

Appendix A

Special Status Wildlife Species with Potential to Occur

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Common Name Scientific Name	Federal Special Status*	State Special Status*	Distribution	Habitat Association	Seasonal Occurrence	Potential Impact
Invertebrates						
Conservancy fairy shrimp <i>Branchinecta conservation</i>	E, X	--	Northern two-thirds of the Central Valley. It ranges from Vina Plains of Tehama County; Sacramento NWR in Glenn County; Jepson Prairie Preserve and surrounding area east of Travis Air Force Base, Solano County; Mapes Ranch west of Modesto, Stanislaus County.	Inhabits the ephemeral water of swales and vernal pools. It is most commonly found in grass or mud bottomed swales, earth sump, or basalt flow depression pools in unplowed grasslands.	Has been collected from early December to early May.	None. Occurrences have been documented within the Seller Service Area. Suitable habitat occurs within the project area. No impacts to vernal pool or other habitats occupied by this species are anticipated. The species is not likely to occur to occur in crop fields and canals due to predators (i.e. fish).
Mid-valley fairy shrimp <i>Branchinecta mesoallensis</i>	Under review	--	Counties within the Great Central Valley, including Sacramento, Solano, Merced, Madera, San Joaquin, Fresno, and Contra Costa Counties.	Found in vernal pools, seasonal wetlands that fill with water during fall and winter rains	Has been collected from early December to early May.	Suitable habitat may occur within the project area. Low potential for occurrence due to predators (i.e. fish).
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	T, X	--	Central Valley and surrounding foothills below 3,000 feet elevation.	Dependent on elderberry shrubs (host plant) as a food source. Potential habitat is shrubs with stems 1 inch in diameter within Central Valley.	Year round for host plant and exit holes; March-June for adults	Elderberry shrubs will not be impacted, therefore no impact to beetles will occur.
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	T, X	--	Endemic to the Central Valley, Central Coast Mountains, and South Coast Mountains of California. It ranges from the Stillwater Plain in Shasta County through most of the length of the Central Valley to Paisley in Tulare County, and along the central Coast Range from northern Solano County to Pinnacles National Monument in San Benito County. Disjunct populations were also reported to occur in San Luis Obispo County, Santa Barbara County, and Riverside County.	Inhabits the ephemeral water of swales and vernal pools. It is most commonly found in grassed or mud bottomed swales, earth sump, or basalt flow depression pools in unplowed grasslands.	Has been collected from early December to early May.	None. Occurrences have been documented in both the Buyer and the Seller Service areas. Crop fields and canals are not likely to support this species due to the presence of predators (i.e. fish), therefore no impacts are anticipated to the species. The project is not expected to impact vernal pools or natural wetlands.
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	E, X	--	Endemic to the Central Valley of California, with the majority of the populations occurring in the Sacramento Valley. This species has also been reported from the Sacramento River Delta to the east side of San Francisco Bay, and from a few scattered localities in the San Joaquin Valley from San Joaquin County to Madera County	Found in a variety of natural and artificial seasonally ponded habitat types including: vernal pools, swales, ephemeral drainages, stock ponds, reservoirs, ditches, backhoe pits, and ruts caused by vehicular activities.	Has been collected from early December to early May.	None. Occurrences have been documented in both the Buyer and the Seller Service area. Suitable habitat is present in the project area. Crop fields and canals are not likely to support this species due to the presence of predators (i.e. fish), therefore there is a low potential for impacts to the species. The project is not expected to impact vernal pools or natural wetlands. No impacts to the species are expected.

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Amphibians						
California tiger salamander <i>Ambystoma californiense</i>	T ¹ , E ² , X	CE, SSC	Found in annual grassland habitat, grassy understories of valley-foothill hardwood habitats, and uncommonly along stream courses in valley-foothill riparian habitats. Occurs from near Petaluma, Sonoma Co., east through the Central Valley to Yolo and Sacramento Counties and south to Tulare Co.; and from the vicinity of San Francisco Bay south to Santa Barbara County.	Lives in vacant or mammal-occupied burrows, occasionally other underground retreats, throughout most of the year, in grassland, savanna, or open woodland habitats. Lays eggs on submerged stems and leaves, usually in shallow ephemeral or semi permanent pools and ponds that fill during heavy winter rains, sometimes in permanent ponds; breeding takes place in fish free pools and ponds.	Migrates up to about 2 km between terrestrial habitat and breeding pond. Migrations may occur from November through April.	None. Occurrences have been documented within both the Buyer and Seller Service Areas. Suitable habitat may occur within the project area, but will not be impacted by the project. Cropland idling has the potential to improve habitat for the species.
Foothill yellow-legged frog <i>Rana boylei</i>	Under review	SSC	This species is known from the Pacific drainages from Oregon to the upper San Gabriel River, Los Angeles County, California, including the coast ranges and Sierra Nevada foothills in the United States.	This species inhabits partially shaded, rocky streams at low to moderate elevations, in areas of chaparral, open woodland, and forest.	Year round	None. Occurrences have been documented within the Seller Service Area. Suitable habitat is present within the project area. However the project is not expected to impact any suitable rocky stream and woodland habitats. No impact to the species is expected.
Western spadefoot toad <i>Spea hammondi</i>	Under review	SSC	This species occurs in the Central Valley and bordering foothills of California and along the Coast Ranges into northwestern Baja California, Mexico.	Lowlands to foothills, grasslands, open chaparral, pine-oak woodlands. Prefers shortgrass plains, sandy or gravelly soil. It is fossorial and breeds in temporary rain pools and slow-moving streams that do not contain bullfrogs, fish, or crayfish.	Year round. Usually in underground burrows most of year, but will travel several meters on rainy nights. Movement is rarely extensive.	None. Occurrences have been documented from Seller Service Areas. Suitable habitat is present in the project area. The project will not impact suitable upland habitat types. The species is not likely to occur in crop field canals due to the presence of predatory fish, bullfrogs etc. Cropland idling has the potential to improve habitat for the species.
Reptiles						
Giant garter snake <i>Thamnophis gigas</i>	T	T	Sacramento and San Joaquin Valleys from Butte County in the north to Kern County in the south.	Primarily associated with marshes, sloughs, and irrigation ditches. Generally absent in larger rivers.	Year round	High. Suitable habitat is present within the Seller Service Areas. Suitable habitat in the Seller Service Area is intermittent based on normal variation in cropping. Direct impacts may include reduction in suitable aquatic habitat within the Seller Service Area. The greatest impact would occur during the breeding season. Conservation measures are in place to maintain aquatic habitat corridors within irrigation ditches.
Western pond turtle <i>Actinemys marmorata</i>	Under review	SSC	Ranged from extreme western Washington and British Columbia to northern Baja California, mostly to the west of the Cascade-Sierra crest.	The western pond turtle occupies a wide variety of wetland habitats including rivers and streams (both permanent and intermittent), lakes, ponds, reservoirs, permanent and ephemeral shallow wetlands, abandoned gravel pits, stock ponds, and sewage treatment.	Year round	High. Suitable habitat occurs within the project area. Pond turtles may occur in ditches, canals, rice fields, etc. Conservation measures are in place to maintain aquatic habitat corridors within irrigation ditches.

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Birds						
Aleutian Canada goose <i>Branta canadensis leucopareia</i>	D	--	Alaska to California	Found grazing in golf courses, agricultural lands, and any open ground adjacent to water. Nests in grasses and marshes.	Year round	Suitable habitat is present in project area. Low impact will occur. Can relocate to other habitats within the area.
American White Pelican <i>Pelecanus erythrorhynchos</i>	--	SSC	Typically found along coasts in winter, but large numbers occur in California's Central Valley, the Salton Sea, and the Colorado River drainage of California and Arizona.	Breed on islands in shallow wetlands in the interior of the continent. They spend winters mainly on coastal waters, bays, and estuaries, or a little distance inland.	Uncommon visitor during spring/summer, more common in winter	Suitable habitat is present in project area. Low impact will occur. Can relocate to other habitats within the area.
American peregrine falcon <i>Falco peregrinus anatum</i>	D, MNBMC	E, FP	Throughout California.	Breeds in woodland, forest and coastal habitats on protected cliffs and ledges. Riparian areas and coastal and inland wetlands are important habitats yearlong especially during the non-breeding season.	Year round	None. Crop fields may provide suitable foraging habitat for the species, but birds could relocate to other habitat areas in the vicinity. No nesting habitat will be affected by the project.
Bald eagle <i>Haliaeetus leucocephalus</i>	D, BGEPA	E	Throughout California.	Riparian areas near coasts, rivers, and lakes. Nesting generally occurs in large old-growth trees in areas with little disturbance.	Year round	None. Occurrences have been documented within both the Buyer and Seller Service Area and both areas provide suitable habitat. No impacts to suitable nesting habitat are anticipated. Crop fields represent marginal foraging habitat but are not expected to be impacted by the project.
Bank swallow <i>Riparia riparia</i>	--	T, SSC	A neotropical migrant found primarily in riparian and other lowland habitats in California west of the deserts during the spring-fall period. Breeding population in California occurs along banks of the Sacramento and Feather rivers in the northern Central Valley.	Requires vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, lakes, and the ocean for nesting. Feeds primarily over grassland, shrub land, savannah, and open riparian areas during breeding season and over grassland, brushland, wetlands, and cropland during migration.	March-mid-September	None. Known from both the Buyer and Seller Service Areas. No suitable nesting habitat (i.e. cliffs along rivers) will be affected from small changes in river flow. There is potential that the project would reduce the area of cropland habitat used for foraging during migration (wetlands and croplands) due to changes in water application. However, fallow cropland would still providing suitable foraging habitat, and birds could forage at other croplands in the vicinity.
Black tern <i>Chlidonias niger</i>	--	SSC	Common spring and summer visitor to fresh emergent wetlands of California.	Uses fresh emergent wetlands, lakes, ponds, moist grasslands, and agricultural fields. In migration, some take coastal routes and forage offshore.	April-September	Moderate. Suitable habitat is present within the project area (i.e. rice fields). A mitigation measures is in place for this species. No occurrences have been documented within either the Buyer and Seller Service Areas.

