APPENDIX E-4
NATURAL RESOURCES DATA

This appendix contains information about the biological and hydrological resources in the MTP/SCS plan area.

Biological Resources

This section contains information on the following biological resources:

- land cover types and associated biological habitat uses,
- invasive plants,
- waters of the United States (including wetlands),
- special-status species, and
- sensitive natural communities.

The key sources of data and information used to identify existing biological resources are listed below:

- California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California. Prepared for California Department of Transportation; California Department of Fish and Wildlife, and Federal Highways Administration (Spencer et al., 2010);
- Six County Aquatic Resources Inventory (SCARI; USACE and SACOG, 2011);
- USFWS National Wetland Inventory Maps (USFWS, 2015);
- Yuba-Sutter HCP/NCCP Land Cover (Yuba-Sutter HCP/NCCP, 2009);
- South Sacramento HCP/NCCP Land Cover (South Sacramento HCP/NCCP, 2008);
- Placer County Conservation Plan Western Placer Land Cover (Placer County Conservation Plan, 2011);
- County of El Dorado Land Cover (County of El Dorado, 2014);
- Yolo HCP/NCCP Land Cover (Yolo HCP/NCCP, 2013);
- CALVEG for the North Sierran and Central Valley ecological zones (USFWS, 2015);
- California Natural Diversity Database (CNDDB) query results for Sacramento, Sutter, Yolo, Yuba, Placer, and El Dorado Counties (California Natural Diversity Database, 2014);
- USFWS list of endangered, threatened, and proposed species for Sacramento, Sutter, Yolo, Yuba, Placer, and El Dorado Counties;
- CDFW's List of Special Vascular Plants, Bryophytes, and Lichens (CDFW, 2015);
- CDFW's List of Vegetation Alliances and Associations (CDFW, 2010)

- CNPS's 2014 online Inventory of Rare and Endangered Plants for Sacramento, Sutter, Yolo, Yuba, Placer, and El Dorado Counties (CNPS, 2014);
- CNPS's A Manual of California Vegetation, Online Edition (CNPS, 2015);
- CDFA's Pest Ratings of Noxious Weed Species and Noxious Weed Seed (CDFA, 2014); and
- California Flora Database (Calflora, 2015).

Land Cover Types and Associated Habitat Uses and Values

Information about the locations and distribution of land cover types in the MTP/SCS plan area was compiled from mapping data from the sources listed below.

- Yuba-Sutter Regional Conservation Plan (an HCP/NCCP) (in progress, 2015);
- South Sacramento HCP (in progress, 2015);
- Placer County Conservation Plan (an HCP/NCCP) (in progress, 2015);
- Yolo County HCP/NCCP (in progress, 2015);
- California Vegetation Maps (CALVEG) for the North Sierran and Central Valley ecological zones (USFS, 2014);
- Six-County Aquatic Resources Inventory (SCARI; USACE and SACOG, 2011); and
- A Guide to the Wildlife Habitats of California (Mayer and Laudenslayer, 1988).

The land cover data obtained from these sources varied from general natural community types to specific vegetation alliances. Therefore, for the purposes of this program-level plan, data were grouped into general land cover types within three broad categories: wildlands, agriculture, and developed and/or disturbed areas. The land cover type descriptions presented below are intended to provide regional-scale, general information about the MTP/SCS plan area.

Wildlands

Grassland

Within the MTP/SCS plan area, there are two types of grassland land cover types: annual grassland and perennial grassland. Annual grassland is one of the most common plant communities in the MTP/SCS plan area and is dominated by nonnative annual grasses, nonnative forbs, and native forbs. Annual grassland is also a very common plant community statewide. Grasslands are found on ridges, hill slopes, and valley floors. Representative species include a mix of dominant nonnative grasses such as soft chess, red brome, ripgut brome, foxtail barley, wild oat, and annual fescues, intermixed with forb species such as clovers, lupines, owl's clover, popcornflower, poppies, and various species of filaree. Some annual grasslands in the MTP/SCS plan area are subject to frequent disturbance, such as grazing and maintenance activities along roadsides. The annual grassland vegetation in these areas are often dominated by introduced nonnative species, such as yellow star-thistle.

Perennial grassland is dominated by native perennial bunchgrass plants that are intermixed with species typical of an annual grassland. Perennial grassland is not common in California, and is considered a sensitive natural community by CDFW. Several areas of perennial grassland are habitat restoration sites created and set aside specifically for this plant community.

In the MTP/SCS plan area, grasslands are important because they support insects, amphibians, reptiles, and small birds and mammals that are prey for other wildlife, such as red-tailed hawks, northern harriers, American kestrels, burrowing owls, and coyotes. Grasslands near open water and woodland habitats are used by the greatest number of wildlife species because they provide places for resting, breeding, forage, and escape.

Both annual and perennial grassland stabilize soils, protect watersheds from erosion, and provide forage for wildlife and livestock. They also provide habitat for a variety of special-status species including American badger, burrowing owl, white-shouldered kite, and Swainson's hawk. Those grasslands that support vernal pools or seasonal wetlands also provide habitat for special-status vernal pool invertebrates, western spadefoot, and California tiger salamander.

Chaparral

Chaparral communities in the MTP/SCS plan area typically occur on the drier slopes of the foothills and are characterized by drought-resistant shrubs. These communities are relatively common in the foothill portions of the MTP/SCS plan area. Dominant species in chaparral communities of the MTP/SCS plan area include manzanita species, buckbrush, black sage, coyote brush, scrub oak, leather oak, and chamise. The herbaceous understory varies depending on the density of shrub cover, and typically includes native grasses and wildflowers.

Chaparral plants provide browse, berries, and seeds for a variety of birds, such as California quail, northern mockingbird, American robin, hermit thrush, spotted towhee, California towhee, dark-eyed junco, and golden-crowned sparrow. Insectivorous birds, such as orange-crowned warbler, bushtit, and Bewick's wren, feed on insects in chaparral foliage. Many bird species also find nesting and roosting sites, and protection from predators, in chaparral habitats. Numerous rodents inhabit chaparral habitats, and deer, rabbits, and hares make extensive use of chaparral sources of food and cover. In addition, chaparral provides foraging and refuge habitat for other mammals and reptiles, including gray fox, coyote, deer mouse, western fence lizard, Pacific rattlesnake, and gopher snake.

Special-status wildlife species that may occupy chaparral habitat include California horned lizard, and Marysville kangaroo rat. Some chaparral communities, especially those found in the lower foothill region of El Dorado County, provide habitat for a variety of special-status plant species that include Nissenan manzanita, big scale balsamroot, Stebbin's morning glory, Mariposa clarkia.

Chamise-Redshank Chaparral

Chamise-redshank chaparral may consist of nearly pure stands of chamise or redshank, a mixture of both, or with other shrubs. Chamise is the dominant shrub of this habitat type throughout northern California. The purest stands of chamise occur on xeric, south-facing slopes. Toyon, sugar sumac, poison oak, redberry, and California buckthorn are commonly found in drainage

channels and on other relatively mesic sites. At upper elevations or on more mesic exposures, chamise mixes with ceanothus, manzanita, scrub oak, and laurel sumac. Ceanothus and sugar sumac are common associates of redshank.

Chamise-redshank chaparral generally occurs below and grades into mixed chaparral. On some sites, Chamise-redshank chaparral may form an ecotone with Ponderosa pine, coastal oak woodland, or mixed conifer types. In northern California, the lower boundary is with annual grassland and blue oak-foothill pine. Chamise-redshank chaparral more frequently mixes with other shrubs, especially several species of ceanothus in northern California. This type of vegetation covers large areas in the central coast ranges and on the eastern exposures of the north coast ranges; as isolated stands in the Cascade and Klamath ranges and the Siskiyou Mountains; and in a broken band on the western slope of the Sierra Nevada.

Wildlife species found in this habitat type also are found in either mixed chaparral, montane chaparral, coastal scrub, sagebrush and in shrubs beneath several woodland and forest types. The primary land management consideration is selection of alternative fire management treatments. Long-term fire suppression can lead to stand senescence and declines in deer, small mammals, birds, and reptiles. Most animal populations reach peak densities in the first two or three decades, frequently one to 15 years after a fire. Repeated fires at short intervals could favor crown-sprouting shrubs over obligate seed sprouters. Either management extreme could have long-term impacts on wildlife through changes in nutrient availability, soil quality or vegetation composition, structure, and recovery time.

