

COVERED SPECIES

Natomas Basin Habitat Conservation Plan
Metro Air Park Habitat Conservation Plan



PLAN OPERATOR

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Conservancy
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Covered Species is a pamphlet that provides detail about the plant and animal species “covered” by the Natomas Basin Habitat Conservation Plan and the Metro Air Park Habitat Conservation Plan (the “HCPs”). Each of the 22 species shown here are the focus of the Conservancy’s efforts as the “Plan Operator” for the HCPs. It is useful as an educational tool for field personnel, consultants, visitors, researchers and others with a general interest in the HCPs.

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COVERED WILDLIFE





Bank swallow

Riparia riparia

Status: State-listed as threatened

Distribution: During their breeding season, bank swallows are found throughout most of North America from Canada to Texas. In California, there are approximately 115 breeding colonies, most of which are found along the Sacramento and Feather Rivers. Scattered breeding colonies also occur in several northeastern counties as well as Monterey, Mono, and Inyo Counties. The Natomas Basin does not contain nesting habitat, but bank swallows from nearby nesting colonies in both Sutter and Sacramento Counties may occasionally forage in or travel through the basin.

Habitat Requirements: In California bank swallows occur mainly in lowland areas along rivers, lakes, oceans, streams, and reservoirs that have vertical banks or cliffs of fine-textured, sandy soil in which they build nests. Bank height and pitch play critical roles in defense against terrestrial predators, and burrows serve both as nest sites and roosting shelters. Bank swallows conduct their aerial foraging mostly over water in riparian areas, various aquatic habitats, and wet croplands, but they can also be found foraging in neighboring brush lands. Roost sites include bank burrows, shoreline vegetation, logs, and telephone wires.

Reproduction and Demography: Bank swallows form breeding colonies that contain anywhere from 5 to 1,000 nesting pairs. Each nest site typically consists of a tunnel dug horizontally up to 55 inches (140 centimeters) into the bank with a grass-lined nest chamber at the end. Four or five eggs are laid in April or May, with three or four surviving to reach fledging age. Most young have fledged by mid-July. The young do not leave the breeding grounds but remain with the adults along the riverbanks until fall migration.

Movement: Bank swallows are neotropical migrants, arriving in California from Central and South America in late March through early May. Breeding colonies from the Central Valley begin their migration south starting in early August.

Ecological Relationships: The bank swallow, the smallest swallow species in North America, feeds mainly on aerial and terrestrial soft-bodied invertebrates. While American kestrels and gopher snakes are their main predators, bank swallows and their eggs are also preyed upon by rats, skunks, house cats, and other snake species.



Burrowing owl

Athene cunicularia

Status: California species of special concern

Distribution: The burrowing owl is found in suitable open habitat throughout western North America from southern Canada to northern Mexico, as well as in Florida, the Caribbean, and Central and South America. They are not found in high mountain areas or dense forests, but they have been observed at elevations up to 5,250 feet (1,600 meters). Burrowing owls are found in several locations in the Natomas Basin, including the higher terrace along the basin's eastern border, in the tree planter boxes in the Power Balance Pavilion (formerly known as Arco Arena) parking lot, and along the higher berms of the larger irrigation and drainage canals in the central basin.

Habitat Requirements: Burrowing owls typically inhabit dry grasslands, deserts, and open shrublands containing burrows in which to nest and roost. Their preferred habitat is characterized by sparse, low vegetation and relatively flat topography, with elevated perches to provide unobstructed views. Burrowing owls have been found in pastureland, along road cuts, and in the margins of croplands, airports, and golf courses.

Reproduction and Demography: Burrowing owls nest from March to August in old rodent burrows, with peak nesting occurring in April and May. Where there is a shortage of natural burrows, burrowing owls may use culverts, pipes, or other artificial burrows, and if the ground is soft enough they sometimes dig their own burrows. The nest chamber is usually lined with a variety of materials including feathers, dried cow dung, grass, and debris. On average, the female lays five or six eggs, although this number can vary widely. Unlike other owls, burrowing owls nest in loose colonies and are relatively social. Young are helpless at hatching and can be seen outside the nest at about two weeks of age, with their first flight occurring at about four to five weeks.

Movement: Little is known about the burrowing owl's migration patterns. In California, most owls are resident, although some owls from northern breeding populations may migrate to Central America for the winter. In resident birds, winter may prompt them to move to lower elevations, with most owls returning to the same nest sites year after year.

Ecological Relationships: Burrowing owls are found in close association with burrowing rodents such as California ground squirrels as well as the reptile and amphibian species that also use these burrows. Burrowing owls are active both night and day and are preyed upon by a variety of mammalian and avian predators including foxes, coyotes, domestic dogs and cats, and larger raptors. The diet of burrowing owls consists mainly of insects, and it has been reported that they decorate their burrows with cow manure and other mammal scat to attract their insect prey. Burrowing owls also consume small mammals, reptiles, birds, and carrion.



Cackling goose (formerly Aleutian Canada goose)

Branta hutchinsii leucopareia (formerly *Branta canadensis leucopareia*)

Status: Removed from the endangered species list in 2001

Distribution: The cackling goose, formerly known as the Aleutian Canada goose, breeds off the coast of Alaska on the Aleutian and neighboring islands and winters in the Sacramento and San Joaquin Valleys. Although there are no known occurrences within the Natomas Basin, the species may stop over in the basin's marshes and agricultural fields on its way to nearby wintering areas in the southern San Joaquin Valley. A small population does winter to the north along the border of Colusa and Sutter Counties.

