update the data on subsidence collected in 1997.

To date the Committee has not made a decision on this critical matter.

It is essential that all of the data that the County has received or collected regarding subsidence should be added to Chapter 5.

Section 6.3.2.1 Table 6-3 includes a value for Urban Irrigation Return Flow; however, the table does not include a similar value for rural-domestic Irrigation Return Flow. The latter group essentially represents de Minimus rural land owners who typically irrigate vegetable gardens, fruit trees, etc., and a factor should be included for this group. Essentially, all of their pumped groundwater is returned to the basin through their septic systems.

- Section 6.3.2.4** The sustainable yield estimate shown needs to be reconciled with **section 9.2**.
- Section 6.5.1.1** The City of Paso Robles Urban Water Management Plan needs to be updated based on the Court Judgment limiting groundwater pumping by the City.
- Section 9.2** The basis for the sentence “Because the amount of ground water pumping in the Subbasin is more than the estimated sustainable yield of about 61,000 AFY (see Chapter 6) and groundwater levels”
The representation of an estimated 61,000 AFY needs a footnote describing how this number was determined.
- Section 9.3.1.1** In the second line of this sentence “will” must be replaced by “may”.²
- Section 9.3.2** **Promoting Best Water Use Practices** – includes the following:
- “Optimization of irrigation needs for frost control if sprinklers are used.”
- Note: This concept is flawed in that sprinklers can be easily used for springtime irrigation in violation of rules. Moreover, frost protection can be achieved through wind machines, which do not use water. The GSP should require the phase out of frost protection using water within three years.
- Section 9.3.3** This section is a good start; but it needs to focus principally on major stormwater capture projects as a “residential” focus will yield limited benefits. Conversely, projects focusing on stormwater capture and diversion to recharge locations will provide the most benefit for the groundwater subbasin. Much of the topography of the land over the subbasin is ideal for stormwater capture, which can be easily diverted to locations providing ideal recharge conditions.
- Note: Refer to the discussion on stormwater capture on page 2.

² This change is mandatory!

Section 9.3.4

Voluntary fallowing of land planted to permanent crops will not yield much benefit. The majority of permanent crops over the subbasin are wine grapes many acres of which have been planted in the last several years. Fallowing grape land and replanting in future years is not economically beneficial. Therefore this section needs more study and analysis.

Section 9.5 Projects

Number 2: State Water Project (SWP) is unacceptable and needs to be removed from the list.

Many of the reasons for not relying on additional SWP water are outlined in a June 6, 2018 letter authored by O’Laughlin & Paris LLP. Moreover, some recipients of SWP water will have a desire to inject the water into the groundwater basin, thus altering the ownership and pumping rights to basin water. Contracting for additional SWP water injected into groundwater is a non-starter and will not be allowed!

Note:

At the September 18th meeting of LAFCO the Commission approved the detachment of 33,000 acres from the Shandon-San Juan Water District. Accordingly, that land will be transferred out of the Shandon-San Juan GSA and transferred into the jurisdiction of the SLO County GSA.

Therefore, the applicable maps need to be revised reflecting the transfer before the final GSP is submitted to the DWR.



J. LOHR
VINEYARDS, INC.

September 26, 2019

J. Lohr Vineyards and Wines
6169 Airport Rd.
Paso Robles, CA 93446

Paso Robles Groundwater Subbasin Cooperative Committee
Paso Robles Groundwater Sustainability Agency
1055 Monterey St.
San Luis Obispo, CA 93408

Dear Committee,

We at J. Lohr Vineyards and Wines (JLV&W) want to thank SLO County and the three other GSA's for all their efforts thus far. Our goal in this letter is to suggest improvements in the Groundwater Sustainability Plan (GSP) that will increase its effectiveness, increase the likelihood that the Department of Water Resources (DWR) will approve the GSP, and reduce the risk of a groundwater adjudication.

JLV&W started purchasing bulk wine and grapes from the Paso Robles area in 1981. We planted vineyards in 1986 and built our winery in 1987. We now farm almost 3,000 net vine count (nvc) acres of vineyards and purchase grapes from an additional ~3,000 nvc acres of vineyards. For 25+ years we have had our sales staff, deployed around the United States and Canada, work very hard to build awareness of Red and Rhone wines from Paso Robles. We are a major local employer. My children are all fully immersed in the business.

We recognize that the Paso Robles Groundwater Basin (PRGB) is in overdraft and that it should be the responsibility of all users, including agricultural pumpers, to help eliminate the overdraft and ensure long-term groundwater sustainability. We would like this to happen as soon as possible!

Three major efforts we are pushing to reduce groundwater pumping in the basin are:

- A. Best Management Practices (BMPs)
- B. Fallowing Policy
- C. Investigation of a Blended Water Project (BWP)

We think the PRGB is best managed **locally** by the groundwater users and their local representatives. The GSP needs to be rigorous enough to satisfy DWR review. We are concerned that the current GSP lacks key features needed to satisfy that review such as:

- 1) A sense of urgency.
- 2) A timetable to involve local groundwater users in the complex decision of pumping allocations.
- 3) Incentives to increase supplies or decrease water use.
- 4) A predictable and stable set of rules developed as soon as possible to allow growers to make rational decisions.

To further expand on the sense of urgency concern, consider the following:

- a. At the end of harvest, growers review their yields, grape quality, and costs for the past year and plan for the next year. On July 10, 2019, we at JLV&W held a half day meeting on efficient water use for our own people and many of our outside growers. 45 people were in attendance. Three outside consultants presented their research, we tasted wines of different quality levels, and we discussed the reasons to limit nitrogen to have a higher probability of harvesting before frost. ***The simple BMP message was that we used less irrigation water, achieved better grape and subsequent wine quality, and had increased yields.*** We immediately applied some of these successful irrigation practices working with some of our growers who were in attendance. Results will show up in their 2019 harvest! These and other BMP's could be implemented immediately across entire vineyards or on large experimental blocks in grower vineyards. It is our 10th year of using these methods. At JLV&W we clearly think that ***on average***, all growers could save at least 2" of irrigation water. On 36,000 acres, this is 6,000 acre feet of irrigated water saved per year. Rather than waiting a year, as the draft GSP suggests, we would like the GSP to immediately promote and actively encourage growers to participate in exploring BMP's to reduce their pumping now.
- b. Another immediate opportunity is to include a policy for fallowing. This would include several concepts, that would ***not make it initially necessary to pay growers to fallow***. There are a number of vineyards in the area which are older, diseased or haven't found a market for their grapes in 2018 or 2019 and may not in 2020. If regulations were promptly passed to allow growers to keep their pumping rights, without a minimum of pumping each year, more growers would fallow sooner. They could then take some time to learn more about the market for grapes, which grapes grow best in their climate and soil, and current BPMs for pre-plant soil preparation, root stock choice, vine spacing, trellis methods, etc. These fallowing concepts could save 2,000 to 4,000 acre feet of irrigation water per year and reductions in groundwater pumping and could go into effect immediately.
- c. We at JLV&W, several of our neighboring growers, and the City of Paso Robles have been working for several years on a ***Blended Water Project (BWP)*** which started with the concept of using treated waste water from the City of Paso Robles for irrigation to reduce pumping. Even though Paso Robles is using some Nacimiento water to supply its residents, the resultant treated water is still somewhat "salty" for long term use in irrigation. The Nacimiento pipeline is only a mile from our proposed treated water blending point. In further development of this concept, we growers realized we could build a "backbone" pipeline from the blending point to north and east of the airport and Jardine area. This is a very powerful opportunity to allow several growers in the new heart of the "red zone" to irrigate with a variable high percentage of blended water and other area growers to pay "in lieu" pumping fees. This saves the "in lieu" pumpers from needing to build reservoirs and filters and connect into their own systems. We think this system could be built for less than \$10,000,000 compared to three possible systems listed in Chapter 9 which in total could cost \$102,000,000. We already have the "backbone" project designed. The GSP should include reference to this project because it demonstrates progress and could be a crucial element of balancing local water needs.

In addressing the **time table** concern:

- a. We believe it is necessary to help all growers understand we all need to pump less water. Their water use for the 2019 crop year must be reported by the GSP to the State by April 30, 2020. For those who don't have meters, an estimate will be used. This data should be quickly assembled and analyzed for trends and major indications. Individual growers should be able to compare their pumping data to overall basin pumping data.
- b. The eventual assigning of pumping allocations is going to be exceedingly complex. It will not be possible to be done without extensive grower participation or the use of adjudication will loom large. We at JLV&W would like to minimize the risk of a full-fledged adjudication, because unless handled very differently from previous adjudications, it could be very costly and delay progress.
- c. We suggest that the GSP provide for a facilitated process to establish pumping allocations. To accommodate busy schedules, the facilitated meetings could be held on a bi-weekly basis to give as many persons as possible a chance to attend, analyze data, go back and confer with others, talk among themselves etc. This effort needs legal input every step of the way and ***cannot be dictated but needs to be negotiated***. Because this process is urgent but will take time, it should start immediately after adoption of the GSP with a goal of finishing within two years.

In so far as **incentives**:

Each of the actions discussed earlier--A (BMPs), B (Fallowing), C (BWP)-- needs a different set of incentives.

- a. BMPs are something that all growers need to be aware of and growers shouldn't need to be paid to adopt. Growers do, however, need to know that they will need to live within groundwater restrictions.
- b. Fallowing also does not need payments to growers. As described above, however, growers need to know that, if fallowing is done in the normal course of business, it will not affect their allocations in the future.
- c. The BWP requires building a pipeline, amortizing its cost and paying an annual fee for management, maintenance and power. Similar projects exist all over California. In order to decide, and at what level, to participate, growers need to fully understand these costs as well as their pumping allocations. The plans, permits, contracts for supply, etc., therefore need to move forward in parallel with the process of setting pumping allocations and implementing other management actions. This will allow growers to make a business decision as to which, or all, of the BMPs, fallowing or BWP they want to use. If the BWP pipeline project is ready to be built by the time allocations are made, growers who are willing to pay a fee to participate in the BWP will not need to wait any unnecessary, additional time for the project to be built.

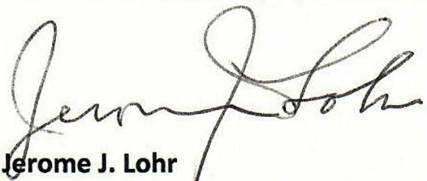
Addressing the concern around the **set of rules as soon as possible**:

Growers need to know as soon as possible the rules by which groundwater will be managed in the Paso Robles basin. BMPs, fallowing, and groundwater allocations are all part of the solution, and work, therefore, should begin on all of these actions immediately and in parallel. There should be no doubt in

anyone's mind that we have a major problem of pumping beyond the sustainable yield in the Paso Robles groundwater basin. We don't need to continue to study this problem for years. We need to immediately begin to take action. DWR expects a more aggressive plan than proposed at present.

In moving forward, there needs to be much greater participation by growers who are the major pumpers and this ***includes having irrigated agriculture as a full member of the process.***

Thus, let's get on very quickly with the work that needs to be done by including ***representation from all partners.*** We all care about the health of the groundwater basin and the local economy as well as the health of our own employees and the community.

A handwritten signature in black ink, appearing to read "Jerome J. Lohr". The signature is fluid and cursive, with the first name "Jerome" and last name "Lohr" clearly distinguishable.

Jerome J. Lohr

President, J. Lohr Vineyards, Inc.
Founder, J. Lohr Winery



J. LOHR
VINEYARDS, INC.

Comprehensive Plan to Bring the Paso Robles Groundwater Basin into Sustainability

Introduction

It is apparent that groundwater levels in the Paso Robles Basin have been declining and that GSP Management Actions will be necessary to bring the Basin into sustainability. J. Lohr Vineyards & Wines (JLVW) believes that, with the cooperation of the agricultural community, significant reductions in groundwater pumping are achievable and much of the current 13,700 AFY overdraft can be overcome. JLVW would like to present two programs that are essential if pumpers in the Basin are to achieve meaningful reductions in groundwater pumping. **First** is the opportunity to bring supplemental water to the Basin. **Second** is to adopt Best Management Practices. It is important that these programs be considered for inclusion in the GSP

Supplemental Water

For several years, JLVW has been working with the City of Paso Robles and other fellow growers to design a backbone pipeline system that would deliver 'blended' water to high density agricultural areas around the Airport and east over the Red Zone. By blending treated water from the City of Paso Robles with Nacimiento Lake water, the system could provide a supplemental water source to farmers in the area for irrigation 'in lieu' of pumping groundwater. This could achieve meaningful reductions in groundwater pumping and specifically target reduced pumping in the most impacted areas.

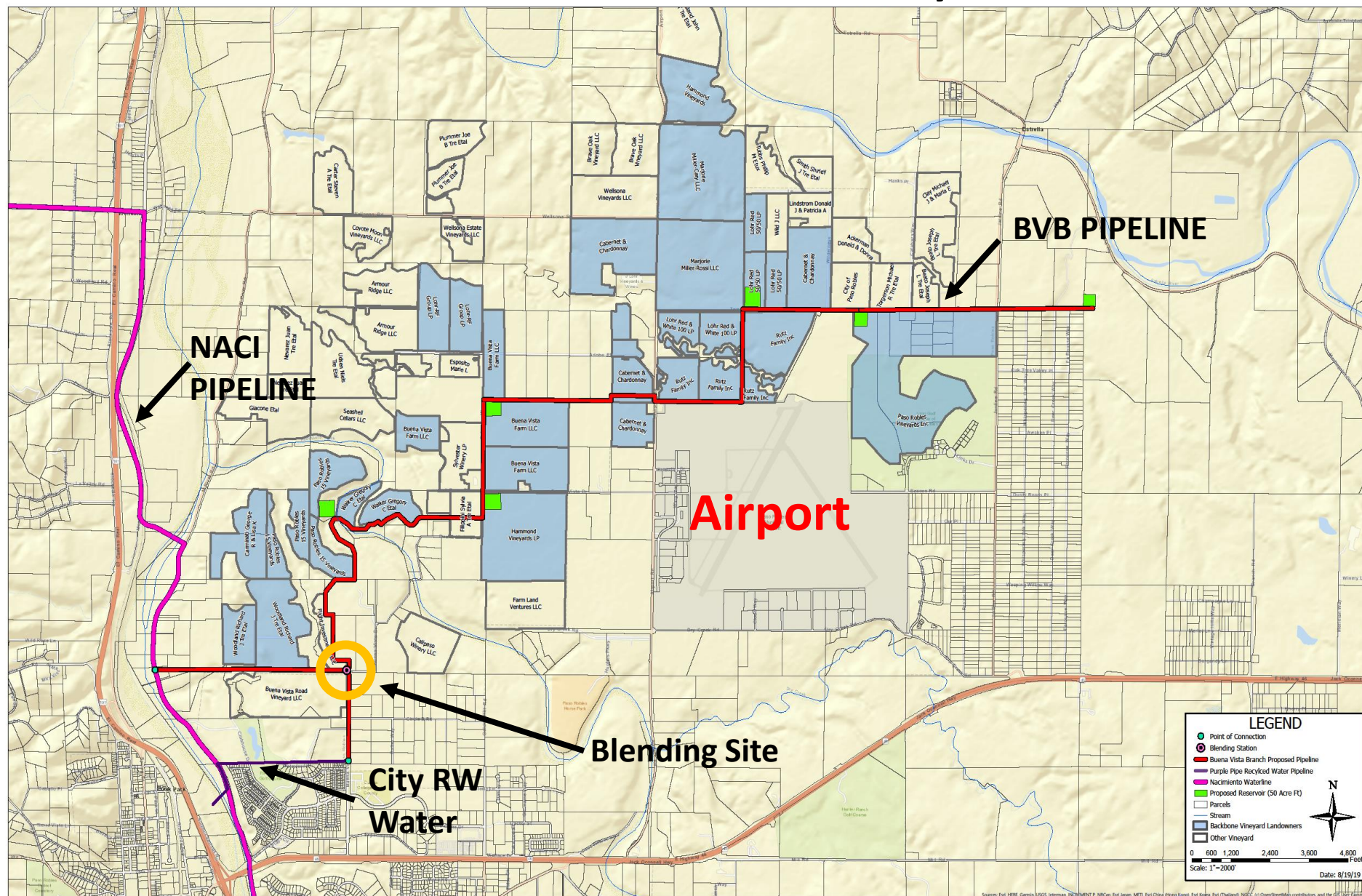
Best Management Practices (BPMs)