Mixed Chaparral

Mixed chaparral is a floristically rich type that supports approximately 240 species of woody plants. Composition changes between northern and southern California and with precipitation regime, aspect, and soil type. Dominant species in cismontane mixed chaparral include scrub oak, chaparral oak, and several species of ceanothus and manzanita. Individual sites may support pure stands of these shrubs or diverse mixtures of several species. Commonly associated shrubs include chamise, birchleaf mountain mahogany, silk-tassel, toyon, yerba-santa, California buckeye, poison-oak, sumac, California buckthorn, hollyleaf cherry, Montana chaparral-pea, and California fremontia. Some of these species may be locally dominant. Leather oak and interior silktassel are widely distributed on cismontane serpentine soils, and chamise and toyon may be abundant on these soils. Shrubs such as Jepson, coyote, and dwarf ceanothus and serpentine manzanita are local serpentine endemics. Incense-cedar, knobcone pine, Coulter pine, and foothill pine frequently are found in mixed chaparral on serpentine soils. In the plan area, this habitat type is a broken band along middle and lower elevations of the western slope of the Sierra Nevada.

Mixed and chamise-redshank chaparral occur as a mosaic on low to middle elevation slopes below several woodland and forest types. Compared to chamise-redshank chaparral, mixed chaparral generally occupies more mesic sites at higher elevations or on north-facing slopes. In northern California, mixed chaparral merges with annual grassland and blue oak-foothill pine at lower elevations. Chaparral shrubs form the understory of many blue oak-foothill pine stands. At upper elevations, mixed chaparral grades into coastal oak woodland, Ponderosa pine or mixed conifer types and frequently forms the understory of these habitats. Jeffrey pine, pinyon juniper or Juniper habitats occur above mixed chaparral.

No wildlife species are restricted to mixed chaparral. Most species are found in other shrub-dominated types including chamise-redshank chaparral, montane chaparral, coastal scrub, and sagebrush, or the shrubs beneath several woodland and forest types.

Montane Chaparral

The growth form of montane chaparral species can vary from treelike (up to three meters) to prostrate. When mature, it is often impenetrable to large mammals. Its structure is affected by site quality, history of disturbance (e.g., fire, erosion, logging) and the influence of browsing animals. Montane chaparral varies markedly throughout California. Species composition changes with elevational and geographical range, soil type, and aspect. One or more of the following species usually characterize montane chaparral communities: whitethorn ceanothus, snowbrush ceanothus, greenleaf manzanita, pinemat manzanita, hoary manzanita, bitter cherry, huckleberry oak, sierra chinquapin, juneberry, fremont silktassel, Greene goldenweed, mountain mahogany, toyon, sumac and California buckthorn. Montane chaparral is associated with mountainous terrain from mid to high elevation at 3,000 to10,000 feet.

Montane chaparral adjoins a variety of other wildlife habitats, including montane riparian, mixed chaparral, and perennial grassland. It becomes established in disturbed coniferous habits such as ponderosa pine), mixed conifer, Jeffrey pine, red fir and lodgepole pine.

Montane chaparral provides habitat for a wide variety of wildlife. Numerous rodents inhabit chaparral. Deer and other herbivores often make extensive use of chaparral. Some small herbivores use chaparral species in fall and winter when grasses are not in abundance. Rabbits and hares eat twigs, evergreen leaves and bark from chaparral. Shrubs are important to many mammals as shade during hot weather and moderate temperature and wind velocity in the winter. Many birds find a variety of habitat needs in the montane chaparral. It provides seeds, fruits, insects, protection from predators and climate, as well as singing, roosting and nesting sites.

Scrub

Four scrub land cover types have been identified in the proposed MTP/SCS plan area: alkali desert scrub, alpine dwarf scrub, low sage scrub, and sagebrush scrub. These areas within the MTP/SCS plan area are characterized by typically low growing (i.e., 0.25 to 0.5 meters tall) shrubs that have varying canopy density. Although generally dominated by shrubs, small trees and herbaceous annual species may also occur in these scrub areas.

Alkali Desert Scrub

In the MTP/SCS plan area, alkali desert scrub stands likely occur on the edges of the Sacramento Valley, where grazing, housing developments, and agricultural activities have destroyed or altered the extent and composition of this vegetation cover type. This vegetation cover type can be further subdivided into two phases: xerophytic (plants adapted to living in a dry arid habitat) and halophytic (plants adapted to living in salty conditions), depending on landscape conditions and location. The xerophytic phase consists of open stands of very low to moderately high (i.e., 0.8 to 6.6 feet) greyish, spiny, long slender leaved to small-leaved subshrubs and shrubs, which are uniform in appearance, widely spaced, occur in relatively dry soils and exhibit low to moderate osmotic tolerance. The halophytic phase consists of woody-stemmed species, which

exhibit varying degrees of succulence, are generally more closely spaced than the xerophytic phase, tolerate periodic flooding, and generally exhibit a high degree of osmotic tolerance.

The alkali desert scrub is a heterogeneous habitat whose component plant assemblages vary considerably in composition along gradients of moisture, salinity, and microtopography (Mayer and Laudenslayer, 1988).

Special-status species that are known to occur in this habitat type occur in southern California for the most part, and not in the proposed MTP/SCS plan area, so they are not listed here.

Alpine Dwarf-Scrub

Alpine dwarf-scrub habitats typically are low graminoid (i.e. grass like) and include forb communities with an admixture of dwarf-shrubs (often cushion plants). The perennial herbs or dwarf shrubs comprising these communities are usually less than 18 inches tall. Ground coverage may reach 100 percent at lower elevations, but becomes increasingly sparse as elevation increases. On mesic sites, a continuous turf contrasts with patches of bunchgrasses and cushion plants on drier sites.

Species composition of alpine dwarf-scrub habitat varies considerably throughout California. The most common shrubs occurring are oceanspray, Greene's goldenweed, and mountain white heather. These shrubs occur primarily in northern California and the Sierra Nevada. Nonshrub species that commonly occur in the alpine areas of northern California and the Sierra Nevada include Eschscholtz's buttercup, primrose, prostrate sibbaldia, sedge, bluegrass, buckwheat, squirreltail, rockcress, mountain sorrel, pussypaws, Indian paintbrush, and Payson's draba (Mayer and Laudenslayer, 1988).

The Sierra Nevada mountain yellow-legged frog, federally listed as endangered and state listed as threatened, was identified as potentially occurring in MTP/SCS plan area in high-elevation lakes and ponds. Other special-status species include the western white-tailed jackrabbit and pika.

Low Sage Scrub

This habitat type is generally dominated by broadleaved, evergreen shrubs ranging in height from about four to 19 inches, typically averaging about 15 percent cover, but sometimes with crowns touching. Deciduous shrubs and small trees are sometimes sparsely scattered within this habitat type. A ground cover of grasses and forbs is typically sparse with five to 15 percent coverage.

Low sage scrub habitat may be dominated by low sagebrush, often in association with Douglas rabbitbrush, bitterbrush, or big sagebrush; black sagebrush is also commonly associated with winterfat and Mormon-tea. Common grass species include Sandberg bluegrass, bluebunch wheatgrass, bottlebrush squirreltail, Thurber needlegrass, and Idaho fescue (Mayer and Laudenslayer, 1988).

The burrowing owl, a California species of special concern, is the only special-status wildlife species in the MTP/SCS plan area identified as potentially occurring in this habitat.

Sagebrush Scrub

Sagebrush stands are typically large, open, discontinuous stands of big sagebrush of fairly uniform height. Big sagebrush tends to have a single short, thick stem that branches into a nearly globular crown. Plant heights range from 1.6 to 9.8 feet and density ranges from very open, widely spaced, small plants to large, closely spaced plants with canopies touching.

Sagebrush occurs at a wide range of middle and high elevations. At lower elevations and on drier sites, it gives way to such species as saltbrush, greasewood, creosote bush, and winterfat. At mid-elevations and on more mesic sites the habitat meets bitterbrush, curl leaved mountain mahogany, and western serviceberry. At high elevations, this habitat type integrates with Ponderosa pine and even Aspen habitat types.