Habitat Requirements: In the winter, cackling geese require inland lakes and marshes that provide roosting areas protected from predators. Their winter foraging habitat consists mostly of agricultural lands such as flooded rice fields, pastures, and crop stubble where they consume grass, sprouted grain, and waste crops following harvest. Their breeding habitat consists of tundra on grass-covered islands that are inaccessible to mammalian predators.

Reproduction and Demography: The cackling goose generally creates a nest on an elevated platform of grass or sedge, adding vegetation and a lining of down as egg laying progresses. The female lays an average of five eggs, which she incubates for just under four weeks. When the young hatch, they are covered in down and can walk, swim, and feed themselves. They leave the nest within 24 hours, relying on parents for protection from predators and for guidance to foraging areas.

Movement: In the fall, the cackling goose migrates south, appearing in California in mid-October through November. Offspring and adults leave the breeding area together. In the spring, departure for the north can occur as early as January but generally occurs between February and April.

Ecological Relationships: The cackling goose was one of the first species listed under the Endangered Species Act due to severe declines following the introduction of nonnative foxes to its island breeding habitat. Starting in the late 1960s, removal of the introduced foxes allowed recovery of nesting populations, and the cackling goose was removed from the endangered species list in 2001. The cackling goose plays a role as a grazer in short-grass vegetation communities, affecting the vegetation on its breeding islands and wintering grounds. Mammalian predators are now generally absent from the islands on which the geese breed, but the geese may be preyed upon by coyotes and other vertebrates during migration and winter. Bald eagles are the main native predator of the cackling goose.



California tiger salamander

Ambystoma californiense

Status: State- and federally listed as threatened; distinct populations in Santa Barbara and Sonoma Counties state- and federally listed as endangered

Distribution: The California tiger salamander is found in suitable habitat at low elevations throughout California's Central Valley. Although the species is known to live in Yolo and southeastern Sacramento Counties, it has been not documented in the Natomas Basin, despite the presence of a narrow band of vernal pool habitats along the eastern edge of the basin.

Habitat Requirements: California tiger salamanders live in grasslands and open foothills that contain both vernal pools for breeding and mammal burrows for summer refuge. To be suitable breeding habitat, pools must remain inundated long enough for the salamander to complete its lifecycle.

Reproduction and Demography: From December to February, when temperatures and rainfall allow the salamanders to move above ground, adults converge at breeding pools filled with winter rains. Females deposit small clusters of eggs or individual eggs on twigs and other underwater vegetation. In two to four weeks, the eggs hatch, and the young salamanders remain in the pool in larval form until metamorphosis is complete, usually by early July.

Movement: California tiger salamanders spend most of the year underground in burrows dug by small mammals. Juvenile California tiger salamanders have been found more than 1,200 feet (370 meters) from their birth ponds, while adults have been found more than a mile (1.6 kilometers) from their breeding ponds.

Ecological Relationships: California tiger salamanders are preyed upon by wading birds, garter snakes, and other amphibian larvae. Most predation occurs when the salamanders are in their aquatic stage.



Giant garter snake

Thamnophis gigas

Status: State- and federally listed as threatened

Distribution: The giant garter snake inhabits low elevation wetlands in the Sacramento and San Joaquin Valleys, from Chico south to the Mendota Wildlife Area in Fresno County. There are 13 recognized subpopulations of giant garter snake, one of which is the Natomas Basin population.

Habitat Requirements: Giant garter snakes are found in marshes, wetlands, low gradient streams, sloughs, rice fields, and the irrigation and drainage canals that supply them. They are active from spring to mid-fall, requiring herbaceous emergent vegetation such as bulrush (*Scirpus* spp.) and cattail (*Typha* spp.) for foraging habitat and escape cover and vegetated banks and open areas containing small mammal burrows, cracks, and crevices for basking and short-term refuge habitat. In winter, they require upland areas above the normal high water line during their inactive period.

Reproduction and Demography: Giant garter snakes breed from March to April when they emerge from winter refuges, and live young are born in late July to early September. Females give birth to an average of 23 young. The maximum recorded brood size is 46. Upon birth, the young disperse into surrounding cover and can begin hunting on their own. Young do not reach sexual maturity until three to five years of age.

Movement: Giant garter snakes are active in aquatic habitats from March to mid-fall. They move to upland burrows in the fall where they remain dormant until early spring. Upland wintering sites are generally not more than 820 feet (250 meters) from aquatic habitat.

Ecological Relationships: Giant garter snakes prey mainly on aquatic species such as frogs, tadpoles, and small fish. Smaller, immature snakes may consume invertebrates. Many large vertebrates prey on the giant garter snake, including striped skunks, gray foxes, river otters, raccoons, larger wading birds, and raptors.



Loggerhead shrike

Lanius ludovicianus

Status: California species of special concern

Distribution: The loggerhead shrike is found in suitable habitat throughout central and southern North America. Shrikes are considered relatively abundant in the Central Valley, although their numbers have been declining. In the Natomas Basin, loggerhead shrikes can be regularly observed, although they occur in low densities throughout the basin.