1. On July 10th, 2019, JLVW held a seminar with its contracted growers. There were presentations by three outside experts. JLVW shared their accumulated knowledge on the optimal use of water in vineyard operations and attendees contributed to the discussion. There were 45 growers, vineyard managers and winery representatives in attendance. As an outcome, a list of management actions was generated which vineyard operators can implement immediately to reduce pumping while increasing fruit quality.
2. JLVW is currently individually contacting an expanded list of other vineyard owners and managers, wineries and local organizations to further discuss and refine best management practices. These BMPs (which we have been using at JLVW for 10 years) will demonstrate how others can increase quality, ***use less water and fertilizer***, and maintain or increase yields.
3. After the 2019 harvest, we will hold additional technical sessions and tastings, open to all basin residents as well as growers and vintners, to demonstrate these aspects. This, hopefully, will help prepare growers for the very complex discussions needed for future pumping allocations.

Conclusion

J. Lohr Vineyards & Wines looks forward to leading this effort to bring Supplemental Water to the basin and to define and inculcate Best Management Practices to help ensure that Paso Robles remains one of the three featured wine regions in the United States while striving to create a sustainable groundwater basin for generations to come.

BVB Blended Water Backbone System



September 27, 2019

Paso Robles Groundwater Subbasin Cooperative Committee
San Luis Obispo County, Paso Robles Groundwater Subbasin GSA
1055 Monterey Street
San Luis Obispo, CA 93408

Dear SLO County Paso Robles GSA,

Re: Comments of the Paso Roble Groundwater Subbasin GSP

I would like to thank all those who spent endless hours in developing the Groundwater Sustainability Plan (GSP). I appreciate this opportunity to submit my comments of the final version of the GSP.

I have been involved in the Subbasin's groundwater issues for almost a decade now. I was a leading figure in proposing the failed AB2453 Water District. I was a founding member of the group that formed the Estrella-El Pomar-Creston Water District (EPC WD). I currently serve on the Board of Directors of the EPC WD. I am a resident in the area for 21 years and a former winegrape grower for 18 years. I also served on the Board of Directors of the Paso Robles Wine Country Alliance for 6 years. My comments are presented as a concerned citizen and stakeholder and my comments do not represent any official position of the EPC WD.

I would like to split my comments into two categories. First, I'd like to discuss my general thoughts about the GSP and its shortcomings. Secondly, I'd like to comment on management actions that can be taken immediately and need to be pursued now as the GSP implementation begins.

General Comments

The GSP is a weak document and almost all important decisions have been delayed to the future.

The GSP does not define a new management structure or the decision-making process necessary to implement the GSP. It seems clear that the current MOA structure has not been able to resolve the many critical decisions that have to be made. There needs to be a new MOA or some other governance structure.

Similar to the item above, the GSP provides little insight into how the GSP implementation is going to be funded. Like myself, I suspect that Subbasin stakeholders would like to know who pays for what and how much?

The GSP makes clear that pumping cutbacks are coming but doesn't say where, when, or by how much. Predictable and stable rules are essential for farmers to plan and make informed decisions. For this reason, the GSP should spell out clearly a process, to begin immediately upon adoption of the plan, to determine future groundwater allocations. This process should ensure that agriculture, like all groundwater users, have meaningful input and involvement. Allocating groundwater will be doomed to failure if those who must sacrifice are not included in the decision-making process.

The GSP seems to list projects in a perfunctory manner with pie in the sky generalities and hefty budgets. There is one project that's real, doable and has already received significant funding from private sources to development preliminary engineering plans, reviewed pipeline routes and has begun environmental

studies. This ‘real’ project is the Blended Water Project which utilizes Nacimiento Lake Water along with the City of Paso Robles’ Recycled Water. The Blended Water Project has the ability to bring needed supplemental water to the Paso Robles Subbasin. This project along with any other ‘real’ projects should receive the endorsement of the GSP and start immediately. Supplemental water is a key component to help solve the Subbasin’s declining water levels.

The GSP is unclear and insufficiently aggressive in setting schedules and deadlines for its management actions. The GSP does not address who does what next? Who’s in charge?

The GSP states that the GSAs will “promote” voluntary fallowing, but does not explain how. Fallowing of land could have a significant positive influence in groundwater levels but there is little in the GSP to ensure that pumpers who choose to fallow will be protected in the future in preserving their pumping allocations. In other word, if I stop irrigating a crop today, will I be able to pump in the future?

The GSP, for example, says that the GSAs will “promote” BMPs, but does not say how.

Without any sort of timetables or specific management action goals, the subbasin remains at risk of further decline while solutions are pondered. The GSP provides no timetable for implementing important actions of the GSP. The GSP commits to do nothing.

The GSP does not mandate metering and extraction reporting. How can you manage a basin if you don’t know what’s being pumped? Fair and equitable decisions about extraction must be backed up by a vigorous monitoring system and a policing mechanism. The GSP is mostly silent on this issue.

The GSP gives a pass to de minimis users and does not address future growth of de minimis users.

Immediate Management Actions Needed

There are certain management actions that need to start immediately. The following are several of these actions.

The GSP needs to establish a metering and groundwater pumping reporting system and it needs to start now. On April 1, 2020, our Subbasin will be required to report its groundwater status. Our Subbasin has very little ‘data’ on who pumps and how much. As we move towards possible pumping cutbacks, the GSP has to have answers to these basic facts. Monitoring and report must start now.

As a corollary to the previous item, the GSP needs to define and fund an immediate effort to determine what other data gaps exist and identify other informational needs that will be necessary in the decision-making process as GSP implementation proceeds.

Projects need to be identified, endorsed and started

Concluding Comments

As an early member of the group that formed the EPC WD and now as an EPC WD Board of Directors Member, I am particularly distressed about actions of County Supervisors that undermined the efforts of a legitimate and significant group of stakeholders in their efforts to participate in the SGMA/GSP process. EPC WD represents 40% of groundwater pumping in the subbasin. EPC WD is the largest group of pumpers in the subbasin and EPC WD was prevented from becoming a GSA and consequently denied the opportunity to represent its members in the GSP process. This is contrary to the spirit and intent of the SGMA Law.

Additionally, EPC WD members have been committed to working to achieve a sustainable Subbasin and have self-assessed themselves with Prop 218 votes to fund efforts in support of a sustainable Subbasin.

The County acting as the GSA for the so called "white area" has failed to properly represent the agricultural pumpers in the GSA. The County GSA did not hold a single outreach meeting. County GSA did not create any sort of ag advisory position for their GSA. The County GSA did not create any sort of forum where there could be open dialogue and exchange of ideas between stakeholders and public officials. Individuals speaking in 3-minute time slots at CC meetings does not constitute outreach by the County.

The irrigated agriculture community in the County's white area accounts for 55% of groundwater pumping in the Paso Robles Subbasin. The County has demonstrated its unwillingness or its inability to include this very large and significant group of groundwater pumpers in developing the current GSP. In addition, irrigate agriculture is one of the major economic drivers in the North County and continued success of the irrigated ag community must be considered.

Since irrigated ag in the white area represents more than 50% of the total pumping in the Subbasin, irrigated agriculture's interests should not be ignored by the lack of a 'seat at the table', a seat that has been unaccounted for in the GSP process to date as the County GSA has had virtually no outreach to these stakeholders. In that regard, the County GSA has severely underrepresented these constituents in the Subbasin by denying them any effective voice in the proceedings. Going forward, irrigated agriculture's input to the GSP will be vital to ensure the Subbasin moves towards sustainability while maintaining the economic powerhouse that is irrigated agriculture in the Subbasin. In conclusion, there needs to be an equal participant "seat" for irrigated agriculture on the new MOA which will define implementation of the Plan.

Thank you for this opportunity to submit my comments and I look forward to working with a newly constituted Memorandum of Agreement where irrigate ag is properly represented.

Regards,

A handwritten signature in cursive script that reads "Jerry Reaugh". The ink is dark and the signature is fluid, with a large, stylized 'J' and 'R'.

Jerry Reaugh

September 27, 2019

County Government Center
1055 Monterey Street, Room 206
San Luis Obispo, CA 93408

Submitted online via: [https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-\(SGMA\)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx](https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-(SGMA)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx)

Re: Paso Robles Subbasin Draft Groundwater Sustainability Plan

Dear Angela Ruberto,

The Nature Conservancy (TNC) appreciates the opportunity to comment on the Paso Robles Subbasin Draft Groundwater Sustainability Plan (GSP) being prepared under the Sustainable Groundwater Management Act (SGMA). Please note that we have previously submitted comments dated 15 April 2019 on Chapters 4-8 and Appendix B and comments dated 1 July 2019 on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. Where these comments have not yet been addressed in the most recent draft, they are restated in this letter with updated section number and page number callouts. In reviewing this version of the plan, we recognize that several TNC tools and approaches were used in the preparation of the sections related to ecosystems, notably the initial identification of groundwater dependent ecosystems (GDEs) in the Paso Robles Subbasin. This is clearly an important first step; however, our comments in this letter highlight additional refinement, monitoring, and future management activities that are needed to fulfil SGMA requirements with respect to GDEs in this basin.

TNC as a Stakeholder Representative for the Environment

TNC is a global, nonprofit organization dedicated to conserving the lands and waters on which all life depends. We seek to achieve our mission through science-based planning and implementation of conservation strategies. For decades, we have dedicated resources to establishing diverse partnerships and developing foundational science products for achieving positive outcomes for people and nature in California. TNC was part of a stakeholder group formed by the Water Foundation in early 2014 to develop recommendations for groundwater reform and actively worked to shape and pass SGMA.

Our reason for engaging is simple: California's freshwater biodiversity is highly imperiled. We have lost more than 90 percent of our native wetland and river habitats, leading to precipitous declines in native plants and the populations of animals that call these places home. These natural resources are intricately connected to California's economy providing direct benefits through industries such as fisheries, timber and hunting, as well as indirect benefits such as clean water supplies. SGMA must be successful for us to achieve a sustainable future, in which people and nature can thrive within Paso Robles Subbasin region and California.

We believe that the success of SGMA depends on bringing the best available science to the table, engaging all stakeholders in robust dialog, providing strong incentives for beneficial outcomes and rigorous enforcement by the State of California.

Given our mission, we are particularly concerned about the inclusion of nature, as required, in GSPs. The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs. These tools and resources are available online at [GroundwaterResourceHub.org](https://groundwaterresourcehub.org). Some of these tools have been used in the preparation of the present draft plan. Additional resources are available and referred to in the comments that follow, and are considered pertinent to the development of this plan.

Addressing Nature's Water Needs in GSPs

SGMA requires that all beneficial uses and users, including environmental users of groundwater, be considered in the development and implementation of GSPs (Water Code § 10723.2).

The GSP Regulations include specific requirements to identify and consider groundwater dependent ecosystems [23 CCR §354.16(g)] when determining whether groundwater conditions are having potential effects on beneficial uses and users. GSAs must also assess whether sustainable management criteria may cause adverse impacts to beneficial uses, which include environmental uses, such as plants and animals. The Nature Conservancy has identified each part of the GSP where consideration of beneficial uses and users are required. That list is available here: <https://groundwaterresourcehub.org/importance-of-gdes/provisions-related-to-groundwater-dependent-ecosystems-in-the-groundwater-s>.

Please ensure that environmental beneficial users are addressed accordingly throughout the GSP. Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decision, and using data collected through monitoring to revise decisions in the future. Over time, GSPs should improve as data gaps are reduced and uncertainties addressed.

To help ensure that GSPs adequately address nature as required under SGMA, The Nature Conservancy has prepared a checklist (**Attachment A**) for GSAs and their consultants to use. The Nature Conservancy believes the following elements are foundational for 2020 GSP submittals and are developed from our publication, *GDEs under SGMA: Guidance for Preparing GSPs*¹.

1. Environmental Representation

SGMA requires that groundwater sustainability agencies (GSAs) consider the interests of all beneficial uses and users of groundwater. To meet this requirement, we recommend actively engaging environmental stakeholders by including environmental representation on the GSA board, technical advisory group, and/or working groups. This could include local staff from state and federal resource agencies, nonprofit organizations and other environmental interests. By engaging these stakeholders, GSAs will benefit from access to additional data and resources, as well as a more robust and inclusive GSP.

¹GDEs under SGMA: Guidance for Preparing GSPs is available at:
https://groundwaterresourcehub.org/public/uploads/pdfs/GWR_Hub_GDE_Guidance_Doc_2-1-18.pdf

2. Basin GDE and ISW Maps

SGMA requires that groundwater dependent ecosystems (GDEs) and interconnected surface waters (ISWs) be identified in the GSP. We recommend using the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) provided online² by the Department of Water Resources (DWR) as a starting point for the GDE map. The NC Dataset was developed through a collaboration between DWR, the Department of Fish and Wildlife and TNC.

3. Potential Effects on Environmental Beneficial Users

SGMA requires that potential effects on GDEs and environmental surface water users be described when defining undesirable results. In addition to identifying GDEs in the basin, The Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define “significant and unreasonable adverse impacts” without knowing *what* is being impacted. For your convenience, we’ve provided a list of freshwater species within the boundary of the Paso Robles Subbasin in **Attachment C**. Our hope is that this information will help your GSA better evaluate the impacts of groundwater management on environmental beneficial users of surface water. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the GSA’s freshwater species list. We also refer you to the Critical Species Lookbook³ prepared by The Nature Conservancy and partner organizations for additional background information on the water needs and groundwater reliance of critical species. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs.