Often the habitat is composed of pure stands of big sagebrush, but many stands include other species of sagebrush, rabbitbrush, horsebrush, gooseberry, western chokecherry, curl leaved mountain mahogany, and bitterbrush. In communities not fully occupied by sagebrush, various amounts of herbaceous understory are found. Idaho fescue, bluebunch wheatgrass, several species of needlegrass, squirreltail, Sandberg bluegrass, and Great Basin wildrye are among the more common grasses found in this habitat (Mayer and Laudenslayer, 1988).

Special-status species that are known to occur in this habitat type occur in the Great Basin Desert east of the Sierra Nevada for the most part, and not in the proposed MTP/SCS plan area, so they are not listed here.

Valley Oak Savanna

In the MTP/SCS plan area, the valley oak savanna occurs in the valley and at the mid- to upper elevations. These communities are dominated by valley oak, but blue oak and interior live oak may also be present. The canopy cover is less than 10 percent, the shrub layer is sparse or absent, and the herbaceous layer consists of grassland.

Valley oak savanna communities provide important breeding, foraging, and cover habitat for several wildlife species common to the region. The upper canopy of the oak trees provides nesting, foraging, and cache sites for many birds, such as Lewis' woodpecker, acorn woodpecker, northern flicker, oak titmouse, western bluebird, mourning dove, and red-tailed hawk; the understory grassland layer provides nesting and foraging habitat for many common species of birds, small mammals, and reptiles.

Special-status wildlife species that could occur in valley oak savanna communities in the MTP/SCS plan area include western spadefoot, western pond turtle, California horned lizard, Swainson's hawk, white-tailed kite, golden eagle, purple martin, Townsend's big-eared bat, and pallid bat.

Valley Oak Woodland

Valley oak woodlands in the MTP/SCS plan area are differentiated from oak savanna by the percent of canopy cover within the community. Valley oak woodland canopy cover ranges from approximately 10 to 60 percent. Oak woodlands are dominated by valley oak, but interior live oak and coast live oak are also present. The understory of valley oak woodlands varies from

sparse to well-developed, including shrubs such as poison oak, ceanothus, and scrub oak. The herbaceous understory frequently contains plant species found in annual grasslands.

Valley oak woodland communities provide important breeding, foraging, and cover habitat for several wildlife species common to the region. The upper canopy of the oak trees provides nesting, foraging, and cache sites for many birds, such as Lewis' woodpecker, acorn woodpecker, northern flicker, oak titmouse, western bluebird, mourning dove, and red-tailed hawk; the understory layer provides nesting and foraging habitat for many common species of birds, small mammals, and reptiles.

Special-status wildlife species that could occur in valley oak woodland communities in the MTP/SCS plan area include western spadefoot, western pond turtle, California horned lizard, Swainson's hawk, white-tailed kite, golden eagle, purple martin, Townsend's big-eared bat, and pallid bat.

Foothill Woodland

Foothill woodlands in the MTP/SCS plan area occur along the slopes of both the Sierra Nevada foothill regions of Placer, El Dorado, and Yuba counties, and the interior coast ranges of Yolo County. This land cover type includes woodlands dominated by blue oak, canyon live oak, coast live oak, foothill pine, juniper, and knobcone pine.

A variety of common wildlife species inhabit foothill woodlands. These areas represent important habitat for nesting birds, roosting habitat for bats that utilize tree cavities or exfoliating bark, wintering habitat for deer, and resident habitat for many common mammals.

Special-status wildlife species that could occur in foothill woodland communities in the MTP/SCS plan area include burrowing owl, golden eagle, foothill-yellow legged frog, and western pond turtle. Some of the plant species expected to occur include adobe lily, parry's horkelia, foothill jepsonia, and veiny monardella.

Montane Forest

Montane forest communities within the MTP/SCS plan area occur in the Sierra Nevada foothill and mountainous regions of Placer, El Dorado, and Yuba counties. These forest communities are dominated by a mix of pines (depending on the elevation), black oaks, red fir, white fir, incense-cedar, quaking aspen, Douglas-fir, juniper, and Pacific madrone. Pine species that occur in montane forest are ponderosa pine, Jeffrey pine, sugar pine, and lodgepole pine.

Species composition of the understory of the montane forest communities varies widely with elevation, slope aspect, and fire history of individual stands; however, in most areas, the shrub and herbaceous layers occur primarily at forest edges or in canopy openings, such as rock outcrops and other natural or artificial clearings.

Large mammals frequent montane forest communities, including coyote, black bear, mountain lion, and bobcat. A variety of smaller rodents, squirrels, and shrews are found in shrub thickets and open patches within the forest. Amphibians and reptiles that occur in forest communities include California newt, long-toed salamander, Sierran treefrog, western toad, western fence

lizard, northern alligator lizard, gopher snake, common kingsnake, mountain kingsnake, common garter snake, and Pacific rattlesnake.

A variety of flycatchers, vireos, warblers, and many other birds occur in montane forests. Canopy-dwelling species include olive-sided flycatcher, golden-crowned kinglet (winter only), and western tanager. Large snags and the decaying portions of living trees offer nesting cavities for pileated woodpecker, western screech owl, and northern flicker. The forest also provides food and habitat for a variety of birds, including white-headed woodpecker, white-breasted nuthatch, red-breasted nuthatch, chestnut-backed chickadee, mountain chickadee, dark-eyed junco, spotted towhee, black-headed grosbeak, and evening grosbeak.

Special-status species that are known to occur in this habitat include western pond turtle, Sierra Nevada yellow-legged frog, northern goshawk, California spotted owl, great gray owl, yellow warbler, American marten, Pacific fisher, ringtail, and bats such as Yuma myotis and pallid bat. There are also a variety of special-status plants that are known to occur within montane forest communities in the Sierra Nevada region, including Sanborn's onion, modest rock cress, serpentine milkweed, sierra bolandra, and Nevada daisy.

Riparian

Riparian land cover types in the proposed MTP/SCS plan area occur along creeks, rivers, and other water bodies in the proposed MTP/SCS plan area. The composition and structure of vegetation varies among riparian areas on the valley floor, in the foothills, and in montane areas, typically includes willows, Fremont's cottonwood, valley oak, California sycamore, box elder, Oregon ash, white alder, and wild grape. The shrub layer of riparian areas is also highly variable and can range from sparse to well developed. The herbaceous understory of riparian areas typically contains a mixture of native and introduced species.

Despite widespread disturbances resulting from urbanization, agricultural conversion, and grazing, riparian forests remain important wildlife resources because of their scarcity regionally and statewide and because the riparian community is used by a large variety of wildlife species. This habitat supports abundant aquatic and terrestrial invertebrates that are prey for amphibians and reptiles, such as common garter snake, western skink, and ringneck snake, as well as insectivorous birds, such as warblers, northern flicker, downy woodpecker, and flycatchers. Small mammals found in riparian habitats include shrews, voles, bats, and mice. Raptors that nest in large riparian trees include great horned owl, red-tailed hawk, and American kestrel. Cavity-dependent species, such as woodpeckers, bats, squirrels, and raccoons, require mature stands of trees. Striped skunk, red fox, gray foxes, and badger forage in riparian habitats and use them for cover and travel.

Elderberry shrubs within riparian woodlands in the proposed MTP/SCS plan area provide habitat for the valley elderberry longhorn beetle. Similarly, dense areas of the riparian woodland could provide nesting habitat for the western yellow-billed cuckoo. Both species are listed as federally threatened. Riparian woodlands also provide nesting habitat for several special-status raptors, including osprey, bald eagle, Cooper's hawk, Swainson's hawk, and white-tailed kite. Cavities or exfoliating bark in riparian trees along waterways in the proposed MTP/SCS plan area may be used as roosting sites by some species of special-status bats, such as pallid bat.

Many riparian forests (including those found in the proposed MTP/SCS plan area) represent important, uncommon plant communities regionally and statewide, because of historic and continuing habitat loss. These communities provide essential habitat functions for many species. For this reason, CDFW has designated riparian habitat as an important habitat. Land conversion practices and flood control projects have been identified as the primary sources of riparian habitat loss.

Wetlands

The MTP/SCS plan area contains a variety of seasonal and perennial wetland communities. Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. The importance and sensitivity of wetlands have increased and their values as recharge areas and as filters for water quality have been recognized. The most common types of wetlands in the MTP/SCS plan area are seasonal wetlands (including vernal pools) and fresh emergent wetlands.