Habitat Requirements: Loggerhead shrikes prefer open woodland, grasslands, and edge habitats containing elevated perches from which to hunt. Rural residential areas and pastureland provide ideal foraging perches in the form of telephone lines and barbed wire fences. The landscape also typically contains dense shrubs, low trees, or debris piles for nesting.

Reproduction and Demography: Loggerhead shrikes often remain paired throughout the winter and nest early in the spring. They build cup nests of sticks, forbs, and grass and often line them with wool, fur, fine plant material, or scraps of string and fabric. Nests are constructed in dense growth where available, with thorny trees and shrubs preferred. If no trees or shrubs are present, shrikes will use brush piles, vines, or accumulations of woody debris upon which to build their nests. Ornamental shrubs and dense growth low in eucalyptus trees may also be used for nesting. The female lays five eggs, on average, and incubates them for approximately 16 days. Young are helpless upon hatching and spend almost three weeks in the nest before fledging.

Movement: Central and southern California loggerhead shrikes are generally year-round residents. Juvenile shrikes tend to disperse quite widely, while adults usually return to nest in the same general area year after year.

Ecological Relationships: Loggerhead shrikes prey on both invertebrates and vertebrates, including insects, small reptiles, amphibians, birds, and mammals. Like others in their family, loggerhead shrikes often impale their prey on spiky vegetation, thorns, and even barbed wire fences to help with manipulating their food while they eat and to store food for later consumption.



Midvalley fairy shrimp

Branchinecta mesovallensis

Status: None

Distribution: The midvalley fairy shrimp is found at relatively low elevations in the middle of the Central Valley. It has been found in the Sacramento Valley from Glenn County to Santa Clara County along the Coast Range, the San Joaquin Valley, and the Sierra foothills from Yuba County to Kern County. The midvalley fairy shrimp has not been documented in the Natomas Basin, but potential habitat exists along the eastern edge of the plan area, and the species has been found in Sacramento County.

Habitat Requirements: The midvalley fairy shrimp is found in shallow ephemeral pools—depressions that fill with rainwater in the winter and spring and dry up in the summer. These pools are generally found in grasslands and lower elevation foothills. Unlike some of the other branchiopods, the midvalley fairy shrimp can live in relatively warm water temperatures, and with its ability to develop rapidly, it can inhabit some of the smallest and shortest-lived seasonal pools.

Reproduction and Demography: The midvalley fairy shrimp develops and reproduces in vernal pools following winter and spring rains. Eggs in the vernal pool hatch with the onset of suitable rainfall and temperatures, and young pass through three different stages before reaching adulthood. While the average age to reproduction is 26 days, in warm water and the right weather conditions, midvalley fairy shrimp can reach sexual maturity in as few as 8 days. The adult midvalley fairy shrimp can live for about four months, but it will not survive to the next season. The female lays eggs that are surrounded by a protective shell, called a cyst. Cysts can survive the dryness of summer, remaining in this dormant phase for years until appropriate environmental signals trigger them to hatch. Not all of the eggs in the soil will hatch in a given season, enabling the species to survive should the pool dry up before the shrimp can reproduce.

Movement: Midvalley fairy shrimp cysts can travel both in flood waters and through the digestive tracts of other animals. In the latter case, the cysts may be deposited unharmed in a new vernal pool, allowing colonization to take place. Adults could be carried by flood waters or on the legs or feathers of other wildlife.

Ecological Relationships: Midvalley fairy shrimp are a source of food for waterfowl, shorebirds, and amphibian larvae.



Northwestern pond turtle

Emys marmorata marmorata

Status: California species of special concern

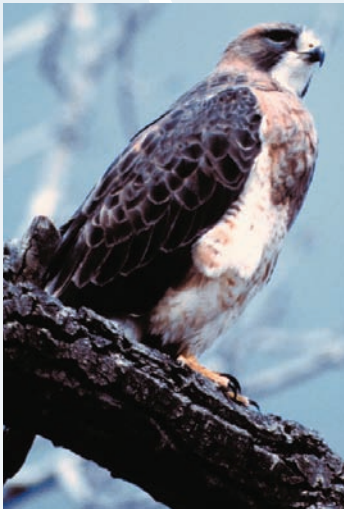
Distribution: Western pond turtles can be found throughout California west of the Cascade-Sierras from near sea level to 4,700 feet (1,400 meters). They are found in many of the Natomas Basin's aquatic habitats, particularly in the larger irrigation and drainage canals, but their upland breeding habitat may be limited.

Habitat Requirements: The western pond turtle inhabits a variety of aquatic habitats provided there is permanent, year-round water, some aquatic vegetation, adequate basking sites (vegetation mats, logs, debris, mud banks), and suitable upland habitat for egg laying.

Reproduction and Demography: Western pond turtles do not reach reproductive maturity until about eight to twelve years of age. Females lay their eggs between March and August in nest sites dug at least four inches (ten centimeters) deep, covering the site with soil and vegetation. Nests can be found in various places from sandy banks to harder upland soil, provided the internal humidity of the covered nest site remains relatively high. Eggs can take up to 80 days to hatch, at which point the young turtles rest in the nest, absorbing the yolk sac until they are large enough to enter the water.

Movement: The home range size of the male western pond turtle averages approximately 2.5 acres (1 hectare), while female and juvenile home ranges are much smaller. Females move overland up to 330 feet (100 meters) in the spring to find nest sites. The drying of ponds or other environmental triggers may also prompt overland movement. Western pond turtles are primarily active during the day, although some twilight and nighttime activity has been observed. Provided temperatures remain suitable, western pond turtles remain active all year. In cases of colder temperatures, western pond turtles hibernate in underwater mud.