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Black-crowned night heron <i>Nycticorax nycticorax</i>	SC	Nesting colonies protected	Resident in lowlands and foothills throughout most of California, including the Salton Sea and Colorado River areas, and very common locally in large nesting colonies.	Feeds along the margins of lacustrine, large riverine, and fresh and saline emergent habitats. Nests and roosts in dense-foliaged trees and dense emergent wetlands.	Year round	None. No occurrences of black-crowned night heron have been documented within either the Buyer or Seller Service Areas. Suitable habitat is present in project area, however no nesting or roosting habitats will be affected.
California yellow warbler <i>Dendroica petechia brewsteri</i>	--	SSC	Throughout California	Frequents open to medium-density woodlands and forests with a heavy brush understory in breeding season. In migration, found in a variety of sparse to dense woodland and forest habitats.	April-October	None. No occurrences have been documented in the project area. The species is not likely to occur in crop fields, and no suitable habitat will be impacted (i.e. dense woodland and forest habitats).
Cooper's hawk <i>Accipiter cooperii</i>	--	WL	Throughout California	Frequents landscapes where wooded areas occur in patches and groves. Often uses patchy woodlands and edges with snags for perching. Dense stands with moderate crown-depths used for nesting.	Year round	None. Occurrences have been documented within both the Buyer and Seller Service Area. Suitable habitat occurs within the project area. No potential impacts to preferred foraging or nesting habitat are anticipated.
Double-crested cormorant <i>Phalacrocorax pelagicus</i>	--	WL	Along the entire coast of California and on inland lakes, in fresh, salt and estuarine waters.	Open water with offshore rocks, islands, steep cliffs, dead branches of trees, wharfs, jetties, or even transmission lines. Requires undisturbed nest-sites beside water, on islands or mainland. Uses wide rock ledges on cliffs; rugged slopes; and live or dead trees, especially tall ones.	Year round	None. No occurrences have been documented within the project area, but the species could occur at reservoirs and inland ponds. No negative impacts to foraging or breeding habitat are expected.
Fulvous whistling duck <i>Dendrocyana bicolor</i>	--	SSC	One of the most widely distributed species of waterfowl in the world, expanded its distribution northward into the southern United States beginning in the mid- to late nineteenth century, becoming established in California and rice-growing regions of the U.S.	Flooding of ricefields in preparation for planting stimulates ground-nesting by birds on ricefield levees and in pastures, haylands, and small grain fields adjacent to ricefields. More commonly, however, Fulvous Whistling-Ducks nest in flooded ricefields when plants are of sufficient stature to support eggs.	Spring-summer	Low impact due to rarity of occurrence. Can relocate to other habitats within the area.
Golden eagle <i>Aquila chrysaetos</i>	BGEPA	E	Throughout California	Riparian areas near coasts, rivers, and lakes. Nesting generally occurs in large old-growth trees in areas with little disturbance.	Year round	None. Occurrences have been documented within both the Buyer and Seller Service Areas. Suitable habitat occurs within the project area. No impacts to nesting habitat are expected.
Great blue heron <i>Ardea herodias</i>	--	Nesting colonies protected	Throughout California	Found in shallow estuaries, fresh and saline emergent wetlands, along riverine and rocky marine shores, in croplands, pastures, salt ponds, and in mountains above foothills. Nests roosts in large trees.	Year round	None. Rookeries have been documented within the Buyer and Seller Service Areas. No impacts to rookeries are anticipated.

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Great egret <i>Ardea alba</i>	--	Nesting colonies protected	Throughout California	Feeds and rests in fresh, and saline emergent wetlands, along the margins of estuaries, lakes, and slow-moving streams, on mudflats and salt ponds, and in irrigated croplands and pastures. Nests roosts in large trees.	Year round	None. Occurrences have been documented in the Seller Service Area. No impacts to rookeries are anticipated.
Greater sandhill crane <i>Grus canadensis tabida</i>	--	T, FP	Breeds only in Siskiyou, Modoc and Lassen counties and in Sierra Valley, Plumas and Sierra counties. Winters primarily in the Sacramento and San Joaquin valleys from Tehama south to Kings Counties.	In summer, this race occurs in and near wet meadow, shallow lacustrine, and fresh emergent wetland habitats. Frequents annual and perennial grassland habitats, moist croplands with rice or corn stubble, and open, emergent wetlands. It prefers relatively treeless plains.	Migration southward is September-October and northward is March-April.	High. No occurrences have been documented within the project area. Suitable foraging and winter roosting habitat is present within the project area (i.e. rice fields). A mitigation measure is in place for this species and birds will have other suitable nesting sites available.
Least bell's vireo <i>Vireo bellii pusillus</i>	E	E	California to northern Baja.	Inhabits low, dense riparian growth along water or along dry parts of intermittent streams. Typically associated with willow, cottonwood, baccharis, wild blackberry, or mesquite in desert localities.	March-August	None. No occurrences have been documented in the Buyer Service Area. Suitable habitat may occur within the project action area. The project is not expected to impact any suitable willow or dense riparian habitat due to small changes in river flow, therefore no impacts to the species are anticipated.
Least bittern <i>Ixobrychus exilis</i>	--	SSC	Formerly widely distributed in the Central Valley, but current range has been greatly reduced.	Fresh and brackish water marshes with tall, dense emergent vegetation and clumps of woody plants over deep water.	Rare nester during spring/summer, may overwinter	Low impact due to rarity of occurrence. Can relocate to other habitats within the area.
Little willow flycatcher <i>Empidonax traillii brewsteri</i>	--	E	Migrant at lower elevations, primarily in riparian habitats throughout California	Most numerous where extensive thickets of low, dense willows edge on wet meadows, ponds, or backwaters.	Spring (mid-May to early June) and fall (mid-August to early September)	None. This species has not been documented within the project area according to CNDDB. Suitable habitat may be present within the project area (i.e. dense willows), but will not be impacted by small changes in river flow.
Long-billed curlew <i>Numenius americanus</i>	SC	WL	Along the California coast, and in the Central and Imperial valleys.	Upland shortgrass prairies and wet meadows are used for nesting; coastal estuaries, open grasslands, and croplands are used in winter.	Winter migrant from July-April	None. No CNDDB occurrences have been documented within the project area, but the species is known to occur within the action area during winter migration. The project is not expected to impact suitable foraging habitat (i.e. cropland).
Long-eared owl <i>Asio otus</i>	--	SSC	Throughout California	Frequents dense, riparian and live oak thickets near meadow edges, and nearby woodland and forest habitats. Also found in dense conifer stands at higher elevations.	Year round	None. Occurrences have been documented in the Buyer Service Area. Suitable habitat occurs within the project area. The project is not expected to impact any suitable habitat (i.e. forest and woodland habitats).

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Northern harrier <i>Circus cyaneus</i>	--	SSC	Throughout lowland California, concentrated in the Central Valley and coastal valleys.	Breeds in annual grasslands and wetlands. Prefers marshes and grasslands for foraging and nesting. Also uses agricultural fields for nesting and foraging, although nests may be destroyed by agricultural activities.	Year round	None. CNDDDB occurrences have been documented in the Buyer Service Area. Suitable habitat is present in project area. Foraging and breeding habitat may be affected, but fallow fields would still represent suitable habitat. Birds can relocate to other habitats within the area.
Osprey <i>Pandion haliaetus</i>	--	WL	Northern California from Cascade Ranges south to Lake Tahoe, and along the coast south to Marin County.	Associated strictly with large, fish-bearing waters, primarily in ponderosa pine through mixed conifer habitats.	Year round	None. Occurrences have been documented within both the Buyer and Seller Service Area. Suitable habitat occurs within the project area. Water transfers would be subject to flow requirements. Therefore no impacts to foraging area expected. No impacts to nesting sites are anticipated.
Redhead <i>Aythya americana</i>	--	SSC	Breeds widely throughout the Prairie Pothole Region of the United States and Canada. It also nests in dense concentrations in marshes of the western United States	Depends heavily on rhizomes of shoalgrass, a seagrass species, for winter nutrition. Nests are constructed in dense emergent vegetation (usually cattail or bulrush) of deep marshes	Spring-summer	Low impact due to rarity of occurrence. Can relocate to other habitats within the area.
Short-eared owl <i>Asio flammeus</i>	--	SSC	Endemic to marshes bordering the San Francisco, San Pablo Bays and Suisun Bay .	Open country, including grasslands, wet meadows and cleared forests. Occasionally in estuaries during breeding season.	Year round	None. Occurrences have been documented in the Buyer Service Area. Suitable habitat occurs within the project area. No impacts to breeding habitat will occur. Fallow rice fields would still represent suitable foraging habitat for the species.
Snowy egret <i>Egretta thula</i>	--	Nesting colonies protected	Throughout California	Found along shores of coastal estuaries, fresh and saline emergent wetlands, ponds, slow-moving rivers, irrigation ditches, and wet fields.	Year round	None. Occurrences have been documented in the Buyer Service Area, however suitable habitat is present in both the Buyer and Seller Service area. No impacts to rookeries are anticipated.
Swainson's hawk <i>Buteo swainsoni</i>	SC, MNBMC	T	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley.	Nests in mature trees, including valley oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain and row crop fields.	Spring and Summer; small wintering population in the Delta	None. CNDDDB occurrences have been documented within both the Seller Service Area. Suitable habitat is present within the project area. The project may alter the composition of foraging habitat in the Seller Service Areas, but these areas would still be suitable for the species, and additional habitats in the vicinity would be available. No impacts to riparian breeding habitat are expected from small changes in river flow.