Vernal Pools and Other Seasonal Wetland Communities

Seasonal wetlands in the MTP/SCS plan area are typically shallow depressions that frequently occur in grasslands and are filled during the rainy season. Some maintain water through the spring or early summer. Vernal pools in the MTP/SCS plan area are a type of seasonal wetland characterized by the presence of an impermeable hardpan layer, a unique hydrologic cycle, and a plant community that adapted to conditions within vernal pools. Vernal pools provide habitat for numerous plant, vertebrate, and invertebrate species, many of which are endemic to vernal pools.

Seasonal wetlands, including vernal pools and seasonal swales, provide habitat for a variety of wildlife species. During the wet season when seasonal wetlands and vernal pools are ponded, avian species such as killdeer, black-necked stilts, American avocets, great egrets, and greater yellowlegs commonly forage on the many invertebrate and amphibian larvae commonly found in this habitat. Seasonal wetlands are also an important breeding habitat for several amphibian species that depend on these temporary water bodies for successful reproduction.

Vernal pools and other types of seasonal wetlands provide habitat for several special-status wildlife species in the MTP/SCS plan area, including vernal pool fairy shrimp, vernal pool tadpole shrimp, Conservancy fairy shrimp, Delta green ground beetle, California tiger salamander, California red-legged frog, and western spadefoot.

Special-status plants that may occur in these seasonal wetland communities include Bogg's Lake hedge-hyssop, legenere, dwarf downingia, Ahart's dwarf rush, Sacramento Orcutt grass, slender Orcutt grass, Red Bluff dwarf rush, and pincushion navarretia.

Vernal pools are sensitive natural communities that are being lost increasingly as a result of conversion of land to other uses. One priority of several of the HCPs/NCCPs that are currently being prepared for areas within the proposed MTP/SCS plan area is to conserve and protect remaining vernal pool complexes.

Fresh Emergent Wetland Communities

This community in the MTP/SCS plan area is distinguished from deepwater aquatic habitats and other wetlands by the presence of tall, perennial, grass-like plants rooted in soils that are

permanently or seasonally flooded or inundated. Characteristic species include broadleaf cattail, California bulrush, creeping spikerush, Pacific rush, Baltic rush, mannagrass, water primrose, water-plantain, and swamp smartweed.

In the MTP/SCS plan area, fresh emergent wetlands are often associated with small artificial ponds, reservoirs, natural drainages, irrigation canals, and roadside ditches.

Characteristic water birds that nest in emergent wetlands include Canada goose, mallard, cinnamon teal, gadwall, Virginia rail, American coot, common moorhen, and Wilson's snipe. These species may be joined by migratory and wintering waterfowl such as American wigeon, northern shoveler, northern pintail, green-winged teal, ring-necked duck, bufflehead, and ruddy duck. Amphibians and reptiles that are found in fresh emergent wetland communities include western toad, Pacific tree frog, common garter snake, and Sierra garter snake.

Special-status wildlife species in the MTP/SCS plan area that may use this community type include California tiger salamander, California red-legged frog, western pond turtle, giant garter snake, northern harrier, white-tailed kite, greater sandhill crane, California black rail, saltmarsh common yellowthroat, and tricolored blackbird. There are also a variety of special-status plants that are known to occur in this wetland community.

Riverine

Riverine systems in the MTP/SCS plan area comprise permanent, intermittent, and ephemeral drainages. Most of the rivers in the MTP/SCS plan area and their tributaries are part of the Sacramento–San Joaquin River watershed. This includes streams and creeks, as well as their associated gravel and sand bars.

A variety of invertebrate and vertebrate species exist in riverine ecosystems in the MTP/SCS plan area. Invertebrates found in rivers and creeks include mayflies, alderflies, stoneflies, dragonflies, damselflies, water striders, and caddis flies.

Fish-eating birds, such as ospreys and bald eagles, forage for fish near the surface of pools and shallow waters along the rivers. Belted kingfishers, double-crested cormorants, and common mergansers also forage for fish in streams and reservoirs. Many amphibians and reptiles depend on riverine systems; these include California newt, western toad, foothill yellow-legged frog, western terrestrial garter snake, Sierra garter snake, and western pond turtle. Mammals in riverine systems include northern river otter, American mink, muskrat, and American beaver. Emerging aquatic insects are a major food source for many bat species that forage over open waters in the proposed MTP/SCS plan area.

Low-elevation rivers and large, perennial creeks support runs of Chinook salmon and Central Valley steelhead. Other native fish species include hitch, Sacramento roach, hardhead, Sacramento sucker, riffle sculpin, Sacramento pike minnow, and Pacific lamprey.

Open Water/Lakes and Reservoirs

The MTP/SCS plan area contains several lakes, reservoirs, and flood control basins, including Folsom Lake, Rollins Reservoir, Sugar Pine Reservoir, New Bullards Bar Reservoir, Collins Lake, and Camp Far West Reservoir. There are many other small reservoirs, lakes, and ponds

throughout each of the counties. Many of these large water bodies support perennial and seasonal wetland and riparian communities along their edges.

These reservoirs provide habitat for a variety of waterfowl, including goose species, mallard, cinnamon teal, green-winged teal, American wigeon, northern pintail, northern shoveler, gadwall, ruddy duck, and common merganser, and can provide important resting and foraging habitat for many waterfowl species during migration.

Vegetation growing along the edges of water bodies also provides nesting habitat for several bird species and foraging and refuge habitat for numerous amphibian, reptile, and mammal species occupying the open water and adjacent grassland, woodland, and forest habitats.

Barren and Rock Outcrops

Barren areas in the proposed MTP/SCS plan area include cliffs, and rock outcrops, that support little, if any, vegetative cover. Another type of barren habitat is the serpentine barrens. Although serpentine soils occupy only one percent of California's land area, where they do occur the complex interaction of plants, soils and rock makes a striking impact on the landscape. Serpentine is a mineral class, the constituents of serpentinite rock. These rocks are composed mainly of iron magnesium silicate, with "impurities" of chromium, nickel, and other toxic metallic elements. Because of this unusual chemical makeup, the soils weathering from serpentinite and other untramafic rocks (i.e., peridotite, dunite) are infertile (high magnesium to calcium ratio) or even toxic to most plants. Some plants have become adapted to serpentines everywhere these rocks reach the surface. Plants restricted to serpentine contribute impressively to the list of California endemics (only found in California). Over 200 species, subspecies and varieties are restricted wholly or in large part to serpentine. Counties within the MTP/SCS plan area that are known to support serpentine areas include El Dorado, Placer, and Yuba (Van Gosen and Clinkerbeard, 2011).

Special-status plant species that have adapted to serpentinite soils within the MTP/SCS plan area include Stebbin's morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, Layne's ragwort, and Keck's checkerbloom.

Agriculture

Agricultural lands occur throughout the valley and lower foothill regions of the MTP/SCS plan area. Agricultural lands include orchards and vineyards, irrigated pastures, rice fields, and row crops

Depending on the crop pattern and the land's proximity to native habitats, agricultural lands can provide relatively high-value habitat for wildlife, particularly as foraging habitat. Raptor species use row- and grain-crop agricultural lands for foraging, because several species of common rodents are found in agricultural fields and are accessible as prey. Agricultural habitats also provide foraging and resting habitat for migrating and wintering waterfowl and shorebirds.

Special-status wildlife species associated with agricultural lands, such as northern harrier and giant garter snake, may use adjacent irrigation canals and freshwater marsh vegetation for

foraging or breeding. Giant garter snakes have the potential to occur in irrigation canals and can use the adjacent agricultural lands as foraging and basking habitat. Swainson's hawks also forage in agricultural land types such as alfalfa and grain crops. Burrowing owls may be found in grazing lands that support California ground squirrels. Greater and lesser sandhill cranes overwinter in fallow agricultural lands such as rice fields, alfalfa, and grain crops.

Irrigation Canal

Areas mapped as irrigation canals are composed of ditches, canals, and levees that convey and distribute water to agricultural lands (e.g., row and field crops, irrigated pasture, rice, orchard and vineyard) in the MTP/SCS plan area. Irrigation canals are typically maintained and cleared of vegetation, although some may contain wetland vegetation characteristic of fresh emergent wetland communities.

Orchards and Vineyards

Areas mapped as orchards and vineyards occur in both the valley and lower foothill regions of the MTP/SCS plan area, with the majority of orchards composed of walnut, plum, or peach trees. This type of agriculture requires active maintenance such as irrigation, pruning, and frequent mowing or herbicide use to discourage vegetation. If present, vegetation typically consists of nonnative, weedy species. The vineyards in the study area contain grape and kiwi vines, and maintenance is comparable to that in orchards.