Ecological Relationships: Western pond turtles are opportunistic omnivores. Their regular diet includes invertebrates, fishes, amphibian eggs and young, and carrion. Western pond turtles must now compete with the nonnative red-eared slider (*Trachemys scripta elegans*). Wading birds, garter snakes, some mammals, and introduced fishes and bullfrogs prey upon hatchling pond turtles, and several mammals prey on nests.



Swainson's hawk

Buteo swainsoni

Status: State-listed as threatened

Distribution: The Swainson's hawk is a migratory species that breeds primarily in open habitats in the Great Basin and eastern prairies of Canada and the United States and in California's Central Valley. Swainson's hawks migrate great distances to the fertile, lowland plains of Argentina in the winter, with smaller numbers wintering in Mexico, Central America, and Columbia. A few birds have been documented wintering in the Sacramento–San Joaquin River Delta. In California, the Swainson's hawk breeds in the Central Valley, Modoc Plateau, Owens Valley, and the Antelope Valley. The majority of Central Valley nest sites are found in Sacramento, Yolo, and San Joaquin Counties. In the Natomas Basin, Swainson's hawks nest primarily in the riparian areas along the Sacramento and American Rivers and along the Natomas Cross Canal.

Habitat Requirements: The Swainson's hawk is a raptor of open landscapes. It forages in native grassland, shrubsteppe habitats, and agricultural fields. During the nesting season, it also requires access to mature trees. In the Central Valley, Swainson's hawk nest sites are associated with riparian areas because of the large cottonwoods, willows, oaks, and sycamores that such habitats provide. The Swainson's hawk is also known to nest in isolated trees in fields, in wind breaks, and occasionally in mature trees in residential or suburban areas.

Reproduction and Demography: Swainson's hawks generally start courting and nest building as soon as they arrive from their wintering grounds. The hawks build small- to medium-sized platform nests of sticks and fresh greenery, usually high in large trees where they will have sweeping views of the surrounding terrain. One to four eggs are laid, and the clutch is incubated by the female for approximately 35 days. Young remain in the nest for up to 33 days before making exploratory climbs to nearby branches. The first flight occurs at about 38–46 days.

Movement: Swainson's hawks start to arrive in California in February to March and leave for southern wintering grounds from September to October. They have large home ranges, sometimes foraging almost 20 miles (32 kilometers) from their nest sites. Juvenile hawks may disperse in late July to August and gather into small foraging groups. Adults leave about one month or more after the young, and they may gather into large groups prior to migrating.

Ecological Relationships: Swainson's hawks have adapted well to certain agricultural practices. They have been known to follow farm equipment, hunting for the rodents that are unearthed by the machinery, and to flock to recently tilled or flooded lands.



Tricolored blackbird

Agelaius tricolor

Status: California species of special concern

Distribution: Tricolored blackbird breeding colonies have been documented throughout California, with other small colonies documented in Oregon, Washington, western Nevada, and Baja California, Mexico. Although tricolored blackbirds can be found during the non-breeding season throughout their breeding range, large concentrations are found in Marin, Solano, Santa Cruz, and Monterey Counties. In the Natomas Basin, nesting colonies have been documented on the Betts-Kismat-Silva tract of the Central Basin Reserve and on the Frazer North tract of the North Basin Reserve. The Frazer North colony has also nested on private land in a large patch of Himalayan blackberry near the northern border of the Natomas Basin.

Habitat Requirements: Tricolored blackbirds nest in emergent marsh vegetation, such as tules and cattails, and in willow and bramble thickets. Mustard and thistle may also be used for nesting, and in some areas, tricolored blackbirds will nest in agricultural stands of triticale or other grains. Tricolored blackbirds require a source of open water within one third of a mile (half a kilometer) of the nesting colony. Foraging grounds contain an abundance of insect prey during the breeding season and consist mainly of pond margins, irrigated pastures, flooded rice fields, dairies, and croplands.

Reproduction and Demography: Tricolored blackbirds nest in dense colonies from mid-March to early July. They build cup nests amidst dense wetland vegetation or thickets, usually within ten feet of the ground. Preferred vegetation is spiny and thick to provide defense against predators. The densest colonies can support up to six nests per square yard. Females typically lay three or four eggs, which they incubate for about 11 days. Young are helpless upon hatching and remain in the nest for 10–14 days. During the breeding season, adults will forage up to eight miles (thirteen kilometers) away from the colony. Fledged juveniles will move two miles or more from the nest site, while remaining dependent on the parents for food. Tricolored blackbirds are polygynous, with each male supporting up to four nesting females.

Movement: Central Valley tricolored blackbirds disperse widely in late summer to find food, remaining in nomadic foraging flocks throughout winter. In March and April, tricolored blackbirds move to their initial breeding territories in Sacramento County and the San Joaquin Valley. Tricolors are itinerant breeders and may nest sequentially in more than one location within the same breeding season.