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Tricolored blackbird <i>Agelaius tricolor</i>	--	SSC	A resident in California found throughout the Central Valley and in coastal districts from Sonoma County south.	Breeds near fresh water, preferably in emergent wetlands with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs. Feeds in grassland and cropland habitats.	Year round	Low. CNDDDB occurrences have been documented within both the Seller and Buyer Service Area. Suitable habitat is present within the project area. Foraging habitat may be affected by the project. A mitigation measure to limit cropland idling and birds can be relocated to other adjacent foraging habitats within the area.
Tule greater white-fronted goose <i>Anser albifrons elgasi</i>	--	SSC	In North America, this species breeds in open tundra areas of the low Arctic and it formerly wintered south to Chiapas, Mexico.	Breeds along tundra wetlands. Winters in agricultural fields, marshes, bays, and lakes.	Winter	None. Species is known to occur within the action area during winter migration. However there is no impacts to suitable foraging habitat (i.e. cropland) under the project. No impact to the species is expected.
Western burrowing owl <i>Athene cunicularia hypugaea</i>	--	SSC	Central and southern coastal habitats, Central Valley, Great Basin, and deserts.	Open annual grasslands or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Dependent upon burrowing mammals (especially California ground squirrel) for burrows.	Year round	None. Occurrences have been documented within both the Buyer and Seller Service Area. Suitable habitat occurs within the project area. Agricultural ditches may be suitable habitat for burrowing owl burrow and nesting activity. Water transfers would not affect the suitability of habitat for burrowing owl in the project area.
Western yellow-billed cuckoo <i>Coccyzus americanus</i>	T	E	Uncommon to rare summer resident in scattered locations throughout California.	Deciduous riparian thickets or forests with dense, low-level or understory foliage, and which abut on slow-moving watercourses, backwaters, or seeps. Willow almost always a dominant component of the vegetation. In Sacramento Valley, also utilizes adjacent orchards, especially of walnut. Nests in sites with some willows, dense low-level or understory foliage, high humidity, and wooded foraging spaces.	Summer migration is from June-September.	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present within the project area. However this species is not likely to occur in crop fields due to lack of suitable foraging and roosting habitat (i.e. dense riparian thickets). No impacts are anticipated to riparian breeding habitat due to small changes in river flow.

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White-faced ibis <i>Plegadis chihi</i>	--	WL	Uncommon summer resident in sections of southern California, a rare visitor in the Central Valley, and is more widespread in migration.	Feeds in fresh emergent wetlands, shallow lacustrine waters, muddy grounds of wet meadows, and irrigated or flooded pastures and croplands. Nests in dense, fresh emergent wetlands.	Present in California from April-October.	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However the project is not expected to impact suitable habitat (i.e. croplands). No impact to the species is expected.
White-tailed kite <i>Elanus leucurus</i>	SC, MNBMC	FP	Central Valley, coastal valleys, San Francisco Bay area, and low foothills of Sierra Nevada.	Savanna, open woodlands, marshes, partially cleared lands and cultivated fields, mostly in lowland situations (Tropical to Temperate zones).	Year round	None. CNDDDB occurrences have been documented within both the Seller and Buyer Service Area. Suitable habitat is present within the project area. No potential impacts to breeding habitat or foraging habitat are anticipated.
Yellow-headed blackbird <i>Xanthocephalus xanthocephalus</i>	--	SSC	Breeds in deep-water, emergent wetlands throughout nonforested regions of western North America.	Breed and roost in freshwater wetlands with dense, emergent vegetation such as cattails. They often forage in fields, typically wintering in large, open agricultural areas.	Year round	None. Suitable habitat is present within the project area. The project is not expected to impacts suitable foraging habitat (i.e. croplands). No impact to the species is expected.
Mammals						
Ring-tailed cat <i>Brassariscus astutus</i>	SC	FP	Ringtails are found in a variety of habitats centered around the semi-arid to arid climates of the west and southwest. Little information available on distribution and relative abundance among habitats.	Occurs in various riparian habitats, and in brush stands of most forest and shrub habitats, at low to middle elevations. Uses hollow trees, logs, snags, cavities in talus and other rocky areas, and other recesses are for cover.	Year round (nocturnal)	None. No CNDDDB records of this species have been documented in the project area. Suitable habitat is present in project area, but the species is not likely to occur in crop fields. No potential impact to suitable riparian habitat are expected from small changes in river flow.
Fish						
Central Valley Steelhead <i>Oncorhynchus mykiss</i>	T	--	Native to streams along the Pacific coast of North America	Populations inhabit small headwater streams, large rivers, lakes, or reservoirs; often in cool clear lakes and cool swift streams with silt-free substrate. Usually requires a gravel riffle for successful spawning.	Year round	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However, flow reductions as a result of this project would be low and would not affect this species.
Chinook Salmon (Fall/late-fall run) <i>Oncorhynchus tshawytscha</i>	--	SSC	Found primarily in the Sacramento River.	Same as described in Chinook Salmon (Winter-run)	Spawning in July - December	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However, flow reductions as a result of this project would be low and would not affect this species.
Chinook Salmon (Winter-run) <i>Oncorhynchus tshawytscha</i>	E	E	Distributed throughout northern California	Utilizing both fresh and salt water habitats, this species requires spawning sites within the stream or river where water velocity, depth, and gravel size are optimal for the incubation of developing eggs.	Spawning December - Early August	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However, flow reductions as a result of this project would be low and would not affect this species.

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Chinook Salmon (Spring-run) <i>Oncorhynchus tshawytscha</i>	T	T	Distributed throughout northern California	Same as described in Chinook Salmon (Winter-run)	Spawning Late March - September	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However, flow reductions as a result of this project would be low and would not affect this species.
Delta smelt <i>Hypomesus transpacificus</i>	T	--	Restricted to the upper reaches of the San Francisco Bay and Sacramento-San Joaquin Delta Estuary, from San Pablo Bay upstream to Sacramento on the Sacramento River and Mossdale on the San Joaquin River.	This species can tolerate a wide range of salinity and temperatures. Shallow, fresh, or slightly brackish backwater sloughs and edgewaters with good water quality and substrate are used for spawning.	Year round	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However, flow reductions as a result of this project would be low and would not affect this species.
Green sturgeon <i>Acipenser medirostris</i>	T	--	Throughout northern and central California; Humboldt Bay, San Francisco Bay and Delta, Monterey Bay, Sacramento, Feather, and Yuba Rivers.	Utilizing both freshwater and saltwater habitat, Green Sturgeon spawn in deep pools, in large turbulent freshwater river mainstems.	Year round	None. No occurrences have been documented in the Seller Service Area. In addition, flow reductions as a result of this project would be low and would not affect this species.
Hardhead <i>Mylopharodon conocephalus</i>	--	SSC	Widely distributed in streams at low to mid-elevations in the Sacramento-San Joaquin and Russian River drainages.	Found at low to mid-elevations in relatively undisturbed habitats of larger streams with high water quality. In the Sacramento River, however, they are common in both the mainstream and tributaries up to approximately 5,000 feet in elevation.	Year round	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However, flow reductions as a result of this project would be low and would not affect this species.
Longfin smelt <i>Spirinchus thaleichthys</i>	C	T	Found on the Sacramento and San Joaquin Rivers in the Delta through Suisun Bay and Suisun Marsh, San Pablo Bay, San Francisco Bay, the Gulf of the Farallones, Humboldt Bay, Eel river estuary and other local coastal areas.	Adult longfin smelt migrate into low salinity or freshwater reaches of coastal rivers and tributary streams to spawn. Encounter a wide variety of water temperatures and salinities during their life cycle but are rarely found in water temperatures greater than 71 degrees F.	Spawning in January - March	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However, flow reductions as a result of this project would be low and would not affect this species.
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	--	SSC	Largely confined to the Delta, Suisun Bay, Suisun Marsh, Napa River, Petaluma River, and other parts of the San Francisco Estuary, while spawning on upstream floodplains and channel edges.	Adapted to estuarine life so they are tolerant of a wide range of salinities and temperatures. Require a rising hydrograph for upstream migration and flooded vegetation for spawning and rearing areas for their early life history stages.	Year round	None. Occurrences have been documented in the Seller Service Area. Suitable habitat is present in project area. However, flow reductions as a result of this project would be low and would not affect this species.