Row and Field Crops

Agricultural areas mapped as row and field crops are distributed primarily in the valley regions of the MTP/SCS plan area. Row and field crops include both active and fallow fields that exhibit indicators of tillage. Row and field crop types mapped in the study area include alfalfa, croplands, grain and hay, irrigated grain crops, irrigated hay field, irrigated row and grain crops, dry land grain crops, and upland crops. Active row and field crops are maintained with irrigation and herbicide application. Alfalfa, hay, and rotating crop farming methods can mean a given piece of land may be harvested several times during the course of the year. The margins of row and field crops typically support nonnative, weedy species.

Pasture

Areas mapped as pasture occur in both the valley and lower foothill regions of the MTP/SCS plan area, and consist of actively irrigated fields utilized for grazing purposes. Vegetation in pastures, which represents regularly grazed or mowed, typically consists of grasses, rushes, and legumes that form a dense ground cover. Representative species are nonnative clovers, dallis grass, and Italian ryegrass.

Rice

Areas mapped as rice, primarily in the valley regions of the MTP/SCS plan area, include both flooded and fallow rice fields. Rice fields commonly include irrigation features, such as berms, ditches, canals, and water control structures. Rice is grown as a monoculture, using tillage or herbicides to eliminate unwanted vegetation; remaining vegetation is generally confined to the berms, ditches, and canals between and around fields, and is dominated by wetland plants, both native and nonnative. Special-status wildlife species associated with rice fields include giant garter

snake, snowy plover, burrowing owl, Swainson's hawk, loggerhead shrike, tricolored blackbird, sandhill crane, western spadefoot, western pond turtle, coast horned lizard, and numerous bat species forage over the rice fields.

Developed/Disturbed

Developed

Developed areas within the MTP/SCS plan area are characterized by residential and commercial properties, infrastructure, and impermeable surfaces. The composition of vegetation within developed areas is variable, but most are ornamental species planted for landscaping or horticulture (e.g., fruit trees) and are actively irrigated. Developed areas also contain weedy plant species, some of which are considered invasive by the California Department of Food and Agriculture (CDFA) and California Invasive Plant Council (Cal-IPC). Representative weed species that occur in these areas are black mustard, bristly ox-tongue, Himalayan blackberry, pampas grass, Bermuda grass, Italian ryegrass, Bermuda buttercup, and periwinkle.

Developed areas in the MTP/SCS plan area also contain inclusions of annual grassland, riparian habitat along streams and rivers, and landscaped areas. In addition to the ornamental landscaping, these habitat types in the developed areas provide nesting and foraging habitat for common bird species, including house sparrow, northern flicker, western scrub-jay, northern mockingbird, Brewer's blackbird, and European starlings. California ground squirrels, eastern fox squirrels, house mice, and striped skunks can also be found using habitats in urban landscapes, such as parks, schools, and vacant lots.

Disturbed

The disturbed portions of the MTP/SCS plan area include nonagricultural areas that have been heavily disturbed or graded such as landfills, gravel mines, and mine tailings. The vegetation in disturbed areas varies in density and typically contains a large proportion of nonnative species.

Landscaped

Landscaped portions of the MTP/SCS plan area include urban parks, golf courses, and urban woodlands, which are frequently located within city limits and are typically surrounded (partially or fully) by developed areas. Landscaped areas vary in size, from large areas that may include remnant patches of natural vegetation, to small, heavily landscaped and managed playgrounds and ball fields.

Nonnative Vegetation

The areas of nonnative vegetation that have been identified in the proposed MTP/SCS plan area consist of dense, monotypic patches of nonnative trees, shrubs, or herbs, including: black locust, eucalyptus, Himalayan blackberry, tamarisk, giant reed, and perennial pepperweed.

Invasive Plants

The proposed MTP/SCS plan area contains plant species that are considered invasive plants or noxious weeds by Cal-IPC (Cal-IPC, 2006) and/or CDFA (CDFA, 2015). According to the California Flora Database (Calflora, 2014), 164 invasive plant species have been reported in El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba counties. The introduction and spread of invasive plants adversely affect natural plant communities by altering ecosystem processes (e.g., fire frequency, hydrological cycles), displacing native plant species, and reducing the quality of habitats that provide shelter and forage for wildlife species (Cal-IPC, 2006). Invasive plants also affect the quality of forage on rangelands and cropland productivity. Invasive plant ratings assigned by Cal-IPC and CDFA are based on multiple criteria, including ecological impacts, invasive potential, distribution, the likelihood that eradication or control efforts would be successful, and perceived importance by CDFA and Cal-IPC.

Invasive plants in the proposed MTP/SCS plan area were not inventoried for this program-level analysis, because target invasive plants would differ widely from project site to project site, depending on the sensitivity of the site to infestation, the nature of the specific proposed project, and the type of invasive plants in the immediate specific project area. Target lists of invasive plants for specific project implementation would include both CDFA and Cal-IPC species, with priority given to CDFA A-rated weed species and species designated as highly or moderately invasive plants by Cal-IPC. Some CDFA B- and C-rated species would be included on project-specific target lists, if the applicable county agricultural commissioner identifies them as target invasive plants.

Wetlands and Other Waters

The MTP/SCS plan area contains numerous types of wetlands and other waters (i.e., non-wetlands) that are subject to state and/or federal regulation. Compliance with regulations for wetlands and other waters in the plan area would be required for projects involving filling of or encroachment into these habitats. Wetlands and other waters in the proposed MTP/SCS plan area are discussed briefly below; descriptive information was provided previously in the discussion of land cover types. Applicable regulations and regulatory agencies are discussed under Regulatory Setting.

The U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) define wetlands as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (40 Code Fed. Regs., § 232.2). This definition is referred to as a three-parameter definition because positive indicators of all three wetland criteria (vegetation, soils, and hydrology) must be present. The most common wetland land cover types identified in the MTP/SCS plan area are seasonal wetlands (including vernal pools) and freshwater emergent wetlands. Areas identified as other waters typically lack positive indicators of one or more wetland criteria. Other waters that occur in the MTP/SCS plan area include streams, creeks, rivers, irrigation canals, reservoirs, and ponds.

Habitat Corridors

The proposed MTP/SCS plan area encompasses large areas of wildlands that provide habitat for both common and rare plants and animals. Corridors between habitat concentrations serve important ecological functions related to connectivity, such as species dispersal, genetic exchange, and resilience to habitat effects of climate change. Some of these areas were mapped as Essential Connectivity Areas (ECA) for the California Essential Habitat Connectivity Project, which was commissioned by the California Department of Transportation (Caltrans) and CDFW with the purpose of making transportation and land-use planning more efficient and less costly, while helping reduce dangerous wildlife-vehicle collisions (Spencer et al., 2010). The ECAs were not developed for the purposes of defining areas subject to specific regulations by CDFW or other agencies.

The ECAs are not regulatory delineations and are identified as lands likely important to wildlife movement between large, mostly natural areas at the statewide level. The ECAs form a functional network of wildlands that are important to the continued support of California's diverse natural communities. The ECAs were not developed for the needs of particular species, but were based primarily on the concept of ecological integrity, which considers the degree of land conversion, residential housing impacts, road impacts, and status of forest structure (for forested areas). In addition, consideration was given to the degree of conservation protection and areas known to support high biological values, such as mapped critical habitat and hotspots of species endemism (Spencer et al., 2010). ECAs are placeholder polygons that can inform land-planning efforts, but that should eventually be replaced by more detailed linkage designs, developed at finer resolution at the regional and ultimately local scale based on the needs of particular species and ecological processes. ECAs occur within all six of the counties comprising the proposed MTP/SCS plan area with El Dorado, Placer, and Sacramento counties having the largest blocks of ECAs. There are a total of 20 ECAs mapped within the plan area with many of these having some overlap. There are a total of 1,033,887 acres of ECA lands mapped within the plan area, which equates to roughly one-quarter (26 percent) of the plan area. These areas consist of mostly wildlands, but also include certain agricultural areas and certain developed areas (mostly rural residential).