Ecological Relationships: As with many songbirds, tricolored blackbirds depend heavily upon insects during the breeding season, consuming beetles, grasshoppers, weevils, and the larvae of aquatic emergent invertebrates. The bulk of the diet shifts to weed and grass seeds once the breeding season has passed. Eggs and nestlings are preyed upon by various vertebrates, including northern harriers, common ravens, black-crowned night herons, cattle egrets, coyotes, and raccoons. It has been reported that in areas where their ranges overlap, the white-faced ibis can protect tricolored blackbird colonies from night heron predators.



Valley elderberry longhorn beetle

Desmocerus californicus dimorphus

Status: Federally listed as threatened

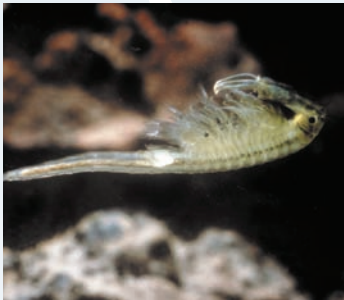
Distribution: The valley elderberry longhorn beetle inhabits California's Central Valley and can be found in the vicinity of Redding in southern Shasta County to the Bakersfield area in Kern County. Although critical habitat for the species has been designated along Putah Creek and the American River, there are no known occurrences of the beetle within the Natomas Basin. Blue elderberry, the host plant for this species, occurs in riparian areas along the Sacramento and American Rivers bordering the basin, but it does not occur in the clay soils that dominate most of the central and northern basin. However, isolated blue elderberry shrubs do grow in alluvial soils along the western edge of the basin.

Habitat Requirements: The valley elderberry longhorn beetle lives exclusively on elderberry shrubs (*Sambucus* spp.), which generally grow in riparian areas. Areas supporting the highest numbers of beetles are those where elderberry bushes are abundant and scattered through riparian forests of cottonwood, alder, sycamore, walnut, willow, wild grape, and other riverside trees and vines.

Reproduction and Demography: From March to June, adult beetles emerge from the stems of elderberry plants to mate and lay eggs. When the eggs hatch, the larvae tunnel into the elderberry stems and feed on the spongy pith (plant material inside the stems), where they remain for one to two years. When they are ready to pupate, the larvae bore an exit hole to the surface of the elderberry stem, pack the hole with wood shavings, then return to their pupal chamber where they eventually become adults. When mating season arrives, the beetle dislodges the plug of wood shavings and uses the exit hole to reach the surface of the elderberry branch, starting the cycle again.

Movement: As adults, valley elderberry longhorn beetles move freely between elderberry shrubs.

Ecological Relationships: The valley elderberry longhorn beetle completely depends on the elderberry plant, a shrub or small tree in the *Sambucus* genus. The elderberry provides food for adults (leaves) and the larvae (pith), mating grounds, egg nursery, a protected area for larvae to develop, and shelter for adults. Introduced insects, such as European earwigs and Argentine ants, are known to prey on different stages of the valley elderberry longhorn beetle. Other predators include lizards and birds.



Vernal pool fairy shrimp

Branchinecta lynchi

Status: Federally listed as threatened

Distribution: Vernal pool fairy shrimp are found from Tehama County south through the Central Valley and in isolated locations in Riverside County, the Coast Ranges, and the Agate Desert in southern Oregon. While widespread, the species generally does not occur in high numbers. Records for vernal pool fairy shrimp in the California Natural Diversity Database are concentrated in the Sacramento Valley and the San Joaquin Valley north of Fresno. Although vernal pool fairy shrimp have not been documented in the Natomas Basin, they have been found east of the Natomas Basin and north of Del Paso Road.

Habitat Requirements: Vernal pool fairy shrimp are found in grassland vernal pools or similar seasonal wetlands. They require cool water with low alkalinity and low total dissolved solids and tend to be found in smaller pools about six inches (fifteen centimeters) deep that stay flooded for relatively short amounts of time. In the southern extent of their range, vernal pool fairy shrimp are found in larger, deeper pools, probably because of the cooler water temperature of these larger pools.

Reproduction and Demography: The vernal pool fairy shrimp reproduces in ephemeral pools flooded by winter and spring rains. Adults cannot survive the drying of these pools in the summer. However, the eggs laid by the female are surrounded by a shell that protects the embryo from the arid environment; these cysts allow the embryo to remain in a dormant phase—also called diapause—for years if necessary. The vernal pool fairy shrimp will not hatch unless water temperatures are below 50 degrees Fahrenheit, which can occur with cold winter rainstorms. With the onset of suitable temperatures and flooding, some eggs in the vernal pool soils will hatch. Once hatched, the young shrimp go through three stages before reaching adulthood. The rate at which they mature depends on water temperature and can vary from 18 days to more than 120.

Movement: Vernal pool fairy shrimp can colonize new pools when relocated by flood waters or when cysts become attached to the feet of birds or other animals. Cysts can also pass unharmed through the digestive tracts of other animals, providing another potential mechanism for dispersal between pools.

Ecological Relationships: The vernal pool fairy shrimp diet consists of unicellular organisms such as algae and bacteria. Vernal pool fairy shrimp are a vital source of nutrients for a range of wetland species, including waterfowl, shorebirds, and amphibians. They are also consumed by vernal pool tadpole shrimp.



Vernal pool tadpole shrimp

Lepidurus packardii

Status: Federally listed as endangered

Distribution: Vernal pool tadpole shrimp inhabit California's Central Valley and are found in scattered populations from Shasta County to northwestern Tulare County. They have also been reported in Placer, Sacramento, Sutter, and Yolo Counties. Although they have been found east of the Natomas Basin, they have not been documented within the basin.