4. Biological and Hydrological Monitoring

If sufficient hydrological and biological data in and around GDEs is not available in time for the 2020/2022 plan, data gaps should be identified along with actions to reconcile the gaps in the monitoring network.

The Nature Conservancy has reviewed the Paso Robles Draft GSP. We appreciate the work that has gone into the preparation of this plan. Specifically, we recognize the use of the NC dataset and other TNC guidance for initial identification of GDE areas in the basin. However, we believe that additional work is needed to refine the initial area estimates including identification of species that may be present in the GDEs, development of monitoring plans to address data gaps, and a more complete evaluation of future management actions to protect GDEs in the basin. Hence, we consider the current GSP draft to be **incomplete** under SGMA.

Our specific comments related to the Paso Robles Subbasin Draft GSP are provided in detail in **Attachment B** and are in reference to the numbered items in **Attachment A**. **Attachment C** provides a list of the freshwater species located in the Paso Robles Subbasin. **Attachment D** describes six best practices that GSAs and their consultants can apply when using local groundwater data to confirm a connection to groundwater for DWR’s Natural Communities Commonly Associated with Groundwater Dataset². **Attachment E** provides an overview of a

² The Department of Water Resources’ Natural Communities Commonly Associated with Groundwater dataset is available at: <https://gis.water.ca.gov/app/NCDatasetViewer/>

³ Available online at: <https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/>

new, free online tool that allows GSAs to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data.

Thank you for fully considering our comments as you develop your GSP.

Best Regards,

A handwritten signature in black ink, appearing to read "Sandi Matsumoto".

Sandi Matsumoto
Associate Director, California Water Program
The Nature Conservancy

Attachment A

Environmental User Checklist

The Nature Conservancy is neither dispensing legal advice nor warranting any outcome that could result from the use of this checklist. Following this checklist does not guarantee approval of a GSP or compliance with SGMA, both of which will be determined by DWR and the State Water Resources Control Board.

GSP Plan Element*		GDE Inclusion in GSPs: Identification and Consideration Elements	Check Box
Admin Info	2.1.5 Notice & Communication 23 CCR §354.10	Description of the types of environmental beneficial uses of groundwater that exist within GDEs and a description of how environmental stakeholders were engaged throughout the development of the GSP.	1
Planning Framework	2.1.2 to 2.1.4 Description of Plan Area 23 CCR §354.8	Description of jurisdictional boundaries, existing land use designations, water use management and monitoring programs; general plans and other land use plans relevant to GDEs and their relationship to the GSP.	2
		Description of instream flow requirements, threatened and endangered species habitat, critical habitat, and protected areas.	3
		Summary of process for permitting new or replacement wells for the basin, and how the process incorporates any protection of GDEs	4
Basin Setting	2.2.1 Hydrogeologic Conceptual Model 23 CCR §354.14	Basin Bottom Boundary: Is the bottom of the basin defined as at least as deep as the deepest groundwater extractions?	5
		Principal aquifers and aquitards: Are shallow aquifers adequately described, so that interconnections with surface water and vertical groundwater gradients with other aquifers can be characterized?	6
		Basin cross sections: Do cross-sections illustrate the relationships between GDEs, surface waters and principal aquifers?	7
	2.2.2 Current & Historical Groundwater Conditions 23 CCR §354.16	Interconnected surface waters:	8
		Interconnected surface water maps for the basin with gaining and losing reaches defined (included as a figure in GSP & submitted as a shapefile on SGMA portal).	9
		Estimates of current and historical surface water depletions for interconnected surface waters quantified and described by reach, season, and water year type.	10
		Basin GDE map included (as figure in text & submitted as a shapefile on SGMA Portal).	11

		If NC Dataset was used:	Basin GDE map denotes which polygons were kept, removed, and added from NC Dataset (Worksheet 1, can be attached in GSP section 6.0).	12
			The basin's GDE shapefile, which is submitted via the SGMA Portal, includes two new fields in its attribute table denoting: 1) which polygons were kept/removed/added, and 2) the change reason (e.g., why polygons were removed).	13
			GDEs polygons are consolidated into larger units and named for easier identification throughout GSP.	14
		If NC Dataset was <i>not</i> used:	Description of why NC dataset was not used, and how an alternative dataset and/or mapping approach used is best available information.	15
		Description of GDEs included:		16
		Historical and current groundwater conditions and variability are described in each GDE unit.		17
		Historical and current ecological conditions and variability are described in each GDE unit.		18
		Each GDE unit has been characterized as having high, moderate, or low ecological value.		19
		Inventory of species, habitats, and protected lands for each GDE unit with ecological importance (Worksheet 2, can be attached in GSP section 6.0).		20
	2.2.3 Water Budget 23 CCR §354.18	Groundwater inputs and outputs (e.g., evapotranspiration) of native vegetation and managed wetlands are included in the basin's historical and current water budget.		21
		Potential impacts to groundwater conditions due to land use changes, climate change, and population growth to GDEs and aquatic ecosystems are considered in the projected water budget.		22
Sustainable Management Criteria	3.1 Sustainability Goal 23 CCR §354.24	Environmental stakeholders/representatives were consulted.		23
		Sustainability goal mentions GDEs or species and habitats that are of particular concern or interest.		24
		Sustainability goal mentions whether the intention is to address pre-SGMA impacts, maintain or improve conditions within GDEs or species and habitats that are of particular concern or interest.		25
	3.2 Measurable Objectives 23 CCR §354.30	Description of how GDEs were considered and whether the measurable objectives and interim milestones will help achieve the sustainability goal as it pertains to the environment.		26
	3.3 Minimum Thresholds 23 CCR §354.28	Description of how GDEs and environmental uses of surface water were considered when setting minimum thresholds for relevant sustainability indicators:		27
		Will adverse impacts to GDEs and/or aquatic ecosystems dependent on interconnected surface waters (beneficial user of surface water) be avoided with the selected minimum thresholds?		28
		Are there any differences between the selected minimum threshold and state, federal, or local standards relevant to the species or habitats residing in GDEs or aquatic ecosystems dependent on interconnected surface waters?		29
	3.4 Undesirable Results 23 CCR §354.26	For GDEs, hydrological data are compiled and synthesized for each GDE unit:		30
		If hydrological data are available within/nearby the GDE	Hydrological datasets are plotted and provided for each GDE unit (Worksheet 3, can be attached in GSP Section 6.0).	31
			Baseline period in the hydrologic data is defined.	32

			GDE unit is classified as having high, moderate, or low susceptibility to changes in groundwater.	33
			Cause-and-effect relationships between groundwater changes and GDEs are explored.	34
		If hydrological data <i>are not available</i> within/nearby the GDE	Data gaps/insufficiencies are described.	35
			Plans to reconcile data gaps in the monitoring network are stated.	36
		For GDEs, biological data are compiled and synthesized for each GDE unit:		37
		Biological datasets are plotted and provided for each GDE unit, and when possible provide baseline conditions for assessment of trends and variability.		38
		Data gaps/insufficiencies are described.		39
		Plans to reconcile data gaps in the monitoring network are stated.		40
		Description of potential effects on GDEs, land uses and property interests:		41
		Cause-and-effect relationships between GDE and groundwater conditions are described.		42
		Impacts to GDEs that are considered to be “significant and unreasonable” are described.		43
		Known hydrological thresholds or triggers (e.g., instream flow criteria, groundwater depths, water quality parameters) for significant impacts to relevant species or ecological communities are reported.		44
		Land uses include and consider recreational uses (e.g., fishing/hunting, hiking, boating).		45
		Property interests include and consider privately and publicly protected conservation lands and opens spaces, including wildlife refuges, parks, and natural preserves.		46
Sustainable Management Criteria	3.5 Monitoring Network 23 CCR §354.34	Description of whether hydrological data are spatially and temporally sufficient to monitor groundwater conditions for each GDE unit.		47
		Description of how hydrological data gaps and insufficiencies will be reconciled in the monitoring network.		48
		Description of how impacts to GDEs and environmental surface water users, as detected by biological responses, will be monitored and which GDE monitoring methods will be used in conjunction with hydrologic data to evaluate cause-and-effect relationships with groundwater conditions.		49
Projects & Mgmt Actions	4.0. Projects & Mgmt Actions to Achieve Sustainability Goal 23 CCR §354.44	Description of how GDEs will benefit from relevant project or management actions.		50
		Description of how projects and management actions will be evaluated to assess whether adverse impacts to the GDE will be mitigated or prevented.		51

* In reference to DWR’s GSP annotated outline guidance document, available at:
https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/GD_GSP_Outline_Final_2016-12-23.pdf

Attachment B

TNC Evaluation of the Paso Robles Subbasin Groundwater Sustainability Plan

A complete draft of the Paso Robles Subbasin Groundwater Sustainability Plan (GSP) Public Draft was provided for public review on August 14, 2019. This attachment summarizes our comments on the complete public draft GSP. Please note that we have previously submitted comments dated 15 April 2019 on Chapters 4-8 and Appendix B (now Appendix C) and comments dated 1 July 2019 on Chapters 9-11. Where these comments have not yet been addressed in the most recent draft, they are restated herein with updated section number and page number callouts. Comments are provided in the order of the checklist items included as Attachment A.

Checklist Item 1 - Notice & Communication (23 CCR §354.10)

[Chapter 11 Notice and Communications (including separate Communications and Engagement Plan, Appendix M)]

- Section 3.0 of the Communications and Engagement Plan (Page 6) lists aquatic ecosystems as a beneficial groundwater use. **However, no details are given as to the types and locations of environmental uses and habitats supported, or the designated beneficial environmental uses of surface waters that may be affected by groundwater extraction in the subbasin. To identify environmental users, please refer to the following:**
 - Natural Communities Commonly Associated with Groundwater dataset (NC Dataset) - <https://gis.water.ca.gov/app/NCDataSetViewer/>
 - The list of freshwater species located in the Paso Robles Subbasin in **Attachment C** of this letter. Please take particular note of the species with protected status.
 - Lands that are protected as open space preserves, habitat reserves, wildlife refuges, etc. or other lands protected in perpetuity and supported by groundwater or ISWs should be identified and acknowledged.

Checklist Items 2 to 4 - Description of general plans and other land use plans relevant to GDEs and their relationship to the GSP (23 CCR §354.8)

[Section 3.6 Existing Monitoring Programs (p. 3-17)]

- Per the GSP Regulations (23 CCR §354.34 (a) and (b)), monitoring must address trends in groundwater and related surface conditions (emphasis added). In order for this section to provide the appropriate context and help assure integration of GSP implementation with other ongoing regulatory programs, this section should describe the following:

- **Monitoring activities and responsibilities by State, Federal and local agencies and jurisdictions related to aquatic resources and GDEs that could be affected by groundwater withdrawals should be discussed.**
- The Critical Habitat for Threatened and Endangered Species website maintained by the US Fish and Wildlife Service (<https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77>) identifies lands with endangered and threatened species in the Basin, including species potentially associated with interconnected surface waters ISWs, including Steelhead (*Onocorhynchus mykiss*). Also please refer to the Critical Species Lookbook⁴ to review and discuss the potential groundwater reliance of critical species in the basin. **Please include a discussion regarding the management of critical habitat for these aquatic species and its relationship to the GSP.**

[Section 3.8.6 Requirements for New Wells (p. 3-30)]

- **Future well permitting must be coordinated with the GSP to assure achievement of the Plan's sustainability goals.**
- The State Third Appellate District recently found that Counties have a responsibility to consider the potential impacts of groundwater withdrawals on public trust resources when permitting new wells near streams with public trust uses (*ELF v. SWRCB and Siskiyou County*, No. C083239). **The need for well permitting programs to comply with this requirement should be stated.**

[Section 3.10 Land Use Plans (p. 3-31)]

- This section should include a discussion of General Plan goals and policies related to the protection and management of GDEs and aquatic resources that could be affected by groundwater withdrawals. **Please include a discussion of how implementation of the GSP may affect and be coordinated with General Plan policies and procedures regarding the protection of wetlands, riparian areas, oak woodlands, aquatic resources and other GDEs and ISWs.**
- This section should identify Habitat Conservation Plans (HCPs) or Natural Community Conservation Plans (NCCPs) within the Subbasin and if they are associated with critical, GDE or ISW habitats. **Please identify all relevant HCPs and NCCPs within the Subbasin and address how GSP implementation will coordinate with the goals of these HCPs or NCCPs.**

Checklist Items 5, 6, and 7 – Hydrogeologic Conceptual Model (23 CCR §354.14)

[Section 4.1 Subbasin Topography and Boundaries (p. 4-1)]

- Please provide additional information on what data was used to determine that “poor quality” groundwater in the Paso Robles Formation would exclude groundwater from being part of the subbasin.

⁴ Available online at: <https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/>

- Defining the bottom of subbasin based on geochemical properties is a suitable approach for defining the base of freshwater, however, as noted on page 9 of DWR's Hydrogeologic Conceptual Model BMP (https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_HCM_Final_2016-12-23.pdf) "the definable bottom of the basin should be at least as deep as the deepest groundwater extractions". **Thus, groundwater extraction well depth data should also be included in the determination of the basin bottom.** This will prevent the possibility of extractors with wells deeper than the basin boundary (defined by the base of freshwater) from claiming exemption of SGMA due to their well residing outside the vertical extent of the basin boundary.