Special-Status Species

Special-status species are plants and animals that are legally protected under the California Endangered Species Act (CESA) (Fish and Game Code, § 2050 et seq.), the federal ESA, or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. For this program EIR, special-status species are defined as:

- species listed or proposed for listing as threatened or endangered under the ESA (50 Code Fed. Regs., § 17.12) for listed plants, (50 Code Fed. Regs., § 17.11) for listed animals, and various notices in the Federal Register for proposed species);
- species that are candidates for possible future listing as threatened or endangered under the ESA (75 Code Fed. Regs,.§ 69222) (December 26, 2014);

- species that are listed or proposed for listing by the State of California as threatened or endangered under the CESA of 1984 (14 Cal. Code Regs., § 670.5);
- plants listed as rare under the California Native Plant Protection Act (NPPA) of 1977 (Fish and Game Code, § 1900 et seq.);
- plants considered by CDFW and CNPS to be "rare, threatened, or endangered in California" (Rare Plant Ranks 1A, 1B, 2A, and 2B; California Department of Fish and Wildlife, 2014; California Native Plant Society, 2014);
- plants identified by CDFW and CNPS about which more information is needed to determine their status, and plants of limited distribution (Rare Plant Ranks 3 and 4, California Department of Fish and Wildlife, 2014; California Native Plant, Society 2014), which may be included as special-status species on the basis of local significance or recent biological information;
- species that meet the definition of rare or endangered under the State CEQA Guidelines, § 15380;
- animals fully protected in California (Fish and Game Code, § 3511 for birds, § 4700 for mammals, and § 5050 for reptiles and amphibians); or
- animal species of special concern to CDFW (CDFW, 2014).

Critical habitat for various federally listed species has been designated in each of the counties within the MTP/SCS plan area.

Hydrological Resources

Watersheds and Hydrology

The topography in the proposed MTP/SCS plan area varies from relatively flat in the Sacramento-San Joaquin Delta and the northern portion of the region in the Sacramento Valley to steeper slopes and greater elevations in the Sierra Nevada range and its foothills in the east and the Coast Range foothills in the west. Elevations in the proposed MTP/SCS plan area along the Sacramento River and in the Delta are generally near sea level. The foothills of the Coast Range and the Sierra Nevada, elevations in the proposed MTP/SCS plan area range around 2,000 feet above mean sea level (amsl). Many passes over the Sierra Nevada are greater than 7,000 feet amsl (USGS, 1971). The hydrology of the Proposed MTP/SCS plan area is dominated by deep canyons that cut into the Sierra Nevada range and discharge into the alluvial basin of the Sacramento Valley.

Major watersheds in the Proposed MTP/SCS plan area include the American River; Bear River; Cache Creek; Cosumnes River; Feather River; Putah Creek; Sacramento River; and Yuba River. Ultimately, these watersheds drain to the Sacramento-San Joaquin River Delta. The northeast corner of the Proposed MTP/SCS plan area is in the Truckee River watershed, which terminates at Pyramid Lake in Nevada. These watersheds and their major surface waters, including average annual flows are summarized in Table 1.

The American River watershed is one of the largest watersheds in the proposed MTP/SCS plan area and overlies Placer, El Dorado, and Sacramento counties. This watershed originates in the high Sierra Nevada, west of Lake Tahoe, and drains west until it ultimately discharges into the Sacramento River near the city of Sacramento. Major rivers and tributaries draining the watershed include the North, Middle, and South Forks of the American River; the Rubicon River, and Silver Fork Creek. Several major reservoirs in this watershed provide water storage and flood control, including Folsom Lake, Lake Natoma, Lake Clementine, Hell Hole Reservoir, Stumpy Meadows Reservoir, Caples Lake, Silver Lake, Loon Lake, Union Valley Reservoir, and Ice House Reservoir (SACOG, 2008).

Table 1
Major Rivers and Creeks in the proposed MTP/SCS Plan Area

Watershed and Watercourse	Annual Average Flows (cfs)[a]	Tributary to
American River Watershed		
North Fork American River	2,300	Main Branch American River
Middle Fork American River	1,300	Main Branch American River
Rubicon River	400	Middle Fork American River
South Fork American River	1,500	Main Branch American River
Silver Fork of the South Fork American River	200	South Fork American River
Main Branch American River	3,800	Sacramento River
Bear River Watershed		
Bear River	450	Feather River
Cache Creek Watershed		
Cache Creek	540	Sacramento River / Yolo Bypass
Cosumnes River Watershed		
Cosumnes River	600	Mokelumne River
Laguna Creek	15	Sacramento River
Feather River Watershed		
Feather River	8,300	Sacramento River
Honcut Creek	600	Feather River
Yuba River	2,400	Feather River
Bear River	450	Feather River
Putah Creek Watershed		
Putah Creek	490	Sacramento River / Yolo Bypass
Sacramento River Watershed		
Sacramento River	24,200	Sacramento-San Joaquin Delta
Feather River	8,500	Sacramento River
Dry Creek	78	Sacramento River
Arcade Creek	19	Sacramento River
American River	3,800	Sacramento River
Morrison Creek	22	Sacramento River
Truckee River Watershed		
Truckee River	800	Pyramid Lake
Yuba River Watershed		
Yuba River	2,400	Feather River
Dry Creek (Yuba County)	72	Yuba River

Source: US Geological Service 2015
[a] *USGS 2015*

The Bear River watershed's boundary forms a portion of the northern border for the plan area. The watershed overlies portions of Nevada, Placer, and Yuba counties. This watershed originates in the lower Sierra Nevada foothills and drains to the Feather River. Bear River flows are impounded by Camp Far West Reservoir, which is located on the northwestern border of Placer County (SACOG, 2012a.

The Cache Creek watershed is located in the western portion of the proposed MTP/SCS plan area and is within Yolo County. Cache Creek originates in the Coastal Range. It drains to the Sacramento River and, during heavy storms, to the Yolo Bypass (SACOG, 2012a).

The Cosumnes River watershed overlies the southern portion of the proposed MTP/SCS plan area and is located in El Dorado, Amador, and Sacramento counties. Major surface waters in this watershed include the Cosumnes River and Laguna Creek. The Cosumnes River originates on the western slopes of the central Sierra Nevada and converges with the Mokelumne River in San Joaquin County before draining to the Sacramento-San Joaquin River Delta. Laguna Creek is a major tributary to the lower Cosumnes River. (SACOG, 2012a).

The Feather River watershed originates high in the northern Sierra Nevada Mountains and drains into Lake Oroville. This watershed is mostly outside of the plan area; however, the lower Feather River passes through the northern portion of the plan area. This portion of the Feather River converges with the Sacramento River approximately 20 miles north of Sacramento. Major tributaries that drain to the lower Feather River include Honcut Creek, the Yuba River, and the Bear River (SACOG, 2012a).

The Yuba River watershed originates in the Sierra Nevada and drains to the Feather River near Yuba City. The portion of the watershed in the proposed MTP/SCS plan area is in Yuba County. Reservoirs impounding flows of the Yuba River include Dry Creek, Collins Lake, Englebright Reservoir, and New Bullard's Bar Reservoir (SACOG, 2012a).

The Putah Creek watershed overlies a portion of the western border of the proposed MTP/SCS plan area and is located in Yolo County. Putah Creek originates in the Coastal Range. The creek is a major tributary to the Yolo Bypass (SACOG, 2012a).

The largest watershed in the proposed MTP/SCS plan area is the Sacramento River watershed, which encompasses almost the entire plan area. The Sacramento River originates near Mount Shasta in the Cascades Range (Domagalski, 2000). Tributaries to the Sacramento River include the Feather River, Cache Creek, Putah Creek, Dry Creek, American River, Arcade Creek, Morrison Creek, and Laguna Creek. The Sacramento River drains an area of approximately 43,500 square miles including all or parts of six landforms or physiographic provinces—the Great Basin, the Middle Cascade Mountains, the Sierra Nevada, the Klamath Mountains, the Coast Ranges, and the Sacramento Valley (Domagalski, 2000). It flows south from the northern mountain ranges through the proposed MTP/SCS plan area before discharging into the Sacramento-San Joaquin River Delta (SACOG, 2012a).

The Sacramento-San Joaquin River Delta receives runoff from approximately 40 percent of the state's land area, including surface waters traversing the plan area (as described above), and covers an area of approximately 738,000 acres. Generally, lands in the Delta are at or below sea

level and are protected from flooding by over 1,000 miles of levees. The Sacramento-San Joaquin River Delta provides unique aquatic and riparian habitat; supports agriculture; provides recreational activities; and is key for water distribution throughout the State (DWR, 2007).