Habitat Requirements: Vernal pool tadpole shrimp live in seasonal pools that dot the grasslands of the Central Valley. Water in these pools is clear to murky and 50–84 degrees Fahrenheit, and the pools range from 55 square feet (5 square meters) to almost 90 acres (36 hectares). These pools flood with winter and spring rains and dry out in the summer. This cyclical, wet-dry aspect of their habitat is vital to the survival of the species, as vernal pool tadpole shrimp have no defense mechanisms against the predatory fish that inhabit water bodies that do not regularly dry out.

Reproduction and Demography: Vernal pool tadpole shrimp complete their entire lifecycle within the seasonal pools flooded by winter and spring rains. Adults can reproduce several times within one wet season, and some adults can produce fertilized eggs on their own. Adult vernal pool tadpole shrimp die when the pools dry out, but eggs are surrounded by a shell that protects the embryo from drying out. These cysts remain in a dormant phase—also called diapause—for years if necessary. With suitable temperatures and rainfall, some cysts in the vernal pool soils will hatch, sometimes in as few as four days. The rate at which the young reach sexual maturity depends on water temperature, but sexual maturity usually occurs between 21 and 28 days.

Movement: Vernal pool tadpole shrimp can be transported between neighboring pools by flood waters. Adults and cysts may also be carried to new pools when caught on the legs and feathers of wetland birds. Cysts can pass unharmed through the digestive system of other organisms and may be deposited in new locations through this process.

Ecological Relationships: Vernal pool tadpole shrimp consume both organic detritus in the sediment and live prey, including amphibian larvae and other freshwater crustaceans. Vernal pool tadpole shrimp are themselves a high-energy food source for a variety of waterfowl and shorebirds. Like other vernal pool branchiopods, the vernal pool tadpole shrimp has a reproductive strategy that is tied to the unpredictable habitat in which it lives. With no guarantee that a pool will stay wet long enough for hatching cysts to complete their lifecycle, having only a portion of cysts hatch in any given season makes it possible for the species to survive years of insufficient rainfall.



Western spadefoot toad

Spea hammondi

Status: California species of special concern

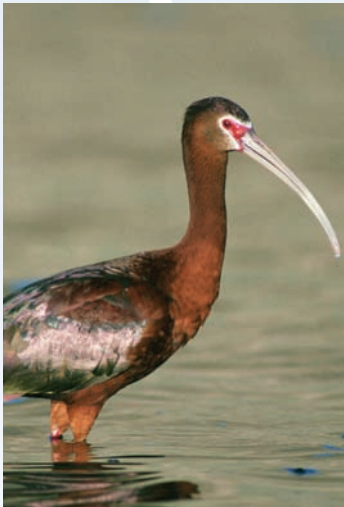
Distribution: The western spadefoot is found in California's Central Valley and adjacent foothills and in the Coast Ranges just south of Monterey County to northern Baja California, Mexico. It has been observed at elevations ranging from sea level to almost 4,600 feet (1,400 meters). It is not known to inhabit the Natomas Basin but has been found in Placer County and central Sacramento County.

Habitat Requirements: The western spadefoot is predominantly a grassland species, although some populations can be found in pine-oak woodlands of the valley foothills. Western spadefoots require shallow, temporary pools or streams during the breeding season. Where natural vernal pools are absent, western spadefoots may make use of artificial ponds and stock tanks. Most of the year, western spadefoots reside in burrows at depths of up to 3 feet (1 meter). Spadefoots are capable of digging their own burrows but will use mammal burrows if available.

Reproduction and Demography: From late winter to the end of March, western spadefoots breed in shallow, seasonal ponds and intermittent streams. Rainfall is crucial to the western spadefoot breeding cycle, because it both forms breeding pools and creates suitably moist conditions for adults to move to these pools. When males arrive at the pools they emit loud, beckoning vocalizations that travel long distances and start the formation of breeding aggregations. After mating, females attach their eggs to vegetation or the surface of small submerged rocks. Hatching occurs in as few as one to six days, with full metamorphosis occurring within three to eleven weeks.

Movement: Adult movement is limited to rainy or humid nights during the breeding season; adults are rarely found on the surface at other times of the year. Newly metamorphosed toads disperse from the breeding pool within hours or days of emergence.

Ecological Relationships: Adult western spadefoots consume insects, worms, and other invertebrates. Tadpoles feed on algae, plankton, and dead amphibian larvae. Predators of western spadefoot tadpoles and juveniles include California tiger salamanders, wading birds, dabbling ducks, and some mammals.



White-faced ibis

Plegadis chihi

Status: California species of special concern

Distribution: The white-faced ibis occurs in California as an uncommon, localized breeder and summer resident. It nests in scattered locations in the San Joaquin Valley, and in recent years it has established breeding colonies in the Sacramento Valley. Until 2002, the white-faced ibis visited the Natomas Basin only in the summer, and the nearest recorded breeding occurrence was in Yolo County. Since then, numbers of the white-faced ibis have increased in the basin, and a breeding colony has nested successfully at the Betts-Kismat-Silva tract in the Central Basin Preserve every year since 2007. In 2010, approximately 2,500 pairs of ibises were recorded nesting at this site.