[Section 4.7.2 Groundwater Discharge Areas Inside the Subbasin (p. 4-32)]

- We support the use of the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) to map groundwater dependent ecosystems in the Paso Robles Groundwater Basin (GSP Draft Figure 4-18). Since the NC Dataset is intended as a starting point, The Nature Conservancy has developed a Guidance Document to assist GSAs and their consultants in addressing GDEs in GSPs⁵. Also refer to **Attachment D** for best practices when using the NC dataset.
- The identification of GDEs within GSPs is a required GSP element of the Basin Setting Section under the description of Current & Historical Groundwater Conditions (23 CCR §354.16). Recognizing natural points of discharge (seeps & springs) as GDEs is consistent with the SGMA definition of GDEs⁶; **however, we recommend the identification of GDEs (GDE map Figure 4-18) for the Paso Robles basin be moved to Chapter 5: Groundwater Conditions, and elaborated upon with a description of current and historical groundwater conditions in the GDE areas.** Chapter 5 is a more appropriate place for the identification of GDEs, since groundwater conditions (e.g., depth to groundwater, interconnected surface water maps, groundwater quality) are necessary local information and data from the GSP in assessing whether polygons in the NC dataset are connected to groundwater in a principal aquifer.
- Decisions to remove, keep, or add polygons from the NC dataset into a basin GDE map should be based on best available science in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed, added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. **We recommend revising Figure 4-18 to reflect this recommended methodology.**

[Section 5.2 Change in Groundwater Storage (p. 5-20)]

- Figure 5-11 illustrates that groundwater storage losses occurred during dry years and recovered in wet years. Potential impacts on groundwater storage loss due to

⁵ GDEs under SGMA: Guidance for Preparing GSPs is available at: https://groundwaterresourcehub.org/public/uploads/pdfs/GWR_Hub_GDE_Guidance_Doc_2-1-18.pdf

⁶ Groundwater dependent ecosystem refer to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. [23 CCR §351 (m)]

groundwater pumping is still very possible, especially since groundwater pumping data has been estimated from groundwater flow models populated with insufficient vertical groundwater gradient data, shallow monitoring data, and surface flow data. Groundwater storage in the Paso Robles formation has also been on a decline since 1980 due to groundwater pumping (Figure 5-12). Understanding groundwater storage fluctuations in the Alluvial Aquifer depends on how vertical groundwater gradients are impacted by pumping and groundwater storage changes in the Paso Robles Formation. **Please address these data gaps in the monitoring network.**

Checklist Items 8, 9, and 10 – Interconnected Surface Waters (ISW) (23 CCR §354.16)

[Section 5.5 Interconnected Surface Waters (p. 5-26)]

- **Please note the following best practices when filling the data gap in delineating any connections between surface water and groundwater.**
 - **Specify what data are used to determine the elevation of the stream or river bottom.**
 - The regulations [23 CCR §351(o)] define interconnected surface waters (ISW) as “surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted”. **“At any point” has both a spatial and temporal component.** Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water. ISWs can be either gaining or losing.
 - Due to limited shallow monitoring wells and stream gauges in the basin, **mapping ISWs are best estimated by first determining which reaches are completely disconnected from groundwater. This approach would involve comparing simulated groundwater elevations with a land surface Digital Elevation Model that could identify which surface waters have groundwater consistently below surface water features, such that an unsaturated zone would separate surface water from groundwater. Groundwater elevations that are always deeper than 50 feet below the land surface can be identified as disconnected surface waters. Also, please reconcile data gaps (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP to improve ISW mapping in future GSPs.**

Checklist Items 11 to 20, Identifying, Mapping, and Describing GDEs (23 CCR §354.16)

[Appendix C: Methodology for Identifying Potential Groundwater Dependent Ecosystems]

- For clarification, iGDEs are mapped polygons in DWR’s NC dataset.

- **Please specify what field verification methods (e.g., isotope analysis, enhanced shallow groundwater monitoring) will be used to definitively determine whether potential GDEs are true GDEs.**
- **It is highly advised that multiple depth to groundwater measurements are used to verify whether an iGDE (or NC dataset polygon) is connected to groundwater, so that fluctuations in the groundwater regime can be adequately represented.** The analysis described on p.7 to create Figure C-3 only relies on Spring 2017 depth data, which is also after the Jan 1, 2015 SGMA benchmark date. Also, according to the shallow monitoring well data gaps described in Chapter 5 and 7, there is insufficient data to confidently remove data for NC polygons that are >5km away from a shallow well. See Attachment D of this letter for six best practices when using groundwater data to verify the NC dataset.
- **The NC dataset needs to be groundtruthed with aerial photography to screen for changes in land use that many not be reflected in the NC dataset (e.g., recent development, cultivated agricultural land, obvious human-made features).**
- Grouping multiple GDE polygons into larger units by location (proximity to each other) and principal aquifer will help to characterize GDEs under Section 4.7.2 and would simplify the process of evaluating potential effects on GDEs due to groundwater conditions under GSP Chapter 8: Sustainable Management Criteria.
- **Groundwater conditions within GDEs and the interaction between GDEs and groundwater should be briefly described within the portion of the Basin Setting Section (Section 4.7.2) where GDEs are being identified.**
- Not all GDEs are created equal. Some GDEs may contain legally protected species or ecologically rich communities, whereas other GDEs may be highly degraded with little conservation value. Including a description of the types of species (protected status, native versus non-native), habitat, and environmental beneficial uses (Refer to **Attachment C** for a list of freshwater species found in the Paso Robles Subbasin, refer to Worksheet 2, p.74 of GDE Guidance Document, and see the Critical Species Lookbook⁷) can be helpful in assigning an ecological value to the GDEs. **Identifying an ecological value of each GDE can help prioritize limited resources when considering GDEs as well as prioritizing legally protected species or habitat that may need special consideration when setting sustainable management criteria.**
- Decisions to remove, keep, or add polygons from the NC dataset into a subbasin GDE map should be based on best available science in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed, added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. **We recommend revising Figure 4-18 (replicated as Figure C-7) and including it in Chapter 5 to reflect this change. Please provide the final acreage of subbasin GDE polygons.**
- While depth to groundwater levels within 30 feet are generally accepted as being a proxy for confirming that polygons in the NC dataset are connected to groundwater, the variable needs of plant species and their dependence on seasonal and inter-

⁷ Available online at: <https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/>

annual groundwater level fluctuations should be considered when applying this criterion. Studies have found the roots of oaks can extend deeper than 70 feet to extract water from the capillary fringe immediately above the water table during the summer and fall, and that groundwater reserves provide a buffer to rapid changes in their hydroclimate, as long as groundwater reserves are not depleted by drought or human consumption.⁸ **It is highly advised that seasonal and interannual fluctuations in the groundwater regime are taken into consideration. Utilizing groundwater data from one point in time or contoured with too few shallow monitoring wells can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs.** Based on a study we recently submitted to Frontiers in Environmental Science Journal, we've observed riparian forests along the Cosumnes River to experience a range in groundwater levels between 1.5 and 75 feet over seasonal and interannual timescales. Seasonal fluctuations in the regional water table can support perched groundwater near an intermittent river that seasonally runs dry due to large seasonal fluctuations in the regional water table. While perched groundwater itself cannot directly be managed due to its position in the vadose zone, the water table position within the regional aquifer (via pumping rate restrictions, restricted pumping at certain depths, restricted pumping around GDEs, well density rules) and its interactions with surface water (e.g., timing and duration) can be managed to prevent adverse impacts to ecosystems due to changes in groundwater quality and quantity under SGMA.

Checklist Items 21 and 22 – Water Budget (23 CCR §354.18)

[Chapter 6. Water Budget (p. 6-1)]

- **Please clarify what assumptions and data were used to calculate Riparian Evapotranspiration.**
- Why was evapotranspiration only calculated for riparian vegetation? In Chapter 3.4.2 of the Draft GSP (p. 3-11), native vegetation was identified as the largest water use sector in the subbasin by land area. **Please estimate evapotranspiration for all native vegetation in the subbasin for the water budget. Environmental beneficial users of groundwater, such as wetlands and phreatophyte (oak) woodlands are of particular importance and should be explicitly mentioned. Calculations should be provided to quantify the amount of ET in the GDEs both spatially and temporally, including water year type. Please identify any data gaps.**

Checklist Items 23 to 46 – Sustainable Management Criteria

[Section 8.1 Sustainability Goal]

⁸ Miller and others. 2009. Groundwater Uptake by Woody Vegetation in a Semi-Arid Oak Savannah. Water Resources Research. Volume 46. November.

- This section states that the groundwater resources in the Paso Robles Subbasin will be managed for the long-term community, financial and environmental benefit of Subbasin users. The discussion of how this goal will be achieved references cultural, community and business needs and related management actions and projects to obtain sustainability, but provides no explanation how environmental beneficial uses will be protected. **Please describe how the sustainability of environmental groundwater and interconnected surface water uses will be protected, and what management actions and conceptual projects will address environmental beneficial uses and users of groundwater.**

[Section 8.2 General Process for Establishing Sustainable Management Criteria]

- Stakeholder involvement is crucial when establishing sustainable management criteria. The role of the GSA is to represent and balance the needs of *all groundwater* beneficial uses and users in the basin, which has been expressed in the Sustainability goal in Section 8.1. According to p. 8-5, only rural residents, farmers, local cities and the county were surveyed to gather input on sustainable management criteria. **Please specify what information or efforts have been used/made to protect the interests of environmental users and disadvantaged community members.**
- SGMA requires that sustainable management criteria are consistent with other state, federal or local regulatory standards [23 CCR§354.28(b)(5)]. No reference is made to the review of supporting documents for General Plan Conservation or Land Use Elements, or to the review of environmental management studies and documents such as Biological Assessments, Biological Opinions, HCPs, NCCPs, or other studies regarding the current and historical conditions of the beneficial uses being evaluated. **Please describe what process was used to identify other regulatory standards that need consideration when establishing minimum thresholds for sustainability criteria, especially those related to protected habitats, minimum flow requirements and habitat conservation plans. Please provide detail on how sustainable management criteria were developed for GDEs and streamflow habitat, and how the above supporting documents were considered.**

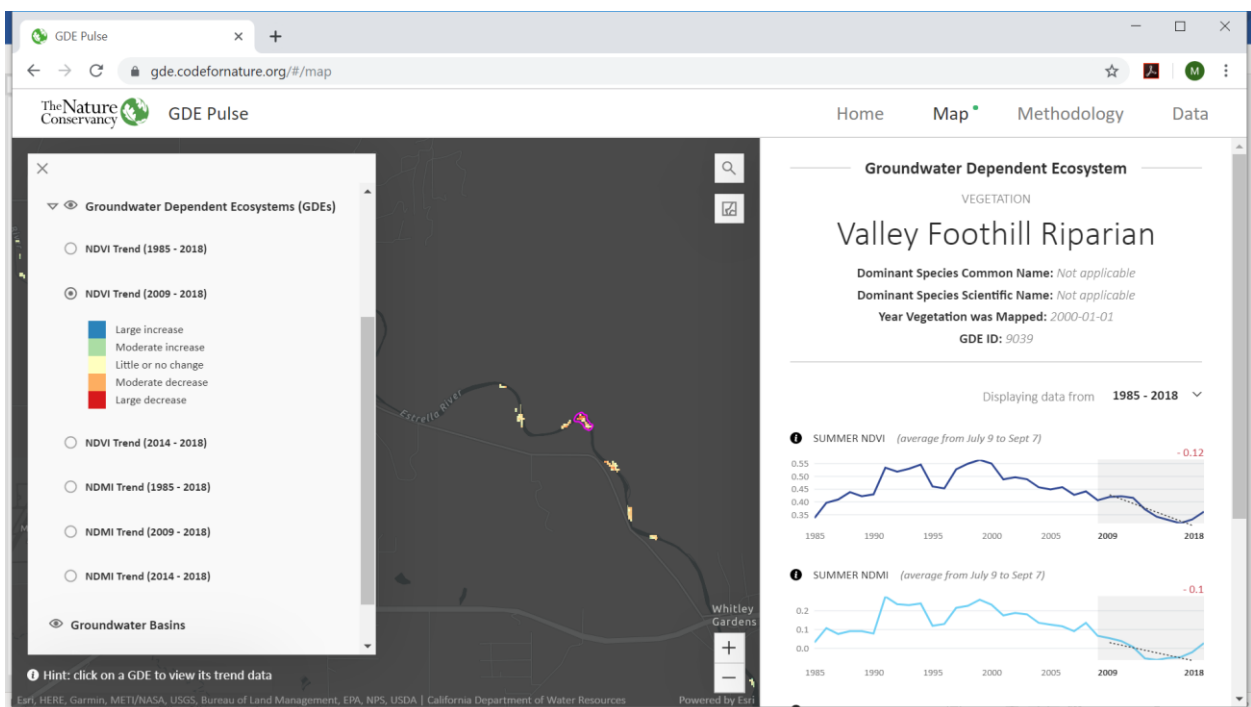
[Section 8.3 Chronic Lowering of Groundwater Levels Sustainable Management Criteria]

- [8.3.2] The definition of 'significant and unreasonable' is a qualitative statement that is used to describe when undesirable results would occur in the basin, which is then related to how a minimum threshold can be quantified. Potential effects on all beneficial users of groundwater in the basin need to be taken into consideration. According to the California Constitution Article X, §2, water resources in California must be "put to beneficial use to the fullest extent of which they are capable". **Please modify the local definition for 'significant and unreasonable' (provided on p. 8-7), so that it also specifies potential effects on environmental beneficial users of groundwater in the basin.**
- [8.3.3] Under SGMA, Measurable Objectives are to be established to achieve the sustainability goal of the basin within 20 years of Plan implementation [23 CCR §

354.30 (a)]. **Please modify the methodology for setting measurable objectives for groundwater levels so that it helps attain the sustainability goal defined on p. 8-4: "sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, and environmental benefit of Subbasin users. ... In adopting this GSP, it is the express goal of the GSAs to balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasin's resources."** (emphasis added)

- Section 8.3.3.1 states that environmental interests were considered when establishing measurable objectives. **Please provide a discussion regarding the environmental beneficial uses and users that were considered and how this was accomplished.**
- Section 8.3.3.2 and 8.3.3.3 present measurable objective for specific wells completed in each principal aquifer, but provide no discussion how a determination was made that these groundwater levels are protective of environmental beneficial uses and users, including GDEs. **Chronic lowering of groundwater levels can have a direct effect on environmental beneficial users and this effect should be considered when setting measurable objectives for this sustainability indicator and discussed in this section and supporting materials provided. Section 8.3.3.1 should describe how environmental beneficial uses and users, including GDEs were considered when establishing measurable objectives for chronic lowering of groundwater levels. Section 8.3.3.2 and 8.3.3.3 should describe how the identified measurable objectives will succeed in preventing significant and unreasonable harm to environmental beneficial uses of groundwater, including GDEs.**
- [8.3.4] **Chronic lowering of groundwater levels can have a direct effect on environmental beneficial users and this effect should be considered when setting minimum thresholds for this sustainability indicator and discussed in this section and supporting materials provided.** A technically defensible approach is to use 10-year baseline period of groundwater elevation data (2005-2015) to establish how groundwater conditions during that time period affect different beneficial water uses and users across the basin, including GDEs. **Please document the consideration of the following when establishing minimum thresholds for chronic lowering of groundwater levels:**
 - The relationship between the minimum threshold for chronic lowering of groundwater levels and potential significant and unreasonable impacts to GDEs and ecological beneficial uses of surface water are not described. **Please provide additional analysis to substantiate that the potential impacts of applying the proposed minimum thresholds will not cause significant and unreasonable impacts to GDEs and ecological beneficial uses of ISW, or identify this as a data gap.**
 - The potential effects of undesirable results on environmental beneficial users are not described and quantified. **Please expand the section to describe the potential effects of undesirable results on all beneficial uses and users, including environmental uses and users.**

- Are the proposed minimum thresholds consistent with other state, federal or local regulatory standards, including those applicable to interconnected surface waters, protected habitats and habitat conservation plans? [23 CCR§354.28(b)(5)]?
- Are there environmental beneficial groundwater users that need consideration, particularly those that are legally protected under the United States Endangered Species Act or California Endangered Species Act? (See **Attachment C** in the attached letter for a list of freshwater species located in the Paso Robles Subbasin)?
- The [GDE Pulse](#) web application developed by The Nature Conservancy (**Attachment E**) provides easy access to 35 years of satellite data to view trends of vegetation metrics, groundwater depth (where available), and precipitation data. This satellite imagery can be used to observe trends for NC dataset polygons within the Subbasin, and relate those trends to nearby groundwater level trends. Over the past 10 years (2009-2018), some NC dataset vegetation polygons have experienced adverse impacts to vegetation growth and moisture in the western portion of the Subbasin. An example is shown in the screen shot below. **Please review these spatial patterns and, where possible, correlate them with water level trends when developing minimum thresholds. Any indications of adverse trends and any data gaps should be identified.**



- [8.3.4.2] This section states that only one monitoring well was identified where minimum thresholds could be assessed in the Alluvial Aquifer. This is a significant data gap for a variety of beneficial uses and users, including GDEs and interconnected surface water. **Please describe a plan in the Monitoring network chapter on how the GSA will install shallow monitoring wells in the alluvial aquifer if confidentially agreements prevent existing wells from being used as**

representative monitoring wells for the Chronic Lowering of Groundwater sustainability indicator in this important aquifer.