Flooding

Flooding can occur during large run-off events or when water impoundment structures, such as levees and dams, fail. The Federal Emergency Management Agency (FEMA) requires that urban areas must have flood protection levels to withstand a 100-year flood level. California's Senate Bill (SB) 5 (Machado, Flood Protection) enacted in 2007 requires that land use agencies cannot approve development projects unless 200-year flood protection for most urban areas and 100-year flood protection for rural areas is provided.

Flood hazards include erosion of infrastructure, inundation of buildings, injury or loss of human and animal life, and the spread of waterborne diseases. Standing floodwater can destroy agricultural crops and contaminate groundwater. Flooding can also contribute to mudslides and slope instability. Because of the presence of regional flood hazards, flood protection features have been implemented both, upstream, and downstream of the plan area. A system of flow bypasses, dams, levees, and reservoirs controls flooding within the region. Two key elements of the flood protection system within the plan area are the Yolo and Sutter Bypasses, which function as flood basins and divert floodwaters away from populated areas when river levels rise. The Sacramento River, Putah Creek, and Cache Creek drain floodwaters into these bypasses. Several dams in and around the proposed MTP/SCS plan area provide flood protection by regulating river and stream flows during wet periods. The most significant of these dams are Folsom, Natoma, Englebright Narrows, Sly Park, Ice House, Camp Far West, North Fork, Union Valley, and New Bullards Bar dams.

Multiple federal, state, and local agencies are responsible for maintaining flood protection features in the plan area. The U.S. Army Corps of Engineers (USACE) is the primary federal agency responsible for maintaining and repairing levees and flood protection devices in the plan area. The California Department of Water Resources (DWR) provides dam safety and flood control services and is responsible for reducing the flood risk to Californians, developing a sustainable flood management system, and reducing the consequences of floods when they occur (DWR, 2014a). The Central Valley Flood Protection Board (CVFPB), formerly known as the California State Reclamation Board, works together with State and local agencies to reduce the risk of catastrophic flooding in California's Central Valley. The CVFPB has adopted the 2012 Central Valley Flood Protection Plan, which guides California's participation in managing flood risk along the Sacramento River and San Joaquin River systems. The 2012 CVFPP proposes a systemwide investment approach for sustainable, integrated flood management in areas currently protected by facilities of the State Plan of Flood Control (SPFC). The CVFPB is coordinating closely with DWR to prepare and implement the 2017 Central Valley Flood Protection Plan, now underway (CVFPB, 2012).
Reclamation districts and local flood management agencies are also responsible for flood control and maintenance activities. These agencies include the Placer County Flood Control and Water Conservation District; Sacramento Area Flood Control Agency (SAFCA); Sacramento County Department of Water Resources; multiple reclamation districts; American River Flood Control

District; West Sacramento Flood Control Agency; Sutter County Flood Control and Water Conservation District; American River Flood Control District; Yolo County Flood Control and Water Conservation District; and Yuba County Water Agency. In addition to the special flood management agencies, the local cities and counties in the SACOG region are also responsible for developing and enforcing local drainage standards.

It should be noted, within the Sacramento Region, USACE advised FEMA that the Natomas Levee system did not meet increased flood risk standards introduced after the flooding caused by Hurricane Katrina. Therefore, in 2008, USACE de-certified the levee system, which resulted in a building moratorium in the Natomas basin. Since de-certification, the Sacramento Area Flood Control Agency (SAFCA) completed upgrades to 18 miles of the most vulnerable Natomas levees as part of the Natomas Levee Improvement Project (NLIP). Further, the U.S. Congress approved the Water Resources Reform and Development Act (WRRDA) in 2014, which allows the implementation of remaining needed levee improvements in the Natomas basin (see below in federal regulations).

Groundwater

Surface water infiltrates into porous soil materials and accumulates in aquifers creating groundwater basins. Generally, groundwater levels will rise as the large inputs from spring snowmelt or storm floods recharge the basins. Aquifer water levels may drop if pumping rates exceed recharge rates, especially when groundwater use increases substantially during dry years. The proposed MTP/SCS plan area overlies 10 groundwater basins in the Sacramento Hydrologic Region, one basin in the San Joaquin Hydrologic region, and two in the Lahontan Hydrologic Region.

Table 2
Groundwater Basin Physical Properties

Groundwater Basin	Size (square miles)	Depth to Groundwater (feet)	Average yield (gallons per minute)	Hydrologic Region
North Yuba	78	20 – 60	Unknown	Sacramento
South Yuba	138	40 – 120	1650	Sacramento
East Butte	415	15 – 40	1019	Sacramento
Sutter	366	10	Unknown	Sacramento
North American	548	10 – 70	800	Sacramento
South American	388	20	Unknown	Sacramento
Solano	644	20 – 100	Unknown	Sacramento
Yolo	400	20 – 420	1000	Sacramento
Colusa	1434	10 – 60	275	Sacramento
Capay Valley	39	10 – 40	Unknown	Sacramento
Cosumnes	439	100	Unknown	San Joaquin
Martis Valley	57	10	Unknown	North Lahontan
Olympic Valley	700	10	330	North Lahontan

(DWR Water Data Library, Bulletin 118, 2004 (a-e), 2006 (a-e))

Most urban areas in the MTP/SCS area depend upon a combination of surface water, groundwater, recycled water, and water conservation measures to provide sufficient water supplies for their existing and planned residents and businesses. Urban development could interfere with groundwater recharge by increasing the area of impervious surfaces. Watersheds and the aquatic and terrestrial species that inhabit them also depend upon replenishment of groundwater resources. Land subsidence, which is the lowering of the ground surface primarily as a result of groundwater extraction, is a result of unsustainable groundwater use and can adversely affect both agricultural and urban areas

Surface Water Quality

Generally, surface water quality in the proposed MTP/SCS plan area is considered sufficient for municipal, agricultural, wildlife, and recreational uses (CVRWQCB, 2011b; LRWQCB, 2011). However, several of the larger water bodies in the proposed MTP/SCS plan area are listed as impaired according to Section 303(d) of the Clean Water Act (CWA) of 1972 (33 U.S.C. §1251 et seq.) (See Regulatory setting section below). Beneficial use impairments can result from several factors but are generally a result of pollutant discharges from point and non-point sources. Point sources include discharges of treated effluent from municipal wastewater treatment plants and wastewater discharges from industrial and commercial facilities. Non-point source pollutants are generally a result of storm water runoff from urban, construction, and agricultural areas. Water quality is expected to reflect the land uses in the watershed. Land uses within and surrounding the project area include open space, urban, and agricultural uses. Open space uses include grazing, timber harvesting, mining, and recreation and typically contribute sediment, nutrients, and minerals. Urban and agricultural land uses include residential and commercial development and small to large-lot farms and typically contribute sediment, hydrocarbons, metals, pesticides, nutrients, bacteria, and trash. Table 3 summarizes water quality impairments in surface waters in the proposed MTP/SCS plan area and the sources of these impairments.

Table 3

CWA Section 303(d)-Listed Impairments in the Plan Area

Surface Water	Water Quality Impairments	Suspected Sources
American River, Lower (Nimbus Dam to confluence with Sacramento River)	Mercury, PCBs (Polychlorinated biphenyls), Unknown Toxicity	Abandoned mines, Unknown
American River, North and South Forks (North Fork Dam to Folsom Lake; below Slab Creek Reservoir to Folsom Lake)	Mercury	Unknown
Arcade Creek	Chlorpyrifos, Copper, Diazinon, Malathion, Pyrethroids, Sediment Toxicity	Agricultural aerial deposition, unknown
Bear River (Amador Co, Lower Bear River Reservoir to Mokelumne River, N Fork)	Copper	Resource extraction