Habitat Requirements: The white-faced ibis depends on shallow, emergent wetlands with high quality fresh water. Wet meadows, irrigated pasture, flooded pond edges, and wet cropland such as rice fields can be suitable foraging habitat. For nesting, ibises typically use large emergent wetlands with islands of dense emergent vegetation.

Reproduction and Demography: The white-faced ibis is a colonial breeder and builds a shallow nest in thick emergent vegetation such as tule and cattail, in shrubs, or in low trees. Both parents incubate the two to five eggs, which hatch in 17–26 days. Significant breeding colonies have been reported in the Mendota Wildlife Area and the Colusa National Wildlife Refuge.

Movement: The white-faced ibis is a species with high mobility and shifting ranges, with movements often coinciding with changing water levels and water quality. In late summer, individuals from North American nesting grounds disperse far beyond their breeding ranges. The winter range of the ibis is predominantly coastal Louisiana and Texas south to Mexico, but some winter groups occur locally in southern and north-central California, particularly around Los Banos in Merced County. There is some indication that the white-faced ibises breeding in California are actually resident populations, but more research is needed. White-faced ibises have been observed traveling up to 25 miles (40 kilometers) between nesting and foraging grounds.

Ecological Relationships: The diet of the white-faced ibis consists of aquatic or humid-soil invertebrates, crustaceans, frogs, and fishes. Predators of the white-faced ibis include skunks, coyotes, and raptors such as peregrine falcons and red-tailed hawks. Ibis chicks may be vulnerable to predators like gulls and night herons.

COVERED PLANTS





Boggs Lake hedge-hyssop

Gratiola heterosepala

Status: State-listed as endangered; California Native Plant Society List 1B.2

Distribution: Boggs Lake hedge-hyssop is found in six separate vernal pool regions, with most occurrences in the Modoc Plateau. Its range includes the inner north coast ranges, the Sacramento Valley, the Sierra Nevada Foothills, and Oregon. Boggs Lake hedge-hyssop is not found in the Natomas Basin; however, potential habitat exists along the eastern edge of the basin. The closest known occurrence is in Rio Linda, which is two miles east of the basin.

Habitat Requirements: Boggs Lake hedge-hyssop habitat includes clay soils of vernal pools and wet margins of freshwater lakes, stock ponds, borrow pits, marshes, and swamps at depths ranging from 2 to 28 inches. Its elevational range is 30–7,800 feet (10–2,400 meters), and it is associated with volcanic, basin rim, and high terrace landforms.

Demography: Boggs Lake hedge-hyssop is a small annual herb in the snapdragon family (Scrophulariaceae) that blooms April through August. The seedbank seems to be substantial, and population size varies widely from year to year. Boggs Lake hedge-hyssop is self-pollinating, and it is often found growing in association with smooth goldfields (*Lasthenia glaberrima*) and Douglas' mesamint (*Pogogyne douglasii*). Higher elevation populations are associated with black oak (*Quercus kelloggii*) and foothill pine (*Pinus sabiniana*).



Colusa grass

Neostapfia colusana

Status: Federally listed as threatened; State-listed as endangered; California Native Plant Society List 1B.1

Distribution: Colusa grass is endemic to California, with a broader geographic range than the other Orcutt grasses. It is found mainly in the southern Sierra foothills, with additional populations in the San Joaquin and Sacramento Valleys. It has been found in Colusa, Glenn, Merced, Solano, Stanislaus, and Yolo Counties. There are no records of Colusa grass in the Natomas Basin, but small patches of suitable vernal pool habitat are present on its eastern border. The closest known occurrence of Colusa grass to the basin is approximately 10 miles (16 kilometers) southwest in Yolo County, near the Yolo-Solano County border.

Habitat Requirements: Colusa grass grows in large, deep vernal pool bottoms at elevations below 660 feet (200 meters). It has been found in pools of widely varying size, from 0.02 to 618 acres (0.008 to 250 hectares). Depending on geographic region, it is associated with the rim of alkaline basins, northern hardpan and claypan, or acidic alluvial soils.

Demography: Colusa grass is a small annual herb in the grass family (*Poaceae*) that blooms May through August. It is also a member of the Orcuttieae tribe, which consists of the Orcutt grasses and plants in the *Tuctaria* genus. Colusa grass relies on a flood-drought cycle, surviving dry summers in seed form and sprouting with winter and spring rains. Like the Orcutt grasses, Colusa grass produces different leaves depending on whether it is in an aquatic or terrestrial stage of life. Compared with other Orcuttieae, Colusa grass has a short underwater growth stage. Colusa grass produces an intensely aromatic fluid that coats its leaves—a possible defense against grazing herbivores. It generally does not grow with many other species, growing instead in single-species stands.



Delta tulle pea

Lathyrus jepsonii var. *jepsonii*

Status: California Native Plant Society List 1B.2

Distribution: Endemic to California, the delta tulle pea is found mainly in the Sacramento–San Joaquin Delta and has been documented in Contra Costa, Sacramento, San Joaquin, Solano, Napa, and Alameda Counties. The closest known occurrence is approximately 20 miles (32 kilometers) south of the Natomas Basin in Walnut Grove.

Habitat Requirements: The delta tulle pea is generally found on brackish and freshwater marsh and slough edges. It can take root in appropriate habitat and climb to neighboring upland and riparian areas. Associate species include the California wildrose (*Rosa californica*), cattails (*Typha* spp.), and the common tulle (*Scirpus acutus*).