- [8.3.4.4 and 8.3.4.6] The description of how the groundwater elevation minimum thresholds affect interconnected surface waters and ecological land uses and users is inadequate for the following reasons:
 - The draft GSP has failed to describe current and historical groundwater conditions near GDE areas, the nature of the GDEs and their potential sensitivity to groundwater level declines, and the potential effect of groundwater level declines on GDEs. Thus, it is impossible to assess how the proposed minimum thresholds relate to historical groundwater conditions in the GDE and whether potential adverse effects could occur to the GDEs as a result of groundwater conditions. **Please include a discussion of how minimum thresholds will affect the GDEs identified in Appendix C and identify any data gaps.**
- [8.3.4.7] The identified GDEs have not been adequately described or characterized. Different GDE species will have different susceptibilities to groundwater level declines. Please refer to the Critical Species Lookbook⁹ to review and discuss the potential groundwater reliance of critical species in the basin. Legally protected species located with GDEs have not been identified. Thus, it is impossible to evaluate whether federal, state, or local standards exist for groundwater elevations needed to protect these listed species. **Please provide a discussion regarding how the selected minimum thresholds will affect compliance with federal, state and local standards related to protected habitats, protected species, and other requirements, such as biological opinions, habitat conservation plans and other applicable standards.**
- [8.3.4.9] Irreversible harm to GDEs can occur within a relatively short period of time. This section summarizes interim milestones to prevent chronic lowering of groundwater levels to achieve the sustainability goal by at least 2040. **Please discuss how significant and unreasonable harm to GDEs will be prevented in the interim.**
- [8.3.5.1 and 8.3.5.3] The GSP proposes to allow violation of minimum thresholds at a certain percentage of locations prior to considering threshold violations as representative of an undesirable result. As stated above, damage to GDEs is often irreversible, leading to the permanent loss of a protected resource. A percentage violation trigger is therefore inadequate to assure that the sustainability goals of the GSP are met. **Please elaborate on how the exceedance criteria would be applied in a way that is protective of significant and unreasonable harm to GDEs. A procedure should be included for violation of minimum thresholds that includes early identification of potential GDE impacts and prioritization potentially impacted areas for investigation of impacts and appropriate response actions. This could be accomplished efficiently and cost-effectively through the use of remote sensing tools, such as GDE Pulse or other remote sensing approaches.**

⁹ Available online at: <https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/>

[Section 8.8 Depletion of Interconnected Surface Water Sustainable Management Criteria]

- The GSP fails to establish measurable objectives or minimum thresholds for this sustainability indicator, citing it as a data gap. The existence of riparian GDEs along the streams in the basin has been identified in Appendix C, and their connection to groundwater is assumed. Their occurrence in the riparian zone means that these GDEs should be considered a beneficial user of groundwater that could be affected by chronic groundwater level decline as discussed above, as well as beneficial users of surface water that could be depleted by groundwater extraction. **A more robust discussion of the known facts regarding these surface-groundwater interactions in the riparian zone should be provided. In addition, more detailed discussion regarding specific data gaps should be included. In our opinion, these changes are required in order for the GSP to be found adequate.**
- [8.8.1] While there are certainly data gaps and a need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients. After filling the data gaps for ISWs and further analysis, **specific plans and schedules should be provided for the establishment of minimum thresholds for ISWs.**
- [8.8.2] There is a need to evaluate and discuss potential effects on beneficial uses of surface and groundwater. In addition, the applicable state, federal and local standards for the protection of aquatic, riparian and other protected habitats should be discussed. This is necessary, at a minimum, so that the nature of the data gaps can be understood. **Please refer to Attachment C for a list of freshwater species in Paso Robles Subbasin that may be exist within ISWs. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs. Please refer to the Critical Species Lookbook¹⁰ to review and discuss the potential groundwater reliance of critical species in the basin.**

Checklist Items 47, 48 and 49 – Monitoring Network (23 CCR §354.34)

[Section 7.2.1 Groundwater Level Monitoring Network Data Gaps (p. 7-10)]

- The last row of Table 7-3 states that “Data must be able to characterize conditions and monitor adverse impacts to beneficial uses and users identified within the basin”. Aside from GDEs mapped in the basin (Figure 4-18), environmental surface water

¹⁰ Available online at: <https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/>

users have not been identified in the GSP thus far. SGMA requires that potential effects on GDEs and environmental surface water users be described when defining undesirable results. In addition to identifying GDEs in the basin, The Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define “significant and unreasonable adverse impacts” without knowing what is being impacted, nor is possible to monitor ISWs in a way that can “identify adverse impacts on beneficial uses of surface water” [23 CCR §354.34(c)(6)(D)]. For your convenience, we’ve provided a list of freshwater species within the boundary of the Paso Robles basin in **Attachment C**. Our hope is that this information will help your GSA better evaluate and monitor the impacts of groundwater management on environmental beneficial users of surface water. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list, and how best to monitor them. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs. **Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap and make plans to reconcile these in Chapter 10 (Plan Implementation).**

[Section 7.6.1 Interconnected Surface Water Monitoring Data Gaps (p. 7-25)]

- In addition to the need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, **there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands.** Ideally, co-locating stream gauges with clustered wells that can monitor groundwater levels in both the Alluvial and Paso Robles Formation aquifers would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surface water and groundwater.
- **There is a need to integrate biological indicators that can monitor adverse impacts to beneficial uses of surface water and groundwater within ISWs.**
- **Please provide sufficient detail for the investigation and monitoring program including stream gauges, screened intervals and aquifers of the shallow wells and frequency of monitoring, in order to describe monitoring of both the extent of ISWs and the quantity of surface water depletions from ISWs.**

[Chapter 10 Groundwater Sustainability Plan Implementation]

- **Please describe the expansion of the monitoring program and specify what types of monitoring will be done to identify impacts to GDEs. Be specific in describing wells and screened intervals that represent the water levels of both the Alluvial Aquifer and Paso Robles Formation Aquifer.**

Checklist Items 50 and 51 – Projects and Management Actions to Achieve Sustainability Goal (23 CCR §354.44)

[Chapter 9 Management Actions and Projects]

- As stated in GSP Section 5.5, a data gap exists around interconnected surface waters (ISWs) in the Paso Robles Subbasin. Please recognize the data gap in this Chapter and the possibility that if ISWs are present in the Subbasin, there is a need to establish sustainable management criteria for ISWs in the basin and include ISWs as a specific sustainability indicator to be addressed by management actions and projects as described herein. **For the management actions and projects already identified, state how GDEs and ISWs will be benefited or protected. If GDEs and ISWs will not be adequately protected by those listed, please include and describe additional management actions and projects.**
- An important data gap already recognized is the lack of publicly available groundwater elevation data in the Alluvial Aquifer. As discussed in TNC's comments on Section 8.3 above, a scientifically robust methodology must be proposed for establishing the initial minimum thresholds for the Alluvial Aquifer. **In light of the data gap regarding Alluvial Aquifer groundwater data, please be more specific in stating how GDEs and ISWs would benefit from management actions and projects, and how actions and projects will be evaluated to assess whether adverse impacts to GDEs will be mitigated or prevented:**
 - Promote Stormwater Capture (Page 9-10): Please describe how recharge from unallocated storm flows will be evaluated to assess benefits to GDEs and ISWs.
 - Mandatory Pumping Reductions (Page 9-13): Please discuss the data gap for wells screened in the alluvial aquifer and the data gap for vertical gradient between the alluvial aquifer and Paso Robles Formation, since most wells are screened in the Paso Robles aquifer. When these data gaps are resolved, it will become clearer how mandatory pumping reductions could also benefit GDEs and ISWs.
 - Conceptual Projects (Pages 9-18 to 9-44): Most of the conceptual projects involve in-lieu recharge for the direct use of recycled wastewater. Thus, the recycled water would replace pumped groundwater. Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs.
- For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website:
<https://groundwaterresourcehub.org/case-studies/recharge-case-studies/>

Attachment C

Freshwater Species Located in the Paso Robles Subbasin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result “depletion of interconnected surface waters”, Attachment C provides a list of freshwater species located in the Paso Robles Subbasin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the Paso Robles groundwater basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015¹¹. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife’s BIOS¹² as well as on The Nature Conservancy’s science website¹³.

Scientific Name	Common Name	Legally Protected Status		
		Federal	State	Other
BIRD				
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	SSC	BSSC - First priority
Aix sponsa	Wood Duck			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya collaris	Ring-necked Duck			
Aythya valisineria	Canvasback		SSC	
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			

¹¹ Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoS ONE, 11(7). Available at: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710>

¹² California Department of Fish and Wildlife BIOS: <https://www.wildlife.ca.gov/data/BIOS>

¹³ Science for Conservation: <https://www.scienceforconservation.org/products/california-freshwater-species-database>

<i>Calidris mauri</i>	Western Sandpiper			
<i>Chen caerulescens</i>	Snow Goose			
<i>Chen rossii</i>	Ross's Goose			
<i>Chroicocephalus philadelphia</i>	Bonaparte's Gull			
<i>Cistothorus palustris palustris</i>	Marsh Wren			
<i>Egretta thula</i>	Snowy Egret			
<i>Fulica americana</i>	American Coot			
<i>Gallinago delicata</i>	Wilson's Snipe			
<i>Gallinula chloropus</i>	Common Moorhen			
<i>Geothlypis trichas trichas</i>	Common Yellowthroat			
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird of Conservation Concern	Endangered	
<i>Icteria virens</i>	Yellow-breasted Chat		SSC	BSSC - Third priority
<i>Lophodytes cucullatus</i>	Hooded Merganser			
<i>Megaceryle alcyon</i>	Belted Kingfisher			
<i>Mergus merganser</i>	Common Merganser			
<i>Mergus serrator</i>	Red-breasted Merganser			
<i>Numenius americanus</i>	Long-billed Curlew			
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron			
<i>Oxyura jamaicensis</i>	Ruddy Duck			
<i>Pandion haliaetus</i>	Osprey		Watch list	
<i>Pelecanus erythrorhynchos</i>	American White Pelican		SSC	BSSC - First priority
<i>Phalacrocorax auritus</i>	Double-crested Cormorant			
<i>Podiceps nigricollis</i>	Eared Grebe			
<i>Podilymbus podiceps</i>	Pied-billed Grebe			
<i>Porzana carolina</i>	Sora			
<i>Rallus limicola</i>	Virginia Rail			
<i>Recurvirostra americana</i>	American Avocet			
<i>Riparia riparia</i>	Bank Swallow		Threatened	
<i>Setophaga petechia</i>	Yellow Warbler			BSSC - Second priority
<i>Tachycineta bicolor</i>	Tree Swallow			
<i>Tringa melanoleuca</i>	Greater Yellowlegs			
<i>Tringa solitaria</i>	Solitary Sandpiper			
<i>Vireo bellii</i>	Bell's Vireo			
<i>Vireo bellii pusillus</i>	Least Bell's Vireo	Endangered	Endangered	

Xanthocephalus xanthocephalus	Yellow-headed Blackbird		SSC	BSSC - Third priority
CRUSTACEAN				
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	SSC	IUCN - Vulnerable
Cyprididae fam.	Cyprididae fam.			
Hyalella spp.	Hyalella spp.			
Pacifastacus spp.	Pacifastacus spp.			
FISH				
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	SSC	Vulnerable - Moyle 2013
Catostomus occidentalis mnioltitus	Monterey sucker			Least Concern - Moyle 2013
Catostomus occidentalis occidentalis	Sacramento sucker			Least Concern - Moyle 2013
Cottus gulosus	Riffle sculpin		SSC	Near-Threatened - Moyle 2013
Entosphenus tridentata ssp. 1	Pacific lamprey		SSC	Near-Threatened - Moyle 2013
Lavinia exilicauda exilicauda	Sacramento hitch		SSC	Near-Threatened - Moyle 2013
Lavinia exilicauda harengus	Monterey hitch		SSC	Vulnerable - Moyle 2013
Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Orthodon microlepidotus	Sacramento blackfish			Least Concern - Moyle 2013
Ptychocheilus grandis	Sacramento pikeminnow			Least Concern - Moyle 2013
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	SSC	Vulnerable - Moyle 2013
HERP				
Actinemys marmorata marmorata	Western Pond Turtle		SSC	ARSSC

<i>Ambystoma californiense californiense</i>	California Tiger Salamander	Threatened	Threatened	ARSSC
<i>Anaxyrus boreas boreas</i>	Boreal Toad			
<i>Anaxyrus boreas halophilus</i>	California Toad			ARSSC
<i>Anaxyrus californicus</i>	Arroyo Toad	Endangered	SSC	ARSSC
<i>Pseudacris cadaverina</i>	California Treefrog			ARSSC
<i>Pseudacris hypochondriaca</i>	Baja California Treefrog			
<i>Pseudacris regilla</i>	Northern Pacific Chorus Frog			
<i>Rana boylei</i>	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	SSC	ARSSC
<i>Rana draytonii</i>	California Red-legged Frog	Threatened	SSC	ARSSC
<i>Spea hammondi</i>	Western Spadefoot	Under Review in the Candidate or Petition Process	SSC	ARSSC
<i>Taricha torosa</i>	Coast Range Newt		SSC	ARSSC
<i>Thamnophis hammondi hammondi</i>	Two-striped Gartersnake		SSC	ARSSC
<i>Thamnophis sirtalis infernalis</i>	California Red-sided Gartersnake			Not on any status lists
<i>Thamnophis sirtalis sirtalis</i>	Common Gartersnake			
INSECT & OTHER INVERT				
<i>Acentrella</i> spp.	<i>Acentrella</i> spp.			
<i>Agabus</i> spp.	<i>Agabus</i> spp.			
<i>Ambrysus mormon</i>	Creeping water bug			Not on any status lists
<i>Antocha</i> spp.	<i>Antocha</i> spp.			
<i>Argia emma</i>	Emma's Dancer			
<i>Argia lugens</i>	Sooty Dancer			
<i>Argia</i> spp.	<i>Argia</i> spp.			
<i>Argia vivida</i>	Vivid Dancer			
Baetidae fam.	Baetidae fam.			
Baetis spp.	Baetis spp.			
<i>Berosus punctatissimus</i>	Water scavenger beetles			Not on any status lists
<i>Berosus</i> spp.	<i>Berosus</i> spp.			
<i>Callibaetis</i> spp.	<i>Callibaetis</i> spp.			