Surface Water	Water Quality Impairments	Suspected Sources
Bear River (from Allen to Upper Bear River Reservoir, Amador County)	pH (low)	Unknown
Bear River, Lower (below Camp Far West Reservoir)	Chlorpyrifos, Copper, Diazinon, Mercury	Agriculture, mining
Bear River, Upper (from Combie Lake to Camp Far West Reservoir, Nevada and Placer counties)	Mercury	Mining
Cache Creek, Lower (Clear Lake Dam to Cache Creek Settling Basin near Yolo Bypass)	Boron, Mercury, Unknown Toxicity	Abandoned mines, Unknown
Cache Creek, North Fork (below Indian Valley Reservoir, Lake County)	Mercury	Unknown
Camp Far West Reservoir	Mercury	Unknown
Carson Creek (from wastewater treatment plant to Deer Creek)	Aluminum, Manganese	Unknown
Chicken Ranch Slough	Chlorpyrifos, Diazinon, Pyrethroids, Sediment Toxicity	Agricultural aerial deposition, urban runoff unknown
Coon Creek, Lower (from Pacific Avenue to Main Canal, Sutter County)	Chlorpyrifos, Escherichia coli (E. coli), Unknown Toxicity	Unknown
Cosumnes River, Lower (below Michigan Bar; partly in Delta Waterways, eastern portion)	Escherichia coli (E. coli), Invasive Species, Sediment Toxicity	Unknown
Cosumnes River, Upper (above Michigan Bar)	Invasive Species	Unknown
Curry Creek (Placer and Sutter Counties)	Pyrethroids, Sediment Toxicity	Unknown
Davis Creek (downstream and upstream from Davis Creek Reservoir, Yolo County); Davis Creek Reservoir	Mercury	Unknown
Deer Creek (Sacramento County)	Iron	Unknown
Deer Creek (Yuba County)	pH	Unknown
Delta Waterways (northern and northwestern portions)	Chlordane, Chlorpyrifos, DDT, Diazinon, Dieldrin, invasive species, group A pesticides, mercury, PCBs, unknown toxicity, electrical conductivity and mercury	Unknown
Elk Grove Creek	Chlorpyrifos, Diazinon	Unknown
Englebright Lake	Mercury	Unknown
Feather River, Lower (Lake Oroville Dam to Confluence with Sacramento River)	Chlorpyrifos, Group A Pesticides, Mercury, PCBs (Polychlorinated biphenyls), Unknown Toxicity	Abandon mines, Unknown
Folsom Lake	Mercury	Unknown
Gilsizer Slough (from Yuba City to downstream of Township Road, Sutter County)	Diazinon, Oxyfluorfen, pH,	Unknown

Surface Water	Water Quality Impairments	Suspected Sources
Gordon Slough (from headwaters and Goodnow Slough to Adams Canal, Yolo County)	Oxygen, Dissolved	Unknown
Honcut Creek (Butte and Yuba Counties)	Oxygen, Dissolved	Unknown
Kaseberg Creek (tributary to Pleasant Grove Creek, Placer County)	Pyrethroids, Sediment Toxicity	Urban Runoff, Unknown
Knights Landing Ridge Cut (Yolo County)	Boron, Oxygen, Dissolved, Salinity	Unknown
Live Oak Slough	Diazinon, Oxyfluorfen, Oxygen, Dissolved	Unknown
Main Drainage Canal	Diazinon, Diuron, Oxygen, Dissolved	Unknown
Miners Ravine (Placer County)	Oxygen, Dissolved	Unknown
Morrison Creek	Diazinon, Pentachlorophenol (PCP), Pyrethroids, Sediment toxicity	Agriculture, Unknown
Morrison Slough	Diazinon	Unknown
Natoma, Lake	Mercury	Unknown
Natomas Cross Canal (Sutter County)	Mercury	Unknown
Natomas East Main Drainage Canal (aka Steelhead Creek, downstream of confluence with Arcade Creek)	Diazinon, Mercury, PCBs (Polychlorinated biphenyls)	Agricultural aerial deposition, unknown
New Bullards Bar Reservoir	Mercury	Unknown
Oxbow Reservoir (Ralston Afterbay, El Dorado and Placer Counties)	Mercury	Unknown
Putah Creek (Solano Lake to Putah Creek Sinks; partly in Delta Waterways, northwestern portion)	Boron, Mercury	Abandoned mines, unknown
Sacramento Deep Water Ship Channel	Chlorpyrifos, DDT, diazinon, dioxins, exotic species, group A pesticides, mercury, pathogens, PCBs and unknown toxicity	Agriculture, urban runoff, storm sewers, abandoned mines, contaminated sediments, unknown sources
Sacramento River (Keswick Dam to Cottonwood Creek)	Unknown Toxicity	Unknown
Sacramento River (Cottonwood Creek to Red Bluff)	Mercury, Unknown Toxicity	Unknown
Sacramento River (Red Bluff to Knights Landing)	DDT (Dichlorodiphenyltrichloroethane), Dieldrin, Mercury, PCBs (Polychlorinated biphenyls), Unknown Toxicity	Unknown
Sacramento River (Knights Landing to the Delta)	Chlordane, DDT, Dieldrin, Mercury, PCBs, Unknown Toxicity	Abandoned mines, unknown

Surface Water	Water Quality Impairments	Suspected Sources
Sacramento Slough	Chlorpyrifos, Mercury, Oxygen Dissolved, Unknown Toxicity, pH (low)	Unknown
Squaw Creek	Sediment	Development
Strong Ranch Slough	Chlorpyrifos, Diazinon, Pyrethroids, sediment toxicity	Agricultural aerial deposition, unknown
Sutter Bypass	Mercury	Unknown
Sycamore Slough (Yolo County)	Oxygen, Dissolved	Unknown
Thermalito Afterbay	Mercury, PCBs	Unknown
Truckee River, middle section	Sediment	Land uses
Tule Canal (Yolo County)	Boron, Escherichia coli (E. coli), fecal coliform, salinity	Unknown
Wadsworth Canal	Chlorpyrifos, Diazinon	Unknown
Willow Slough (Yolo County)	Boron	Unknown
Willow Slough Bypass (Yolo County)	Boron, Escherichia coli (E. coli), fecal coliform	Unknown
Winters Canal (Yolo County)	Diazinon	Unknown
Yankee Slough (Placer and Sutter Counties)	Chlorpyrifos, Unknown Toxicity	Unknown
Yuba River, Lower	Mercury	Unknown
Yuba River, Middle Fork (Bear Creek to North Yuba River)	Mercury	Unknown
Yuba River, North Fork (New Bullards Bar Reservoir dam to Lake Englebright)	Mercury	Unknown
Yuba River, South Fork (Spaulding Reservoir to Englebright Reservoir)	Mercury, Temperature, water	Unknown

Source: State Water Resources Control Board 2010

Groundwater Quality

Generally, groundwater quality in the proposed MTP/SCS plan area is considered sufficient for municipal and agricultural uses; however, there are several localized areas with documented contamination. Constituents of concern to public water purveyors include total dissolved solids (TDS), radon, and various species of arsenic, nitrogen, iron, manganese, and chromium. These pollutants may result from both anthropogenic and natural inputs. As the water quality regulations for these constituents are updated, water quality for individual well sites must be reevaluated. Table 4 describes the general water quality concerns in specific basins.

Table 4
Groundwater Basin Water

Sub-basin	Overall Quality	Number of Wells Tested for Contaminants	Constituents with MCL Exceedances (Contaminated Wells)
North Yuba	Good – Excellent	27	Radiological (1), nitrates (1), VOCs (2)
South Yuba	Good	38	Primary organics (2), VOCs (1)
East Butte	Not Characterized	30	Primary organics (1), nitrates (2)
Sutter	Good – Excellent		None
North American	Acceptable	265	Primary inorganics (7), Radiological (2), VOCs and SVOCs (6)
South American	Good - Excellent	144	Primary inorganics (2), Radiological (1), nitrates (1), VOCs and SVOCs (8)
Solano	Good	71	Primary inorganics (1), nitrates (8), pesticides (3), VOCs and SVOCs (1)
Yolo	Good	61	Primary inorganics (3), nitrates (1), VOCs (1)
Colusa	Good	Localized areas have high manganese, fluoride, magnesium, sodium, iron, chloride, total dissolved solids, ammonia, and phosphorous.	
Capay Valley	Good	Several	None
Cosumnes	Good	26	Pesticides (1)
Martis Valley	Good - Excellent		None
Olympic Valley	Good - Excellent		None

MCL = Maximum Contaminant Level allowed in drinking water
VOC = Volatile Organic Chemical
SVOC = Semi-volatile Organic Chemical
Source: DWR, 2006a; DWR, 2006b; DWR, 2006c; DWR, 2006d; DWR, 2006e; DWR, 2004a; DWR, 2004b; DWR, 2004c; DWR, 2004d; DWR, 2004e