Demography: The delta tulle pea is a perennial herb with a vine-like habit in the pea family (Fabaceae). It depends on a cycle of flooded and dry periods in freshwater or brackish wetlands. It generally grows along the edges of riparian wetlands, sloughs, marshes, and swamps and blooms showy pink flowers from May through July and, in some years, as late as September.



Legenere

Legenere limosa

Status: California Native Plant Society List 1B.1

Distribution: Legenere is endemic to California. It is found mainly in vernal pools in Sacramento and Solano Counties, but it has also been reported in 12 other north-central and bay-delta counties. While legenere has not been found in the Natomas Basin, vernal pool habitat exists on the eastern edge of the basin, north of Del Paso Road. This habitat is approximately two miles (three kilometers) west of the closest known occurrence of legenere to the basin.

Habitat Requirements: Legenere is associated with smaller, densely vegetated vernal pools ranging in depth from 1.5 to 15 inches (4 to 38 centimeters). It is found at elevations of 3–2,900 feet (1–880 meters) and known from a variety of geological landforms and at least five soil profiles.

Demography: Legenere is a small annual herb in the bellflower family (Campanulaceae) that blooms April through June. The seeds of legenere are long lived and can lay dormant for years. With suitable rainfall and temperatures in the winter, some dormant seeds in vernal pools will sprout. Legenere commonly grows with semaphore grass (*Pleuropogon californicus*) and various *Downingia* species.



Sacramento Orcutt grass

Orcuttia viscida

Status: State-listed as endangered; Federally listed as endangered; California Native Plant Society List 1B.1

Distribution: Sacramento Orcutt grass is endemic to California and known from fewer than ten occurrences, all in Sacramento County. Currently it is not known to exist in the Natomas Basin; the nearest known population is in southeastern Sacramento County, approximately eight miles (thirteen kilometers) from the basin.

Habitat Requirements: Sacramento Orcutt grass is found in a limited elevation range of approximately 100–350 feet (30–100 meters) and grows in deep vernal pools that remain flooded for relatively long periods of time. It is associated with ancient alluvial soils, such as prehistoric floodplains.

Reproduction and Demography: Sacramento Orcutt grass is a small annual herb in the grass family (Poaceae) that blooms from April to July. Like some other plants in the Orcuttieae tribe, Sacramento Orcutt grass produces different leaves during its juvenile, aquatic stage. Sacramento Orcutt grass grows with other vernal pool plant species such as goldfields (*Lasthenia* spp.) and coyote thistles (*Eryngium* spp.).



Sanford's arrowhead

Sagittaria sanfordii

Status: California Native Plant Society List 1B.2

Distribution: Although this species is endemic to California, it has mostly disappeared from the Central Valley and is no longer present in southern California. Several occurrences remain in Sacramento County along the American River Parkway, and records exist for Butte, Del Norte, El Dorado, Fresno, Merced, Mariposa, Orange, Placer, Shasta, San Joaquin, Tehama, and Ventura Counties. Although it is not known to grow in the Natomas Basin, the closest known occurrence is about one mile (two kilometers) southeast of the basin along the American River Parkway.

Habitat Requirements: Sanford's arrowhead grows in shallow, freshwater marshes and swamps at elevations lower than approximately 2,100 feet (650 meters).

Demography: Sanford's arrowhead is a perennial rhizomatous herb that blooms from May through October. It is a member of the water plantain family (Alismataceae), and the rhizome of Sanford's arrowhead has been a source of food to native cultures and waterfowl. It grows in standing or slow-moving freshwater ponds, marshes, and ditches in association with the water plantain (*Alisma plantago-aquatica*), water primrose (*Ludwigia peploides*), and various species of cattail (*Typha* spp.).



Slender Orcutt grass

Orcuttia tenuis

Status: State-listed as endangered; Federally listed as threatened; California Native Plant Society List 1B.1

Distribution: Slender Orcutt grass is endemic to California and has been found in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Tehama Counties, with the southernmost extent of its current range falling in Sacramento County. Occurrences of slender Orcutt grass are concentrated in the northeastern portion of the Sacramento Valley and on the Modoc Plateau. It is not known to grow in the Natomas Basin, but appropriate habitat exists in the vernal pools along the basin's eastern edge. The closest known occurrence is approximately 12 miles (19 kilometers) southeast near the city of Rancho Cordova.

Habitat Requirements: Slender Orcutt grass grows in the drying clay substrate of relatively deep vernal pools and swales. It is found at elevations of approximately 120–5,800 feet (35–1,750 meters).

Demography: Slender Orcutt grass is a small annual herb in the grass family (Poaceae) that blooms May through September and sometimes in October. It is one of the latest blooming members of the Orcuttieae tribe, and it grows in the thickest stands. This dense growth habit may have evolved in conjunction with grazing impacts, both to defend against trampling damage and to keep other plants from gaining a foothold following grazing. It has been theorized that the seeds of slender Orcutt grass require fungi to germinate. Like other Orcuttieae, slender Orcutt grass releases a sticky and odorous fluid that coats the leaves, protecting the plant from drying out and making it less palatable to grazers. Slender Orcutt grass often grows in association with various *Downingia* species and Fremont's goldfields (*Lasthenia fremontii*).



PLAN OPERATOR

The Natomas Basin
Conservancy

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