¹Central CA DPS

²Santa Barbara and Sonoma Counties

Green Shading: potential to be affected, further evaluated in Chapter 3

*** Status explanations:**

Federal

E = listed as endangered under the federal Endangered Species Act

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Common Name Scientific Name	Federal Special Status*	State Special Status*	Distribution	Habitat Association	Seasonal Occurrence	Potential Impact
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T = listed as threatened under the federal Endangered Species Act

C = Candidate for listing as threatened or endangered

SC = species of concern; formerly Category 2 candidate for federal listing

BGEPA = Bald and Golden Eagle Protection Act

MNBMC = Fish and Wildlife Service: Migratory Nongame Birds of Management Concern

-- = no designations

X = critical habitat

PX = potential critical habitat

D = delisted

State

E = listed as endangered under the California Endangered Species Act

T = listed as threatened under the California Endangered Species Act

CE = candidate endangered under the California Endangered Species Act

FP = fully protected under the California Fish and Game Code

SSC = species of special concern

WL = Watch List

-- = no designations

Appendix B

Special Status Plant Species with Potential to Occur

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Common Name Scientific name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential Impact
Ahart's dwarf rush <i>Juncus leiospermus</i> var. <i>ahartii</i>	-/-/ 1B	Butte, Calaveras, Placer, Sacramento, Tehama, and Yuba Counties.	Valley and foothill grassland (mesic).	March-May	Not likely to occur in crop fields, no suitable habitat present.
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	-/-/ 1B	Central western California including Yolo County.	Subalkaline flats and areas around vernal pools.	March-June	Not likely to occur in crop fields, no suitable habitat present (i.e. subalkali flats).
Antioch Dunes evening-primrose <i>Oenothera deltoides</i> ssp. <i>howellii</i>	E/E/ 1B	Found only in Contra Costa and Sacramento Counties.	Occurs in inland dunes.	March-September	Not likely to occur in crop fields, no suitable habitat present.
Brittlescale <i>Atriplex depressa</i>	-/-/1B	Western Central Valley and valleys of adjacent foothills.	Alkali grassland, alkali meadow, alkali scrub, and vernal pools.	April-October	There is a CNDDDB occurrence within Glenn, Colusa, and Yolo counties, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. alkali and vernal pools).
Boggs Lake hedge- hyssop <i>Gratiola hetersepela</i>	-/-/1B	Dispersed throughout the Sacramento and Central Valley. Also in Oregon.	Marsh's, swamps, and vernal pools (clay).	April-August	There is a CNDDDB occurrence within Sacramento County. Suitable habitat is present but has low potential to occur. No effects anticipated from small changes in river flow.
Contra Costa goldfields <i>Lasthenia conjugens</i>	E/SSC/1B	San Francisco Bay Delta Regions, and scattered coastal areas.	Cismontane woodlands, playas, valley and foothill grasslands, and vernal pools.	March-June	No CNDDDB occurrences; not likely to occur in crop fields due to lack of suitable habitat (i.e. vernal pools, playas).

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Common Name Scientific name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential Impact
Colusa grass <i>Neostapfia colusana</i>	T/E/1B	Southern Sacramento Valley, and northern San Joaquin Valley.	Vernal pools.	May-July	There is a CNDDDB occurrence within Glenn and Colusa counties, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. vernal pools).
Crampton's tuctoria (Solano grass) <i>Tuctoria mucronata</i>	E/E/1B	Located only in Yolo and Solano Counties.	Valley and foothill grassland (mesic), and vernal pools.	April-August	Not likely to occur in crop fields, no suitable habitat present.
Ferris' milk-vetch <i>Astragalus tener</i> var. <i>ferrisae</i>	-/-/1B	Sacramento Valley.	Subalkaline flats and areas around vernal pools.	March-June	Not likely to occur in crop fields, no suitable habitat present.
Fox sedge <i>Carex vulpinoidea</i>	-/-/2	Northern Sacramento Valley, including Butte County, isolated populations in San Joaquin County.	Riparian woodland, marshes and swamps.	May-June	Suitable habitat present in project area. Low potential to occur. Not likely to establish in crop fields and no effects anticipated from small changes in river flows.
Greene's tuctoria <i>Tuctoria greenii</i>	E/SSC/1B	Butte, Colusa, Fresno, Glenn, Madera, Merced, Modoc, Shasta, San Joaquin, Stanislaus, Tehama, and Tulare Counties.	Vernal pools.	May-July	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. vernal pools).
Hairy Orcutt grass <i>Orcuttia pilosa</i>	E/E/1B	Northern Sacramento Valley, Pit River Valley; isolated populations in Lake and Sacramento counties.	Vernal pools.	May-September	There is a CNDDDB occurrence within Butte and Glenn counties, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. vernal pools).

Common Name Scientific name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential Impact
Heartscale <i>Atriplex cordulata</i>	-/-/1B	Western Central Valley and valleys of adjacent foothills.	Alkali grasslands, alkali meadows, and alkali scrub.	May-October	There is a CNDDDB occurrence within Butte, Colusa, Yolo, and Glenn counties, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. alkali areas).
Heckard's pepper-grass <i>Lepidium latipes</i> var. <i>heckardii</i>	-/-/1B	Glenn, Solano, and Yolo Counties.	Valley and foothill grassland alkaline flats.	March-May	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. alkali flats).
Hoover's spurge <i>Chamaesyce hooveri</i>	T/-/ 1B	Scattered in Glenn, Butte, Colusa, Merced, Stanislaus, Tehama, and Tulare Counties.	Vernal pools.	July-September	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. vernal pools).
Indian valley brodiaea <i>Brodiaea coronaria</i> ssp. <i>rosea</i>	-/E/1B	Scattered in Glenn, Lake, Colusa, and Tehama Counties.	Closed cone coniferous forest, chaparral, valley and foothill grasslands (serpentinite).	May-June	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat.
Jepson's milk-vetch <i>Astragalus rattanii</i> var. <i>jepsonianus</i>	-/-/1B	Colusa, Glenn, Lake, Napa, Tehama, and Yolo counties.	Chaparral, cismontane woodland, valley and foothill grassland, often serpentinite.	April-June	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat.
Keck's checkerbloom <i>Sidalcea keckii</i>	E/-/1B	Colusa, Fresno, Merced, Napa, Solano, Tulare, and Yolo counties.	Cismontane woodlands, foothill and valley grasslands (serpentinite).	April-May	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat.

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Common Name Scientific name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential Impact
Legenere <i>Legenere limosa</i>	SC/-/1B	Sacramento Valley and south of the North Coast Ranges.	Vernal pools.	May-June	Not likely to occur in crop fields, no suitable habitat present (i.e. vernal pools)
Lone buckwheat <i>Eriogonum apricum</i> var. <i>apricum</i>	E/E/1B	Found in Amador and Sacramento Counties.	Chaparral.	July-October	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat (chaparral).
Marsh checkerbloom <i>Sidalcea oregana</i> ssp. <i>hydrophila</i>	-/-/1B	Glenn, Lake, Mendocino, and Napa Counties.	Meadows and seeps, and riparian forest.	June-August	Suitable habitat present in project area. Low potential to occur. Not likely to establish in crop fields and no effects anticipated from small changes in river flow.
Milo Baker's lupine <i>Lupinus milo-bakeri</i>	-/T/1B	Glenn and Mendocino Counties.	Cismontane woodlands, foothill and valley grasslands.	June-September	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat.
Palmate-bracted bird's-beak <i>Cordylanthus palmatus</i>	E/E/1B	Found in Glenn and Colusa Counties and within the Central Valley.	Alkali meadow, alkali scrub, valley and grasslands.	May-October	Not likely to occur in crop fields, no suitable habitat present (i.e. alkali).
Pincushion navarretia <i>Navarretia myersii</i> ssp. <i>myersii</i>	-/-/1B	Alamador, Calaveras, Merced, Placer, and Sacramento Counties.	Vernal pools (often acidic).	May	No CNDDDB occurrences; not likely to occur due to lack of suitable habitat (i.e. vernal pools).
Recurved larkspur <i>Delphinium recurvatum</i>	-/-/1B	Disbursed throughout the Sacramento and Central Valley.	Chenopod scrub, cismontane, valley and foothill grasslands (alkali).	March-June	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. alkali).

Common Name Scientific name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential Impact
Red mountain catchfly <i>Silene campanulata</i> ssp. <i>campanulata</i>	-/E/1B	Found in Colusa, Glenn, Mendocino, Shasta, Tehama, and Trinity Counties.	Chaparral and lower montane coniferous forest, usually sepentinite and rocky.	April-July	There is a CNDDDB occurrence in Colusa County, however this species is not likely to occur in crop fields due to lack of suitable habitat.
Rose-mallow <i>Hibiscus laiocarpos</i>	-/-/2	Northern Sacramento County.	Marshes and swamps.	June-September	Suitable habitat present in project area. Low potential to occur. Not likely to establish in crop fields and no effects anticipated from small changes in river flow.
Sacramento orcutt grass <i>Orcuttia viscida</i>	E/E/1B	Valley grasslands and freshwater wetlands.	Vernal pools.	May-June	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. vernal pools).
San Joaquin spearscale <i>Atriplex joaquiniana</i>	-/-/1B	Western Central Valley and valleys of adjacent foothills.	Alkali grasslands, and alkali scrub.	April-September	Not likely to occur in crop fields, no suitable habitat present (i.e. alkali).
Sanford's arrowhead <i>Sagittaria sanfordii</i>	-/-/1B	Central Valley.	Freshwater marshes, shallow streams, and ditches.	May-August	Suitable habitat on present in ditches; not yet detected. Not likely to establish in crop fields and no effects anticipated from small changes in river flow.
Slender Orcutt grass <i>Orcuttia tenuis</i>	T/E/1B	Northern Sacramento Valley, Pit River Valley; isolated populations in Lake and Sacramento Counties	Vernal pools.	May-July	There is a CNDDDB occurrence, however this species is not likely to occur in crop fields due to lack of suitable habitat (i.e. vernal pools).

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Common Name Scientific name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential Impact
Soft bird's beak <i>Cordylanthus mollis</i> ssp. <i>mollis</i>	E/SSC/1B	Located in Contra Costa, Marin, Napa, Sacramento, Solano, and Sonoma Counties.	Coastal salt marshes and swamps.	July-November	There is a CNDDDB occurrence in Sacramento County, however this species is not likely to occur in crop fields due to lack of suitable habitat.