Centroptilum spp.	Centroptilum spp.			
Chaetarthria bicolor	Water Scavenger Beetles			Not on any status lists
Chaetarthria ochra	Water Scavenger Beetles			Not on any status lists
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus spp.	Chironomus spp.			
Cladotanytarsus spp.	Cladotanytarsus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Corisella spp.	Corisella spp.			
Corixidae fam.	Corixidae fam.			
Cricotopus spp.	Cricotopus spp.			
Dicrotendipes spp.	Dicrotendipes spp.			
Dytiscidae fam.	Dytiscidae fam.			
Enallagma civile	Familiar Bluet			
Enallagma cyathigerum	Common blue damselfly			Not on any status lists
Enochrus carinatus	Water Scavenger Beetles			Not on any status lists
Enochrus cristatus	Water Scavenger Beetles			Not on any status lists
Enochrus piceus	Water Scavenger Beetles			Not on any status lists
Enochrus pygmaeus	Water Scavenger Beetles			Not on any status lists
Enochrus spp.	Enochrus spp.			
Ephemerella spp.	Ephemerella spp.			
Ephemerellidae fam.	Ephemerellidae fam.			
Ephydriidae fam.	Ephydriidae fam.			
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Graptocorixa spp.	Graptocorixa spp.			
Gyrinus spp.	Gyrinus spp.			
Helichus spp.	Helichus spp.			
Helicopsyche spp.	Helicopsyche spp.			
Hetaerina americana	American Rubyspot			
Hydrochus spp.	Hydrochus spp.			
Hydrophilidae fam.	Hydrophilidae fam.			
Hydroporus spp.	Hydroporus spp.			
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydryphantidae fam.	Hydryphantidae fam.			
Ischnura spp.	Ischnura spp.			
Laccobius ellipticus	Water scavenger beetles			Not on any status lists
Laccobius spp.	Laccobius spp.			

Laccophilus maculosus	Dingy Diver			Not on any status lists
Lepidostoma spp.	Lepidostoma spp.			
Leptoceridae fam.	Leptoceridae fam.			
Libellula saturata	Flame Skimmer			
Limnophyes spp.	Limnophyes spp.			
Liodesus obscurellus	Predacious Diving Beetle			Not on any status lists
Macromia magnifica	Western River Cruiser			
Malenka spp.	Malenka spp.			
Microcylloepus spp.	Microcylloepus spp.			
Microtendipes spp.	Microtendipes spp.			
Nectopsyche spp.	Nectopsyche spp.			
Ochthebius spp.	Ochthebius spp.			
Ophiogomphus bison	Bison Snaketail			
Optioservus spp.	Optioservus spp.			
Oreodytes spp.	Oreodytes spp.			
Paracloeodes minutus	A Small Minnow Mayfly			
Paracymus spp.	Paracymus spp.			
Paratanytarsus spp.	Paratanytarsus spp.			
Peltodytes spp.	Peltodytes spp.			
Phaenopsectra spp.	Phaenopsectra spp.			
Plathemis lydia	Common Whitetail			
Postelichus spp.	Postelichus spp.			
Procladius spp.	Procladius spp.			
Pseudochironomus spp.	Pseudochironomus spp.			
Psychodidae fam.	Psychodidae fam.			
Rheotanytarsus spp.	Rheotanytarsus spp.			
Rhyacophila spp.	Rhyacophila spp.			
Sigara mckinstryi	A Water Boatman			Not on any status lists
Sigara spp.	Sigara spp.			
Simuliidae fam.	Simuliidae fam.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Sperchontidae fam.	Sperchontidae fam.			
Stictotarsus spp.	Stictotarsus spp.			
Sweltsa spp.	Sweltsa spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tipulidae fam.	Tipulidae fam.			
Tramea lacerata	Black Saddlebags			
Tricorythodes spp.	Tricorythodes spp.			
Wormaldia spp.	Wormaldia spp.			
MAMMAL				
Castor canadensis	American Beaver			Not on any status lists

MOLLUSK				
Gyraulus spp.	Gyraulus spp.			
Lymnaea spp.	Lymnaea spp.			
Menetus opercularis	Button Sprite			CS
Physa spp.	Physa spp.			
Pisidium spp.	Pisidium spp.			
Planorbidae fam.	Planorbidae fam.			
PLANT				
Alnus rhombifolia	White Alder			
Ammannia coccinea	Scarlet Ammannia			
Anemopsis californica	Yerba Mansa			
Azolla filiculoides	Mosquito Fern			
Baccharis salicina	Willow Baccharis			Not on any status lists
Bolboschoenus maritimus paludosus	Saltmarsh Bulrush			Not on any status lists
Callitriche heterophylla bolanderi	Large Water-starwort			
Callitriche marginata	Winged Water-starwort			
Castilleja minor minor	Alkali Indian-paintbrush			
Castilleja minor spiralis	Large-flower Annual Indian-paintbrush			
Cotula coronopifolia	Brass Buttons			
Crassula aquatica	Water Pygmyweed			
Cyperus vaginiflora	African Prickle Grass			
Cyperus erythrorhizos	Red-root Flatsedge			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis parishii	Parish's Spikerush			
Epilobium campestre	Smooth Boisduvalia			Not on any status lists
Epilobium cleistogamum	Cleistogamous Spike-primrose			
Eryngium spinosepalum	Spiny Sepaled Coyote-thistle		SSC	CRPR - 1B.2
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle			Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Helenium puberulum	Rosilla			
Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort			
Juncus dubius	Mariposa Rush			
Juncus effusus effusus	Common Bog Rush			
Juncus luciensis	Santa Lucia Dwarf Rush		SSC	CRPR - 1B.2
Juncus macrophyllus	Longleaf Rush			
Juncus xiphioides	Iris-leaf Rush			

<i>Limosella aquatica</i>	Northern Mudwort			
<i>Marsilea vestita vestita</i>	Hairy Waterclover			Not on any status lists
<i>Mimulus guttatus</i>	Common Large Monkeyflower			
<i>Mimulus latidens</i>	Broad-tooth Monkeyflower			
<i>Mimetanthe pilosa</i>	Snouted Monkey Flower			Not on any status lists
<i>Montia fontana fontana</i>	Fountain Miner's-lettuce			
<i>Navarretia prostrata</i>	Prostrate Navarretia		SSC	CRPR - 1B.1
<i>Paspalum distichum</i>	Joint Paspalum			
<i>Persicaria lapathifolia</i>	Common Knotweed			Not on any status lists
<i>Persicaria maculosa</i>	Spotted Ladysthumb			Not on any status lists
<i>Phacelia distans</i>	Common Phacelia			
<i>Pilularia americana</i>	Pillwort			
<i>Plagiobothrys acanthocarpus</i>	Adobe Popcorn-flower			
<i>Plantago elongata elongata</i>	Slender Plantain			
<i>Platanus racemosa</i>	California Sycamore			
<i>Psilocarphus brevissimus brevissimus</i>	Dwarf Woolly-heads			
<i>Ranunculus aquatilis diffusus</i>	Whitewater Crowfoot			Not on any status lists
<i>Rorippa curvisiliqua curvisiliqua</i>	Curve-pod Yellowcress			
<i>Rumex conglomeratus</i>	Green Dock			
<i>Rumex salicifolius salicifolius</i>	Willow Dock			
<i>Salix exigua exigua</i>	Narrowleaf Willow			
<i>Salix laevigata</i>	Polished Willow			
<i>Salix lasiolepis lasiolepis</i>	Arroyo Willow			
<i>Schoenoplectus americanus</i>	Three-square Bulrush			
<i>Schoenoplectus pungens longispicatus</i>	Three-square Bulrush			
<i>Schoenoplectus pungens pungens</i>	Common Threesquare			
<i>Schoenoplectus saximontanus</i>	Rocky Mountain Bulrush			
<i>Typha domingensis</i>	Southern Cattail			
<i>Typha latifolia</i>	Broadleaf Cattail			
<i>Veronica anagallis-aquatica</i>	Water Speedwell			

Veronica catenata	Chain Speedwell			Not on any status lists
Notes: ARSSC = At-Risk Species of Special Concern BSSC = Bird Species of Special Concern CRPR = California Rare Plant Rank CS = Currently Stable SSC = Species of Special Concern				

Attachment D

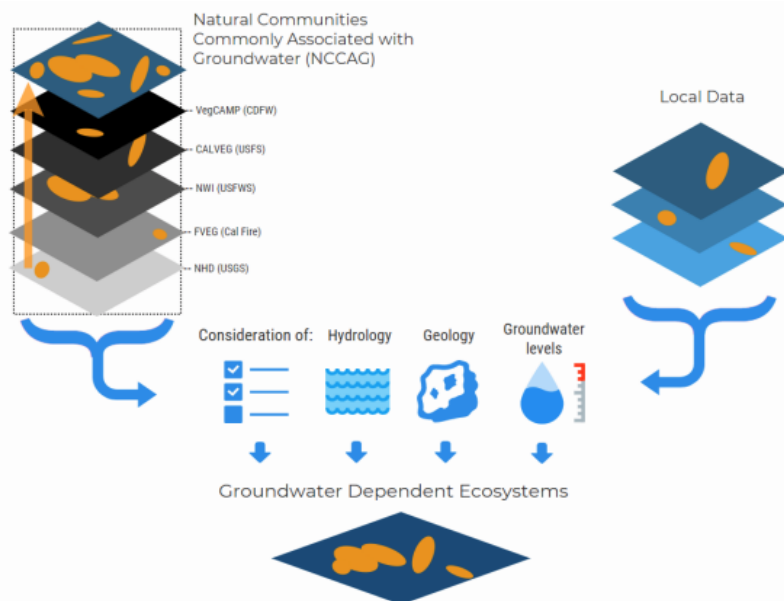


July 2019



IDENTIFYING GDEs UNDER SGMA Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online¹⁴ to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)¹⁵. This document highlights six best practices for using local groundwater data to confirm whether mapped features in the NC dataset are supported by groundwater.



¹⁴ NC Dataset Online Viewer: <https://gis.water.ca.gov/app/NCDataSetViewer/>

¹⁵ California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf>

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California¹⁶. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset¹⁷ on the Groundwater Resource Hub¹⁸, a website dedicated to GDEs.

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2a) or multiple aquifers stacked on top of each other (Figure 2b). In unconfined aquifers (Figure 2a), using the depth-to-groundwater and the rooting depth of the vegetation is a reasonable method to infer groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2d). However, it is important to consider local conditions (e.g., soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2c). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2b) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and GDEs (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should be done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

¹⁶ For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf

¹⁷ "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at: <https://groundwaterresourcehub.org/qde-tools/qsp-guidance-document/>

¹⁸ The Groundwater Resource Hub: www.GroundwaterResourceHub.org

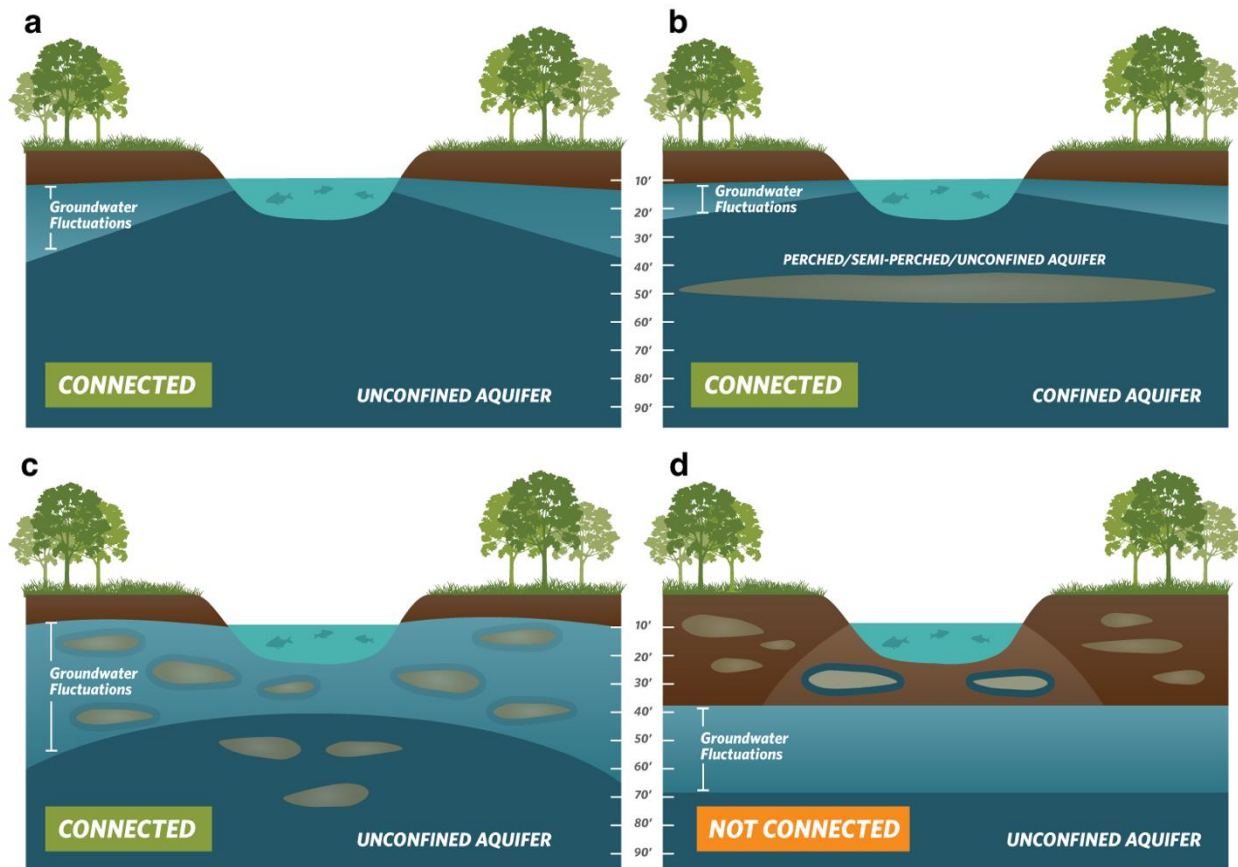


Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(b)** Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (c)** Depth-to-groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(d)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under the surface water feature. These areas are not connected to groundwater and typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets¹⁹ recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline²⁰ could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach²¹ for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document⁴, one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (see Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however if these groundwater conditions are prolonged, adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet⁴ of the land surface are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer²². However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP until data gaps are reconciled in the monitoring network (see Best Practice #6).