***Status explanations:**

F=Federal

E=Endangered

T=Threatened

SC= Special Concern

S=State

E=Endangered

T=Threatened

SSC=Species of Special Concern

CNPS=California Native Plant Society

1B=Rare, threatened, or endangered in California and elsewhere

2=Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

3=Plants about which we need more information - A review list

Appendix C

Groundwater Existing Conditions

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Appendix C

Groundwater Existing Conditions

This appendix includes the following figures:

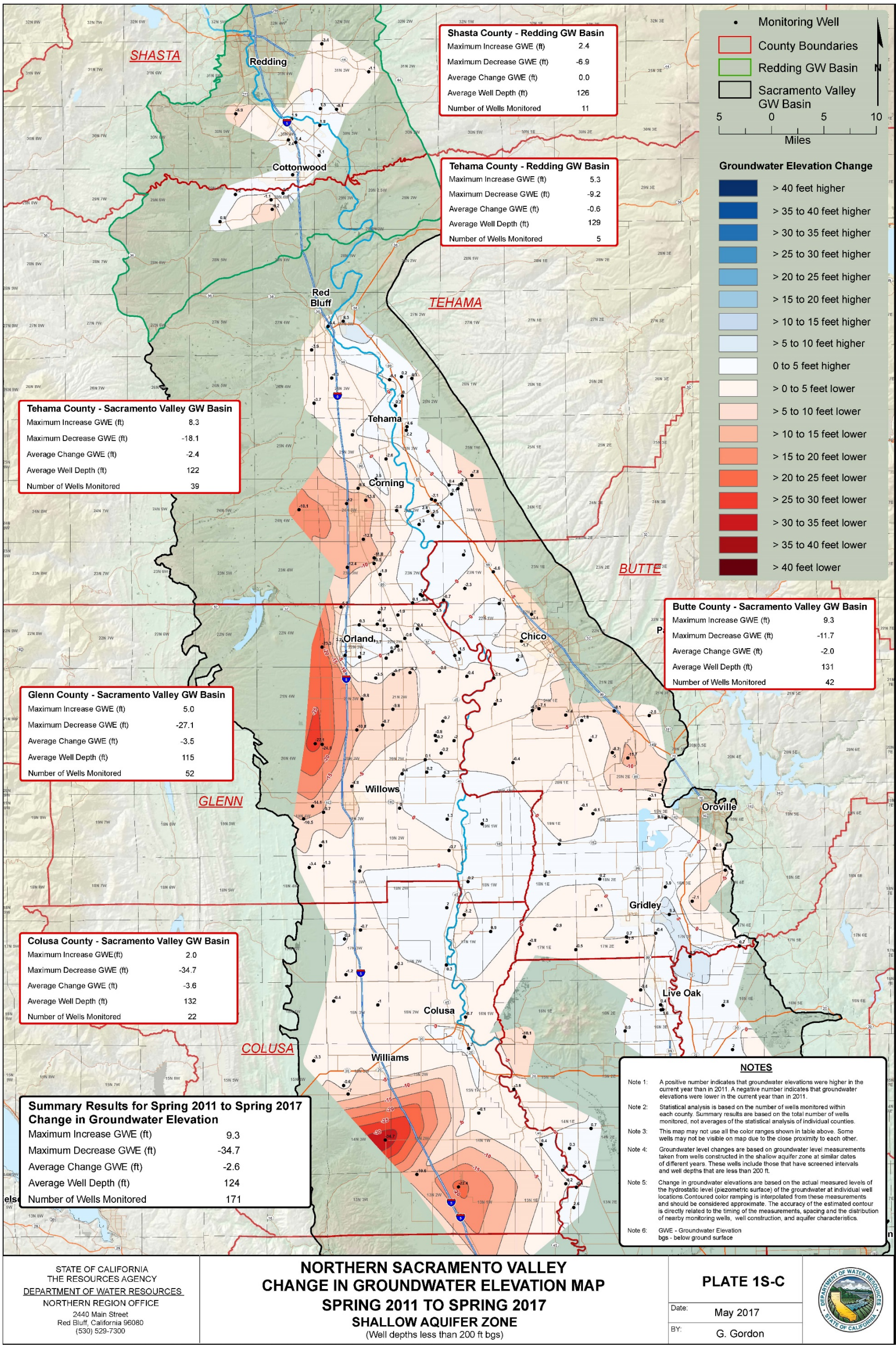
1. Spring 2011 to Spring 2017 change in groundwater elevation in shallow (<200 feet bgs), intermediate (200-600 feet bgs), and deep (>600 feet bgs) wells. These figures were retrieved from DWR's Groundwater Information Center:
(http://www.water.ca.gov/groundwater/maps_and_reports/northern_region/GroundwaterLevel/gw_level_monitoring.cfm)
2. Groundwater monitoring data for wells within the seller districts. DWR's CASGEM website and was used to obtain the monitoring data. The process to query out the groundwater level data is explained below.

Direction to manually lookup groundwater level data from DWR's CASGEM website:

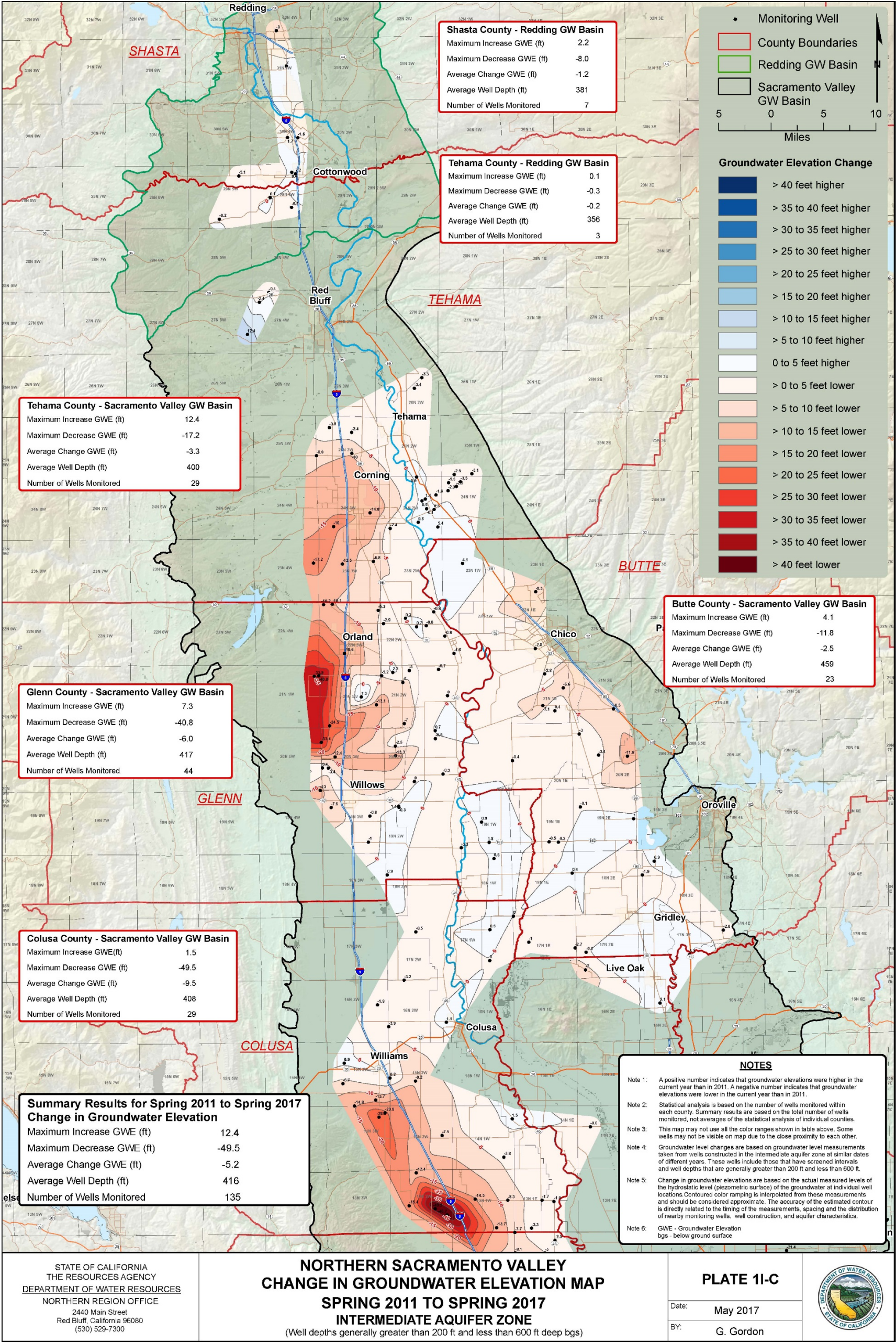
Example Well 29N04W15E002M

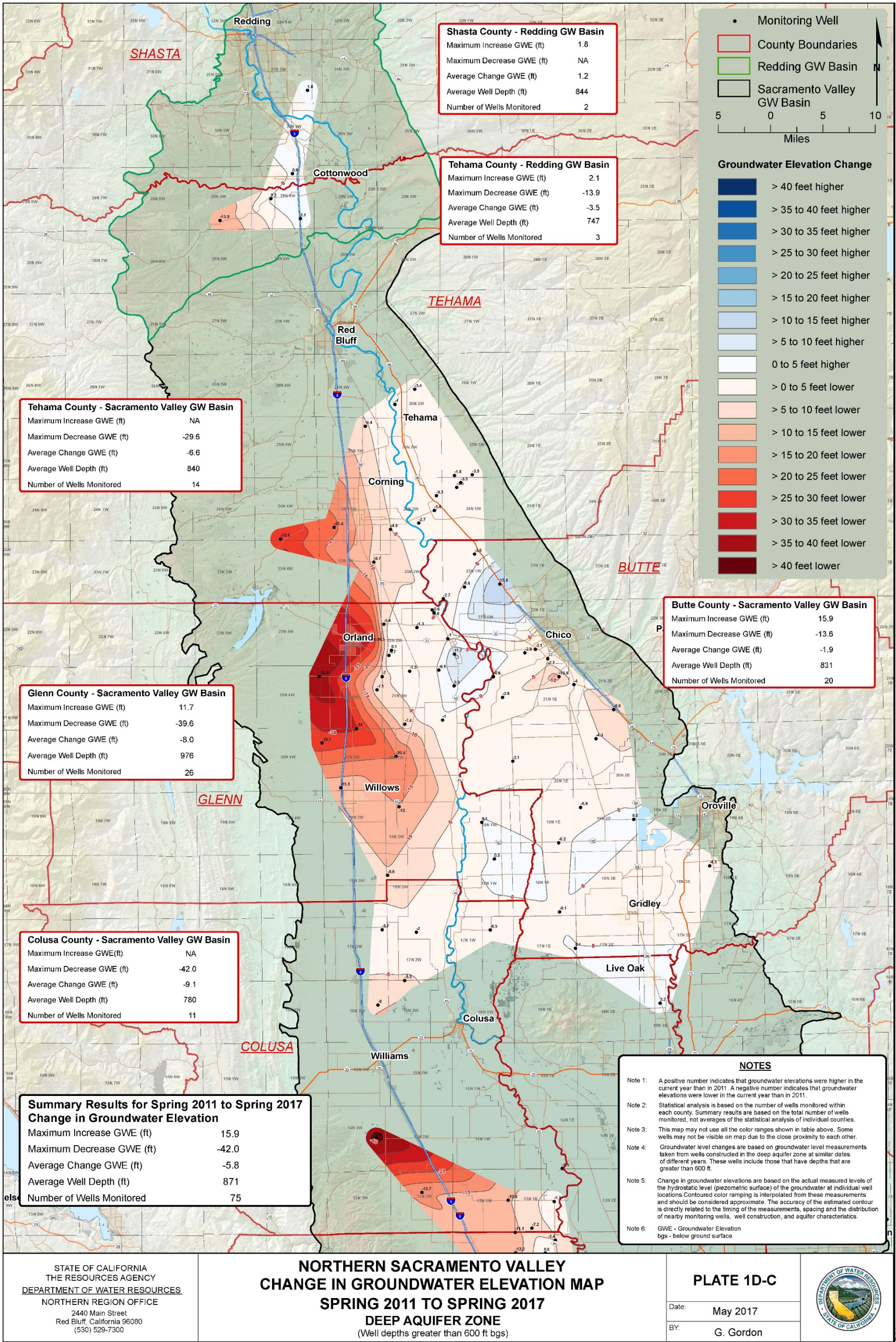
1. Go to CASGEM Public Login website:
http://www.water.ca.gov/groundwater/casgem/online_system.cfm (setup login if not previously done)
2. Select Well Information> State Well Number. Input well number (29N04W15E002M for this example)
3. Go to Well Details: View> View Hydrograph

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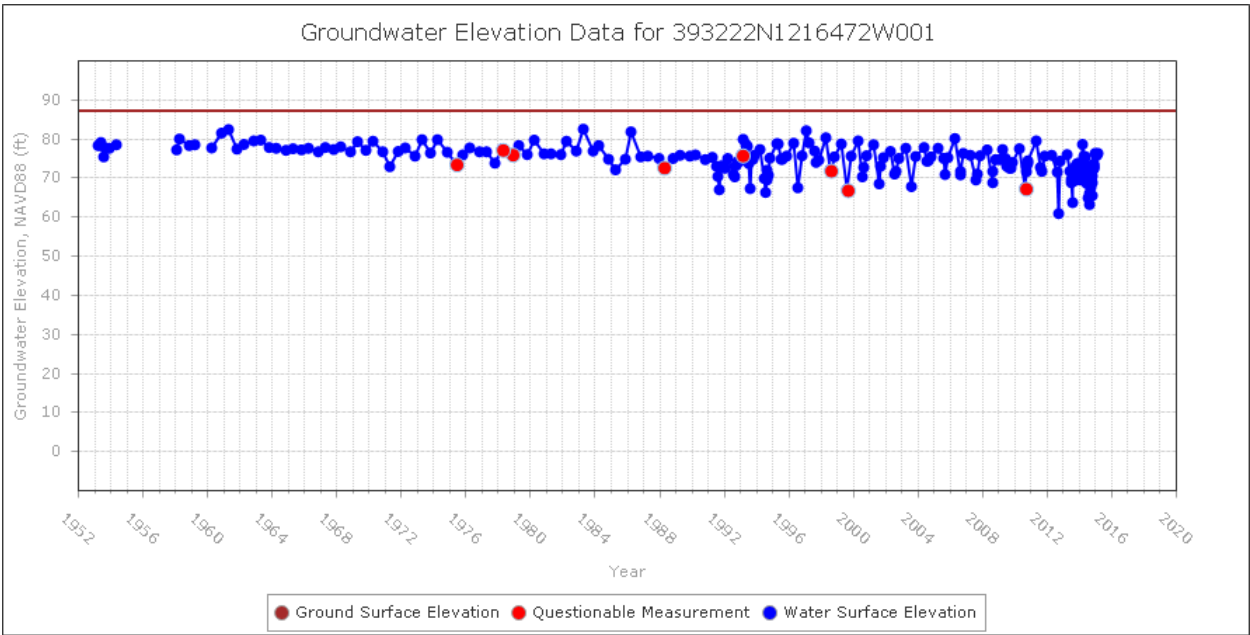


http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/GroundwaterLevel/gw_level_monitoring.cfm



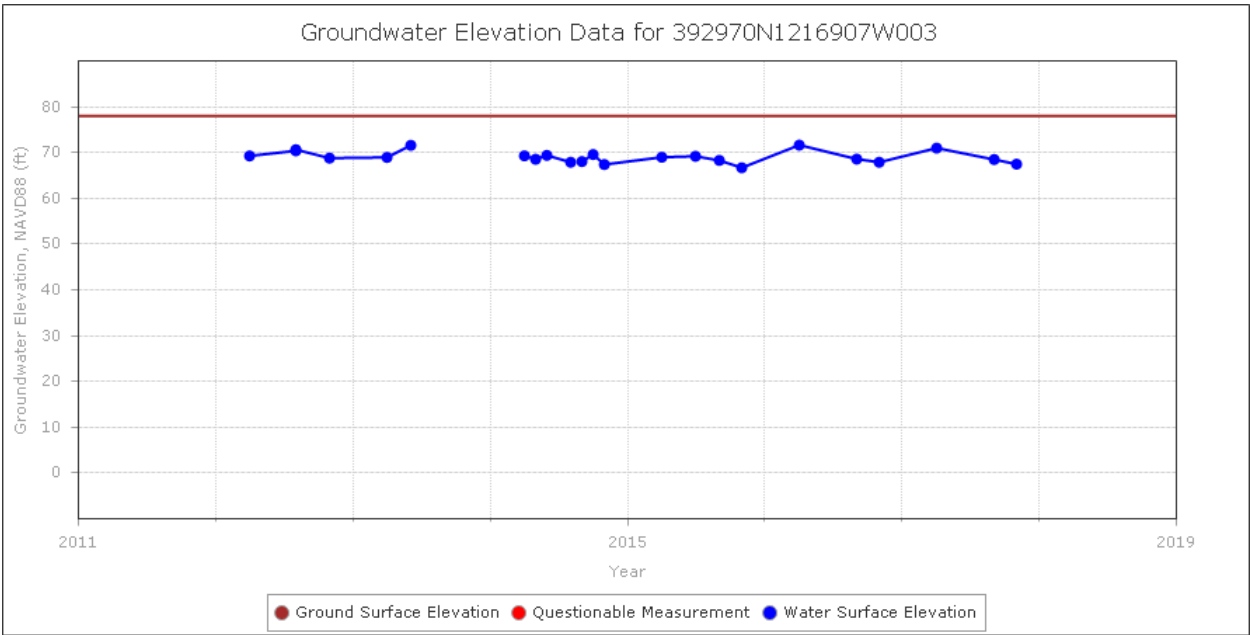


Butte Water District
State Well ID 17N03E16N001M



Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

State Well ID 17N02E25J003M

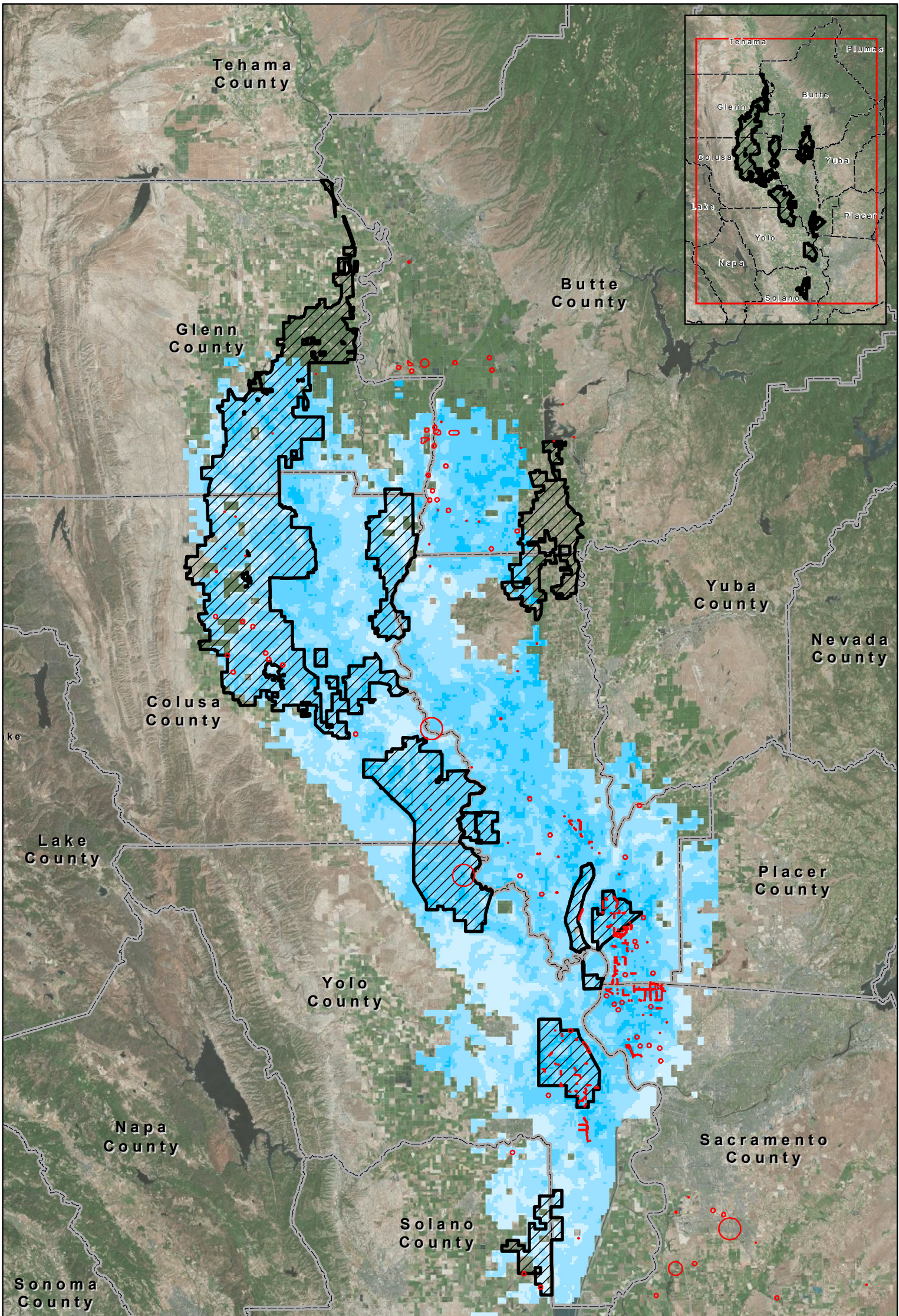


Source: DWR's CASGEM website.
Note: Well number in the title of the figure is the CASGEM Well Number.

Appendix D

Giant Garter Snake Priority Habitat Maps

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Giant Garter Snake Priority Habitat

Habitat Suitability x Probability of Occurrence Bounded by Top 75%
Overview of Priority Habitat Raster



District with Proposed Crop Idling/Shifting

County Boundary

80m Radius Occurrence

Specific Occurrence Location

Non-specific Occurrence Location

Circular Occurrence

80-100 (Most Suitable)

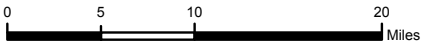
60-80

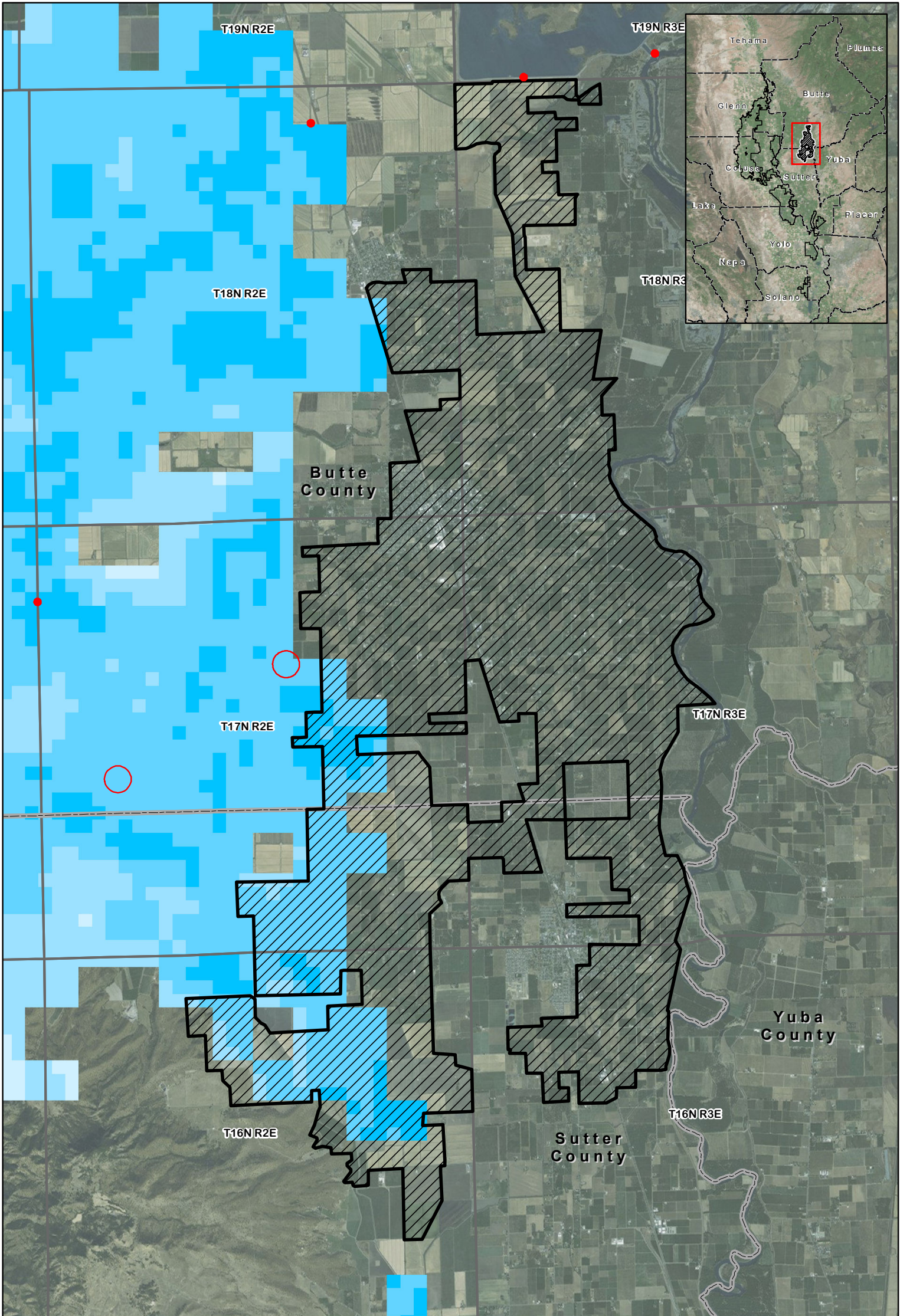
40-60

20-40

0-20 (Least Suitable)

Habitat Suitability





Giant Garter Snake Priority Habitat

Habitat Suitability x Probability of Occurrence Bounded by Top 75%
BUTTE WATER DISTRICT

District with Proposed Crop Idling/Shifting

County Boundary

Giant Garter Snake Occurrence

80m Radius Occurrence

Circular Occurrence

Habitat Suitability

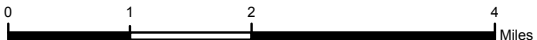
80-100 (Most Suitable)

60-80

40-60

20-40

0-20 (Least Suitable)



Appendix E

Climate Change Analysis Emission Calculations

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Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency Butte Water District
Transfer Volume 5,750 acre-feet/year

Table E-1. Butte Water District Greenhouse Gas Emissions

Well	Fuel Type	Power Rating	Pump Rate		Transfer Volume	Operations	Fuel Consumption		Emission Factors				GHG Emissions						
													(tonnes per year)			(MTCO2e per year)			
		(hp)	(gpm)	(% of Total)	(AF/year)	(hours/year)	(kWh/yr)	(gal/yr)	CO2	CH4	N2O	Units	CO2	CH4	N2O	CO2	CH4	N2O	Total
#1	Electric	300	4,000	53%	3,067	4,164	932,161	n/a	293.67	0.033	0.004	lbs/MWh	124.17	0.01	0.00	124.17	0.35	0.50	125.02
#2	Electric	250	3,500	47%	2,683	4,164	776,801	n/a	293.67	0.033	0.004	lbs/MWh	103.48	0.01	0.00	103.48	0.29	0.42	104.19
Total			7,500	100%	5,750	8,327	1,708,962	0					227.65	0.03	0.00	227.65	0.64	0.92	229.21

Note: Power ratings estimated from existing pumps used by Butte Water District and from other representative pumps in the region.