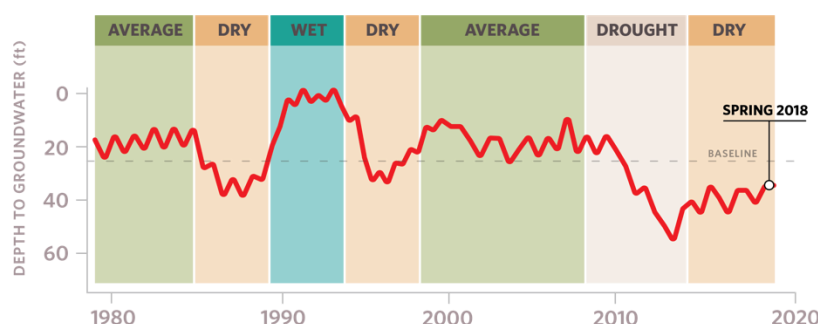


Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

¹⁹ DWR. 2016. Water Budget Best Management Practice. Available at:

https://water.ca.gov/LegacyFiles/groundwater/sqm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

²⁰ Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

²¹ Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs⁴).

²² SGMA Data Viewer: <https://sgma.water.ca.gov/webqis/?appid=SGMADataViewer>

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around a GDE does not preclude the possibility that it is supported by groundwater, too. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals²³, which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

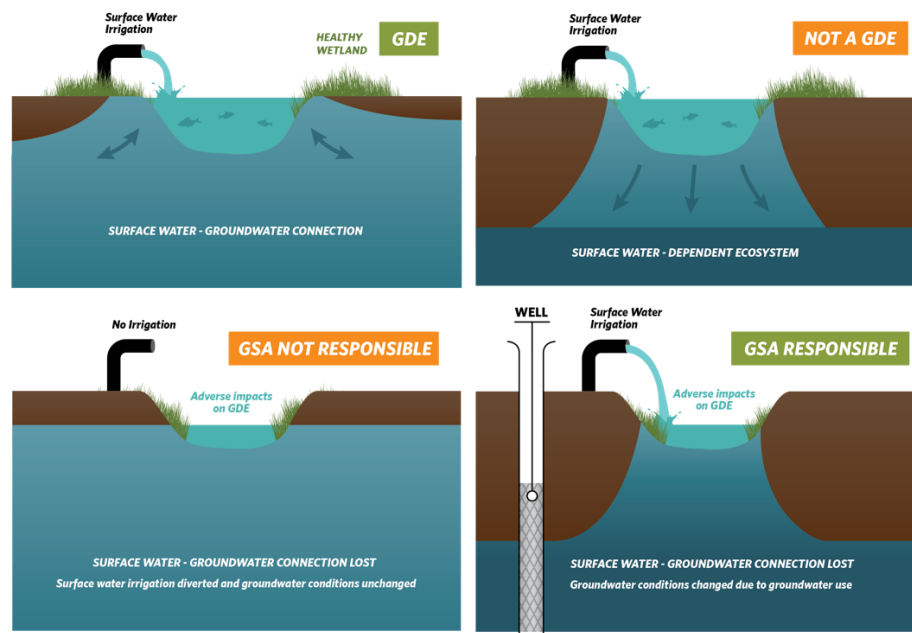


Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

²³ For a list of environmental beneficial users of surface water by basin, visit: <https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/>

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.
- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.
- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

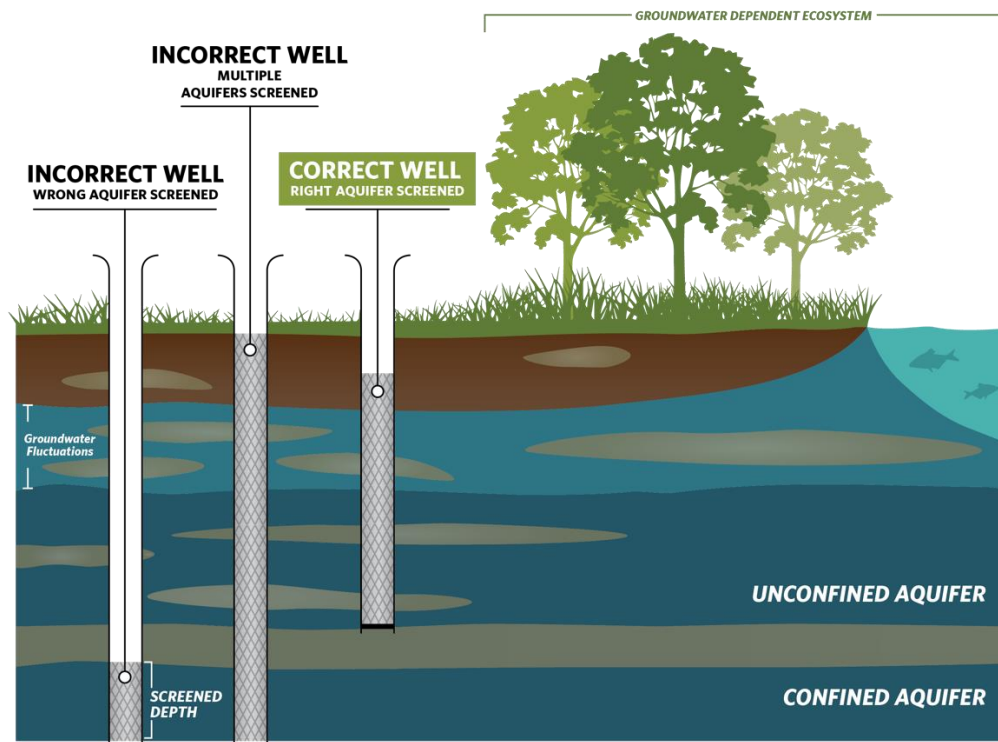


Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like stream and wetland depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6a). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get groundwater elevation contours across the landscape. This layer can then be subtracted from land surface elevations from a Digital Elevation Model (DEM)²⁴ to estimate depth-to-groundwater contours across the landscape (Figure b; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

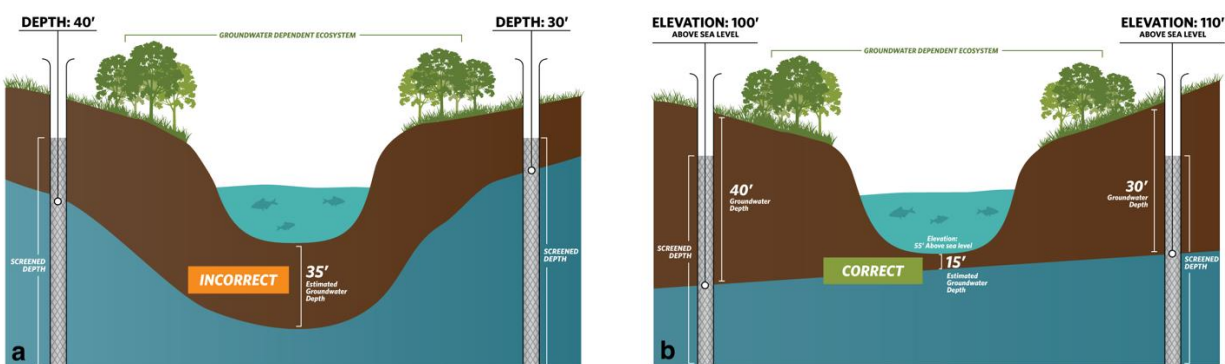


Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(b)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

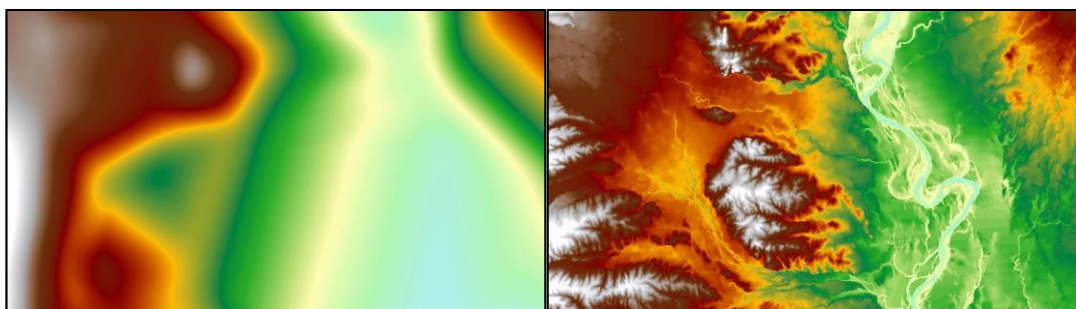


Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth-to-groundwater contours. The image on the right shows a more accurate depth-to-groundwater estimate because it takes the local topography and elevation changes into account.

²⁴ USGS Digital Elevation Model data products are described at: <https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services> and can be downloaded at: <https://viewer.nationalmap.gov/basic/>

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring programs to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. 23 CCR §341(g)(1)

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. 23 CCR §351(m)

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. 23 CCR §351(o)

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. 23 CCR §351(aa)

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Attachment E

GDE Pulse

A new, free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data.



Visit
<https://gde.codefornature.org/>



Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset²⁵. The following datasets are included:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset²⁶. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

²⁵ The Natural Communities Commonly Associated with Groundwater Dataset is hosted on the California Department of Water Resources' website: <https://gis.water.ca.gov/app/NCDatasetViewer/#>

²⁶ The PRISM dataset is hosted on Oregon State University's website: <http://www.prism.oregonstate.edu/>

My name is Robert Woodland. My family has been part of San Luis Obispo county for three generations. We have been involved in Farming for many years. I am the managing member and or family representative of approx. 300 acres of vineyard in the north county.

Thank you SLO Co and the other GSAs for all of your time and effort in forming the current draft of the Groundwater Sustainability Plan.

There are a few issues that I am concerned about that aren't answered or addressed in the current draft.

I am concerned that there is no agriculture related representations or inclusion in the various GSP meetings or involvement in the draft policy. I am also concerned that in an agricultural county there is no agricultural voice and that there should be at least 1 voting representative from the ag community.

I am concerned that growth doesn't appear to have been considered regarding de minimis users and that there doesn't appear to be a way of monitoring or policing water use.

I am concerned that there has been nothing addressed regarding farmers that have been and are working on best farming practices versus farmers that don't. If there is a blanket cut back in water use, those who have invested time and money into reducing water usage will be hurt the most.

Thanks again to the County and other GSAs for your hard work and dedication. The GSP will impact everyone in the area and I believe should be represented by all facets of those impacted.

Respectfully,

Robert Woodland

Appendix O

SGMA Implementation Grant Spending Plan, Paso Robles Subbasin of the Salinas Valley Basin

Applicant Name: County of San Luis Obispo
Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

Table 1 – Spending Plan

Rank	Name	Estimated Score	COD SJV Component Requirement	Benefactors	Cost	Justification
1	GRANT ADMINISTRATION	N/A	<input type="checkbox"/>	<input type="checkbox"/> Tribe(s) <input checked="" type="checkbox"/> URC(s) <input checked="" type="checkbox"/> SDAC(s)	\$ 250,000	As required under the Basin's current Grant Agreement, this task will involve the preparation of reimbursement request packages containing invoices and quarterly progress reports. This task is required for successful grant implementation.
2	RECYCLED WATER PROJECT <ul style="list-style-type: none"> City of Paso Robles Recycled Water Supply – Salinas Segment San Miguel CSD Recycled Water Supply 	26	<input type="checkbox"/>	<input type="checkbox"/> Tribe(s) <input checked="" type="checkbox"/> URC(s) <input checked="" type="checkbox"/> SDAC(s)	\$ 4,500,000	1.) The City of Paso Robles has a master plan to distribute tertiary-quality recycled water currently being produced at the City's WWTP to east Paso Robles, where it may be safely used for irrigation of City parks, golf courses, and vineyards. This direct use of recycled water will reduce the need to pump groundwater from the Basin and further improve the sustainability of the City's water supply and provide a supplemental water supply to irrigators in the basin that will further offset groundwater pumping. The City is nearing completion of the design of a major distribution system to deliver recycled water to east Paso Robles. When completed, the distribution system project will be capable of delivering up to 4,900 AFY of disinfected tertiary effluent. Of this amount, approximately 2,000 AFY is currently available for use by agricultural irrigators in-lieu of groundwater extraction, in the central portion of the basin near and inside the City of Paso Robles. Water that is not used in lieu of groundwater pumping will be discharged to Huer Huero Creek with the potential for additional recharge benefits. The component of the project to be funded in conjunction with the SGM GSP Implementation Grant would include the infrastructure required to convey the treated effluent supply from the City WWTF and will include a critical segment of the pipeline infrastructure to provide for delivering across the Salinas River to a point of

Applicant Name: County of San Luis Obispo
Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

					<p>connection to a segment of recycled water line the City has already constructed. These initial pipeline segments will facilitate a new turn-out for future extension of the "purple-pipe" distribution system to irrigation users including vineyards, municipal parks, golf courses, residential developments, and the local community college.</p> <p>2.) The San Miguel Community Services District (CSD) is currently in the final design and permitting phases for a major upgrade to their wastewater treatment facility (WWTF) which will allow the District to produce effluent which meets California Code of Regulations (CCR) Title 22 criteria for disinfected secondary recycled water for irrigation use by vineyards. The WWTF upgrade construction phase is scheduled to be completed in 2023. The District has been in preliminary discussions with a group of agricultural customers in close proximity to the WWTF that are interested in taking delivery of the treated effluent to be used for vineyard irrigation in-lieu of pumping groundwater from the Basin. The project could provide between 200 and 450 AFY of in-lieu water supplies. The component of the project to be funded in conjunction with the SGM GSP Implementation Grant would include the infrastructure required to convey the treated effluent supply from the WWTF to the vineyard and would include a new recycled water pumping station, pipeline, and turn-out infrastructure to provide for delivering water to the vineyard.</p>
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Applicant Name: County of San Luis Obispo

Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

3	<p>ADDRESS GSP DATA GAPS – HIGH PRIORITY</p> <ul style="list-style-type: none">• Expand and Improve Existing Basin Monitoring Network• Supplemental Hydrogeologic Investigation(s)• Install New MWs, Stream Gages, Climatologic Stations	25	<input type="checkbox"/>	<input type="checkbox"/> Tribe(s) <input checked="" type="checkbox"/> URC(s) <input checked="" type="checkbox"/> SDAC(s)	\$ 1,400,000	<p>1.) The SGMA regulations require a sufficient spatial coverage and density of monitoring wells to characterize the groundwater table or potentiometric surface for each principal aquifer, which in this Basin includes the Paso Robles Formation aquifer and the alluvial aquifers associated with the Salinas River and major perennial streams. The Basin is approximately 682 square miles in area, and the current groundwater level monitoring network includes 22 wells in the Paso Robles Formation Aquifer, which equates to approximately 3 wells per 100 square miles for well density in the Paso Robles Formation. The proposed strategy for adding monitoring wells and representative monitoring sites (RMS) to the monitoring network will be to first incorporate existing wells to the extent possible.</p> <p>2.) New monitoring wells will be drilled in data gap areas where existing wells do not exist or areas where access to existing wells could not be secured. The GSAs will obtain required permits and access agreements before drilling new wells. In addition to new monitoring wells, the GSAs will install new stream gages and climatologic stations to allow for an enhanced understanding of the interaction between surface waters and groundwater, both in the alluvial and Paso Robles Formation aquifers. Additional climatologic stations will provide valuable information regarding crop water usage and evapotranspiration which will be used in future groundwater extraction calculations.</p> <p>3.) The goal of the supplemental hydrogeologic investigations will be to improve our understanding of the hydrogeologic conceptual model of the Basin to support an equitable decision-making process and adaptive management of the programs and actions designed to achieve sustainability. The supplemental hydrogeologic investigations will be conducted in tandem with improving the</p>
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Applicant Name: County of San Luis Obispo

Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

						groundwater level monitoring network. The investigation will rely on existing information first and conduct additional investigations, as deemed appropriate by the GSAs, to address targeted data gaps.
4	<p>HIGH PRIORITY MANAGEMENT ACTIONS</p> <ul style="list-style-type: none">• Well verification and registration program• Groundwater extraction measurement program• Well interference mitigation program• Multi-benefit land repurposing program	23	<input type="checkbox"/>	<input type="checkbox"/> Tribe(s) <input checked="" type="checkbox"/> URC(s) <input checked="" type="checkbox"/> SDAC(s)	\$ 800,000	<p>1.) The Well Verification and Registration Program will ensure that the GSA's information regarding the location and spatial distribution of groundwater use is correct and will help fill data gaps about groundwater users and well owners in the basin. Well registration is intended to establish a relatively accurate count of all the active wells in the Basin. If the information obtained through the well registration program indicates that there is a potential for adverse impacts to the future water supply adequacy or water quality of domestic and/or community drinking water supply wells, then the GSA can elect to develop and implement a Drinking Water Well Impact Mitigation Program</p> <p>2.) The GSAs will also require all non-de minimis groundwater pumpers to report extractions annually and use a water-measuring method satisfactory to the GSAs in accordance with Water Code § 10725.8. Extraction measurements by private well owners within the Basin have not been heretofore required. Extractions from these wells, which are used primarily for irrigated agricultural operations, will be required to be metered and extractions reported.</p> <p>3.) The GSAs also intend to develop and implement a Drinking Well Impact Mitigation Program to provide drinking water wells, and especially domestic well users, protection from</p>

Applicant Name: County of San Luis Obispo

Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

						<p>the effects of agricultural pumping, with specific emphasis on protecting those areas within the Basin where there are concentrations of shallow domestic wells. Recent experience has demonstrated that some of these areas have experienced several wells going dry and domestic water supply disruptions.</p> <p>4.) The GSAs will also develop and implement a voluntary multi-benefit land repurposing program that will facilitate the conversion of high-water use irrigated agricultural land to low water use agriculture use or open space, public land, or other land uses on a voluntary basis. The GSAs propose to develop and implement programs that will permit both voluntary temporary and long-term or permanent fallowing and conversion to other land uses. An important consideration in developing the voluntary multi-benefit land repurposing programs will be to include protections of water rights for the overlying landowners that choose to temporarily repurpose irrigated lands.</p>
5	<p>SUPPLEMENTAL WATER SUPPLY FEASIBILITY / ENGINEERING STUDIES</p> <ul style="list-style-type: none">• Nacimiento Lake supplemental supply projects• State Water Project (SWP) supplemental supply projects• Santa Margarita Lake supplemental supply projects• Well Impact Mitigation and Alternative Water Supply Projects	22	<input type="checkbox"/>	<input type="checkbox"/> Tribe(s) <input checked="" type="checkbox"/> URC(s) <input checked="" type="checkbox"/> SDAC(s)	\$ 650,000	<p>1.) The Nacimiento Water Project (NWP) consists of 45 miles of pipeline that conveys raw water from Lake Nacimiento in the northern portion of San Luis Obispo County to communities within San Luis Obispo County. Monterey County Water Resource Agency (MCWRA) manages and operates Lake Nacimiento and San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWD) has an entitlement of 17,500 AFY through a Master Water Agreement with MCWRA negotiated in 1959. Any surplus NWP water must be obtained from the existing participants through a "turn back pool" arrangement. Several potential projects that considered the use of Lake Nacimiento water were identified in the GSP. One project that has gained local support in the Basin has been proposed by a consortium of vineyard growers which have operations in the central portion of the Basin. The group of private growers is</p>

Applicant Name: County of San Luis Obispo

Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

						<p>considering plans to use a blended supply of recycled water from the City of Paso Robles and a supply from the NWP to produce a irrigation supply water that has desirable water quality properties. The proposed project would provide funding for an engineering study to assess the feasibility of the proposed project, perform design alternatives analyses and develop recommendations for the final project design criteria, including pipeline alignments, and design criteria for the proposed blending facility and pump station(s).</p> <p>2.) A study performed on behalf of the Central Coast Water Authority (2021) concluded that SLOFCWCD has adequate SWP water supplies to meet its current Participant and simulated additional demands in all years under historic hydrologic patterns. The study further recommended that SLOFCWCD explore alternative management of SLOFCWCD's uncontracted SWP Table A. Available options include entering into contracts with other entities for purposes such as groundwater basin supply augmentation, among others. Since a supplemental supply for groundwater basins is typically used to maintain long term sustainability, the SWP supplemental deliveries would not necessarily be needed in every year. Given the considerably higher value of SWP supplies through sales in drier years, an alternative approach for supplemental groundwater basin supply would be to provide higher amounts of water deliveries in wetter years and lower amounts (or none at all) in drier years. An intermittent SWP supply approach would likely be more cost effective for SWP supplies, but there would be a tradeoff from increased turnout and delivery facility costs for higher capacity deliveries and lower use factors. The proposed project would provide funding for an engineering study to assess the feasibility using unallocated SLOFCWCD SWP supplies, and other supplemental water supplies as may become</p>
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						<p>available, for the benefit of the Basin to help in achieving sustainability.</p> <p>3.) SLOCFWCD operates the Salinas Dam to provide water to the City of San Luis Obispo. The storage capacity of the lake is 23,843 AF; however, the City has existing water rights of 45,000 AF of storage. The SLOCFWCD is leading a project to transfer ownership of the Dam from the Army Corp of Engineers to the SLOCFWCD in order to pursue opportunities to optimize its use and provide additional supplies to beneficiaries. This involves retrofitting the dam and expanding the storage capacity by installing gates along the spillway in order to retain flood flow/stormwater for beneficial use. There may be opportunities to use the water from the expanded and/or reoperated reservoir to benefit the Basin. One possibility would be to schedule summer releases from the storage to the Salinas River, which would benefit the Basin by recharging the basin through the Salinas River. Another way this project might indirectly benefit the Basin is if the City of San Luis Obispo were to use more of their Salinas River water allocation, thereby freeing up the NWP water for purchase by the GSAs. The proposed project would provide funding for identifying and evaluating the options and determining the best way to stabilize groundwater levels and address surface water depletion utilizing any available Salinas River flood flow/stormwater provided by the SLOCFWCD project.</p>
6	<p>MEDIUM PRIORITY MANAGEMENT ACTIONS</p> <ul style="list-style-type: none">• Pumping fee program• Groundwater pumping allocation program	21	<input type="checkbox"/>	<p><input type="checkbox"/> Tribe(s)</p> <p><input checked="" type="checkbox"/> URC(s)</p> <p><input checked="" type="checkbox"/> SDAC(s)</p>	\$ 700,000	<p>The GSP identified the activities included in this Project as critical for achieving sustainability within the Basin and for compliance with the provisions of SGMA. As part of the Project review process, the Project Review Panel discussed each of these activities in detail and determined that of the Management Actions being considered, the Project proposed herein will provide significant benefit to the communities and rural residents, agricultural community, the environment, and the overall</p>

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						<p>health of the Basin. This Project is considered very feasible, cost effective, and critically important. Although extremely important and feasible, the Project Review Panel determined that this Project should be of a lower priority to Project #3 and will be implemented at such time that funding is available, either from future grant funding opportunities or as funding from the GSAs (or other sources) becomes available.</p> <p>1.) The GSAs intend to develop and implement a regulatory program to equitably allocate a groundwater Base Pumping Fee and Allocation (BPA). Once the program is implemented, individual non-de minimis pumper's will be provided an annual groundwater BPA which may be based on historically used quantities of water. Alternatively, the GSAs may define the BPA, based on acreage and crop type. Under whatever allocation structure is adopted, the GSAs anticipate that the BPAs for each regulated pumper will be ramped down over time to bring pumping in the Basin within its sustainable yield by 2040. As described in SGMA, any limitation on extractions by the GSAs "shall not be construed to be a final determination of rights to extract groundwater from the basin or any portion of the basin" (Water Code § 10726.4(a)(2)). With respect to those pumpers that are not anticipated to be subject to the fee, the GSAs plan to develop a program pursuant to which such pumpers will be required to self-certify that they only pump for domestic and / or non-commercial purposes.</p>
7	<p>GROUNDWATER BASIN RECHARGE TECHNICAL / ENGINEERING STUDIES</p> <ul style="list-style-type: none">• Floodplain expansion / enhancement• Distributed stormwater collection and managed aquifer recharge (DSC-MAR)	16	<input type="checkbox"/>	<p><input type="checkbox"/> Tribe(s)</p> <p><input checked="" type="checkbox"/> URC(s)</p> <p><input checked="" type="checkbox"/> SDAC(s)</p>	\$ 400,000	<p>The GSP identified the activities included in this Project as extremely valuable for achieving sustainability within the Basin and for compliance with the provisions of SGMA. As part of the Project review process, the Project Review Panel discussed each of these activities in detail and determined that this Project is considered feasible, cost effective, and important. The Project Review Panel considered this Project, and the activities</p>

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						<p>included therein, should be a lesser priority than the higher scored projects and should be considered in the future after other projects and management actions are implemented. These Project activities may also be considered by other agencies and private entities on a localized or area-specific scale, rather than Basin-wide.</p> <p>1.) The proposed activity would provide funding for an engineering study to assess the feasibility of the developing floodplain / stream channel modifications, perform design alternatives analyses and develop recommendations for the final project design criteria for those sites that are deemed potentially viable for floodplain / stream channel modifications which would result in riparian corridor enhancements, groundwater recharge, and/or in-channel storage of excess floodwater and / or supplemental water for subsequent irrigation use in-lieu of groundwater pumping from the Basin.</p> <p>2.) DSW-MAR is a landscape management strategy that can help to reduce the storage deficit and maintain long-term water supply reliability. DSW-MAR targets relatively small drainage areas (generally 100 to 1,000 acres) from which stormwater runoff can be collected to infiltrate 100 to 300 AF of water per year, per individual basin. Infiltration can be accomplished in surface basins, typically having an area of 1 to 5 acres, or potentially through flooding of agricultural fields or flood plains, use of drywells, or other strategies. The proposed activity would include the completion of a engineering study to identify the optimal number and location of a series of DSW-MAR facilities, based on hydrogeologic and watershed conditions.</p>
8	ADDRESS DATA GAPS – MEDIUM PRIORITY • Update GSP hydrogeologic model	15	<input type="checkbox"/>	<input type="checkbox"/> Tribe(s) <input checked="" type="checkbox"/> URC(s) <input checked="" type="checkbox"/> SDAC(s)	\$ 250,000	<p>The GSP identified numerous data gaps and subsequent notification by DWR that the GSP was deemed "Incomplete" was determined to be largely due to significant data gaps, especially regarding the potential for risk to</p>

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						interconnected surface water depletions from pumping and unknowns regarding adverse impacts to shallow domestic wells. The GSA's recognize that at some point in the future it will be necessary to update and recalibrate, or possibly replace the Basin hydrogeologic model. The Project Review Panel determined that this Project is work that should be delayed until such time that the data gaps to be addressed in conjunction with Project #2 are filled and the impacts from the implementation of the higher ranked Projects are assessed.
9	SGMA COMPLIANCE ACTIVITIES	12	<input type="checkbox"/>	<input type="checkbox"/> Tribe(s) <input type="checkbox"/> URC(s) <input type="checkbox"/> SDAC(s)	\$ 1,050,000	The GSAs recognize that there are ongoing costs that must be incurred to maintain compliance with the requirements of SGMA, including costs associated with the preparation of GSP Annual Reports, Bi-Annual monitoring of Basin Conditions, and preparing regular updates of the GSP as conditions in the Basin dictate. The Project Review Panel determined that the costs associated with the activities in this Project were “part of doing business” as a GSA and that the grant funds would provide more benefit to the Basin and move the Basin toward sustainability if the higher ranked projects were implemented.
				Total Cost:	\$10,000,000	

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Grant Proposal Summary Budget

TABLE 2 – GRANT PROPOSAL SUMMARY BUDGET

Budget Categories	Requested Grant Amount
Component 1: GRANT ADMINISTRATION	\$250,000
Component 2: RECYCLED WATER PROJECT	\$4,500,000
Component 3: ADDRESS GSP DATA GAPS – HIGH PRIORITY	\$1,400,000
Component 4: HIGH PRIORITY MANAGEMENT ACTIONS	\$800,000
Component 5: SUPPLEMENTAL WATER SUPPLY FEASIBILITY / ENGINEERING STUDIES	\$650,000
Component 6: MEDIUM PRIORITY MANAGEMENT ACTIONS	\$700,000
Component 7: GROUNDWATER BASIN RECHARGE TECHNICAL / ENGINEERING STUDIES	\$400,000
Component 8: ADDRESS DATA GAPS – MEDIUM PRIORITY	\$250,000
Component 9: SGMA COMPLIANCE ACTIVITIES	\$1,050,000
Grand Total <i>Sum rows (1) through (n) for each column</i>	\$10,000,000

Grant Proposal Summary Schedule

TABLE 3B – GRANT PROPOSAL SCHEDULE

Categories	Start Date	End Date
Component 1: Grant Administration	6/1/2022	6/30/2025
Component 2: Recycled Water Project	6/1/2022	6/30/2025
Component 3: Address GSP Data Gaps – High Priority	6/1/2022	6/30/2025
Component 4: High Priority Management Actions	6/1/2022	6/30/2025
Component 5: Supplemental Water Supply Feasibility / Engineering Studies	6/1/2022	6/30/2025
Component 6: Medium Priority Management Actions	7/1/2023	6/30/2025
Component 7: Groundwater Basin Recharge Technical / Engineering Studies	7/1/2023	6/30/2025
Component 8: Address Data Gaps – Medium Priority	7/1/2023	6/30/2025
Component 9: SGMA Compliance Activities	12/17/2021	6/30/2025