Key:

AF = acre-feet

CH4 = methane

CO2 = carbon dioxide

gal/yr = gallons per year

GHG = greenhouse gas

gpm = gallons per minute

hp = horsepower

kW/yr = kilowatt hours per year

MTCO2e = metric tons carbon dioxide equivalent

N2O = nitrous oxide

Conversion Factors

1 lb = 453.6 g
1 tonne = 1,000 kg
1 tonne = 1,000,000 g
1 MWh = 1,000 kWh
1 GWh = 1,000,000 kWh
1 kW = 1.34 hp
1 hour = 60 minutes
1 acre-foot = 325,851 gallons

http://www.water.ca.gov/pubs/dwrnews/california_water_facts_card/waterfactscard.pdf

Global Warming Potential

CO2 1
CH4 25
N2O 298

GHG Emission Factors

Table E-2. GHG Emission Factors for Electric Pumps

County	Utility Company	Emission Factors		
		CO2 (lbs/MWh)	CH4 (lbs/MWh)	N2O (lbs/MWh)
Colusa	Pacific Gas & Electric	293.67	0.033	0.004
Glenn	Pacific Gas & Electric	293.67	0.033	0.004
Sacramento	Sacramento Municipal Utility District	590.84	0.033	0.004
Shasta	Pacific Gas & Electric	293.67	0.033	0.004
Sutter	Pacific Gas & Electric	293.67	0.033	0.004
Tehama	Pacific Gas & Electric	293.67	0.033	0.004
Yolo	Pacific Gas & Electric	293.67	0.033	0.004

Table E-3. Utility-Specific CO2 Emission Factors

Utility	Factor Type	Emission Factor (lbs CO ₂ /MWh)	Emission Rate Year
Sacramento Municipal Utility District	Retail Power	590.84	2015
	Special Power	0.00	
	Wholesale Power	667.34	
Pacific Gas & Electric	System average	293.67	2016

Source:

The Climate Registry. 2018. Utility-Specific Emission Factors. Accessed on: March 15, 2018. Available at: <https://www.theclimateregistry.org/our-members/cris-public-reports/>

Table E-4. Diesel Emission Factors

Pollutant	Emission Factor	Unit	Emission Factor Description
CO2	10.35	kg/gallon	Table 12.1, Distillate Fuel Oil No. 2
CH4	0.003	kg/MMBtu	Table 12.9.1, Petroleum Products, Industrial
N2O	0.0006	kg/MMBtu	Table 12.9.1, Petroleum Products, Industrial
Heat Content	0.14	MMBtu/gallon	Table 12.1, Distillate Fuel Oil No. 2

Source: The Climate Registry. 2017. 2017 Climate Registry Default Emission Factors. Accessed on: March 15, 2018. Available at: <https://www.theclimateregistry.org/wp-content/uploads/2017/05/2017-Climate-Registry-Default-Emission-Factors.pdf>

Table E-5. Natural Gas Emission Factors

Pollutant	Emission Factor	Unit	Emission Factor Description
CO2	53.06	kg/MMBtu	Table 12.1, US Weighted Average
CH4	0.001	kg/MMBtu	Table 12.9.1, Natural Gas, Industrial
N2O	0.0001	kg/MMBtu	Table 12.9.1, Natural Gas, Industrial
Heat Content	1,026	Btu/scf	Table 12.1, US Weighted Average

Source: The Climate Registry. 2017. 2017 Climate Registry Default Emission Factors. Accessed on: March 15, 2018. Available at: <https://www.theclimateregistry.org/wp-content/uploads/2017/05/2017-Climate-Registry-Default-Emission-Factors.pdf>

Table E-6. Propane Emission Factors

Pollutant	Emission Factor	Unit	Emission Factor Description
CO2	62.87	kg/MMBtu	Table 12.1, Propane (liquid)
CH4	0.003	kg/MMBtu	Table 12.9.1, Petroleum Products, Industrial
N2O	0.0006	kg/MMBtu	Table 12.9.1, Petroleum Products, Industrial
Heat Content	0.09	MMBtu/gal	Table 12.1, Propane (liquid)

Source: The Climate Registry. 2017. 2017 Climate Registry Default Emission Factors. Accessed on: March 15, 2018. Available at: <https://www.theclimateregistry.org/wp-content/uploads/2017/05/2017-Climate-Registry-Default-Emission-Factors.pdf>

Table E-7. Subregion Output Emission Rates (eGRID2016)

eGRID subregion acronym	eGRID subregion name	Total output emission rates lb/MWh							Non-baseload output emission rates lb/MWh							Grid Gross Loss (%)
		CO2	CH4	N2O	CO2e	Annual NOx	Ozone Season NOx	SO2	CO2	CH4	N2O	CO2e	Annual NOx	Ozone Season NOx	SO2	
AKGD	ASCC Alaska Grid	1,072.3	0.077	0.011	1,077.3	6.5	6.5	0.5	1,367.8	0.110	0.016	1,375.0	6.8	6.7	0.7	5.25%
AKMS	ASCC Miscellaneous	503.1	0.023	0.004	504.9	7.0	6.5	0.6	1,533.8	0.068	0.012	1,538.9	21.8	20.8	2.0	5.25%
AZNM	WECC Southwest	1,043.6	0.079	0.012	1,049.0	1.0	0.9	0.3	1,384.8	0.097	0.014	1,391.2	1.3	1.1	0.4	4.23%
CAMX	WECC California	527.9	0.033	0.004	529.9	0.6	0.5	0.1	942.9	0.045	0.006	945.6	0.8	0.8	0.1	4.23%
ERCT	ERCOT All	1,009.2	0.076	0.011	1,014.1	0.5	0.6	1.0	1,402.8	0.108	0.015	1,409.8	0.8	0.7	1.6	4.89%
FRCC	FRCC All	1,011.7	0.075	0.010	1,016.4	0.5	0.5	0.4	1,188.5	0.078	0.011	1,193.3	0.6	0.6	0.4	4.49%
HIMS	HICC Miscellaneous	1,152.0	0.095	0.015	1,158.7	7.4	7.0	4.5	1,530.0	0.147	0.023	1,540.2	11.8	11.3	4.5	5.35%
HIOA	HICC Oahu	1,662.9	0.181	0.028	1,675.2	3.4	3.2	8.6	1,637.5	0.153	0.024	1,648.3	4.1	4.2	8.1	5.35%
MROE	MRO East	1,668.2	0.156	0.026	1,679.3	1.0	1.1	1.3	1,740.1	0.156	0.025	1,750.9	1.0	1.0	1.3	4.49%
MROW	MRO West	1,238.8	0.115	0.020	1,247.4	1.0	1.1	1.4	1,822.0	0.154	0.029	1,834.0	1.6	1.5	2.0	4.49%
NEWE	NPCC New England	558.2	0.090	0.012	563.7	0.4	0.4	0.1	975.1	0.086	0.011	980.5	0.5	0.4	0.2	4.49%
NWPP	WECC Northwest	651.2	0.061	0.009	655.4	0.6	0.7	0.4	1,524.9	0.124	0.020	1,533.8	1.4	1.4	0.8	4.23%
NYCW	NPCC NYC/Westchester	635.8	0.022	0.003	637.1	0.3	0.3	0.0	1,061.7	0.022	0.002	1,062.9	0.5	0.6	0.0	4.49%
NYLI	NPCC Long Island	1,178.3	0.126	0.016	1,186.0	0.9	0.8	0.2	1,338.8	0.036	0.004	1,340.9	0.9	0.9	0.3	4.49%
NYUP	NPCC Upstate NY	294.7	0.021	0.003	295.9	0.3	0.3	0.2	1,018.2	0.061	0.008	1,022.0	0.8	0.8	0.9	4.49%
RFCE	RFC East	758.2	0.050	0.009	762.1	0.6	0.6	0.6	1,434.4	0.079	0.017	1,441.4	1.2	1.1	1.2	4.49%
RFCM	RFC Michigan	1,272.0	0.067	0.018	1,278.9	0.9	0.9	1.7	1,806.1	0.101	0.025	1,816.1	1.3	1.2	2.8	4.49%
RFCW	RFC West	1,243.4	0.108	0.019	1,251.5	0.9	0.9	1.2	1,934.4	0.172	0.029	1,946.9	1.5	1.4	2.2	4.49%
RMPA	WECC Rockies	1,367.8	0.137	0.020	1,376.8	1.0	1.0	0.6	1,688.3	0.147	0.021	1,697.9	1.2	1.2	0.8	4.23%
SPNO	SPP North	1,412.4	0.149	0.022	1,422.2	0.8	0.9	0.5	1,990.8	0.202	0.029	2,004.1	1.4	1.5	1.1	4.49%
SPSO	SPP South	1,248.3	0.095	0.015	1,254.9	0.9	0.9	1.7	1,662.5	0.121	0.019	1,670.9	1.3	1.3	2.4	4.49%
SRMV	SERC Mississippi Valley	838.9	0.050	0.007	842.2	0.8	0.9	0.7	1,186.0	0.071	0.010	1,190.6	1.3	1.4	1.1	4.49%
SRMW	SERC Midwest	1,612.6	0.082	0.026	1,622.5	1.1	1.1	2.4	1,955.2	0.084	0.031	1,966.5	1.3	1.2	3.1	4.49%
SRSO	SERC South	1,089.4	0.087	0.013	1,095.1	0.5	0.5	0.4	1,453.5	0.115	0.017	1,461.1	0.8	0.7	0.6	4.49%
SRTV	SERC Tennessee Valley	1,185.4	0.093	0.017	1,192.6	0.7	0.7	1.0	1,757.4	0.135	0.025	1,767.9	1.1	1.1	1.6	4.49%
SRVC	SERC Virginia/Carolina	805.3	0.067	0.011	810.1	0.5	0.5	0.3	1,422.2	0.111	0.019	1,430.4	0.8	0.8	0.6	4.49%
U.S.		998.4	0.080	0.013	1,004.2	0.7	0.7	0.8	1,501.0	0.111	0.018	1,508.9	1.1	1.0	1.3	4.48%

Source: U.S. Environmental Protection Agency. 2018. eGRID Summary Tables 2016. Available online at: https://www.epa.gov/sites/production/files/2018-02/documents/egrid2016_summarytables.pdf [Accessed on March 15, 2018].