the potential to occur in the study area and are addressed in this BA. A list of surveyor qualifications is included in **Appendix C**.

Endangered
Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)
Butte County Meadowfoam (*Limnanthes, floccosa* ssp. *californica*)

Threatened
Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)
Bald Eagle (*Haliaeetus leucocephalus)*
Giant Garter Snake (*Thamnophis gigas*)

The following species, initially indicated on the USFWS list, are not known to occur in the study area and/or suitable habitat is not present at the project site. Therefore, these species are not discussed further in this BA.

Endangered
Conservancy Fairy Shrimp (*Branchinecta conservatio*)
Central Valley Winter-Run Chinook Salmon (*Oncorhnchus tshawytscha*)
Greene's tuctoria (*Tuctoria greenei*)

Threatened
California Red-legged Frog (*Rana aurora draytonii*)
Bald Eagle (*Haliaeetus leucocephalus)*
Delta smelt (*Hypomesus transpacificus*)
Hoover's spurge (*Chamaesyce hooveri*)

Candidate Species
Central Valley Fall/ Late Fall-Run Chinook Salmon (*Oncorhnchus tshawytscha*)
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)

Critical Habitat

The action addressed in this BA falls within the recently designated critical habitat for vernal pools and 15 associated listed species, including BCM, vernal pool tadpole shrimp, and vernal pool fairy shrimp (**Figure 5,** Federal Register, August 11, 2005). Although formal protocol level surveys have not been conducted for invertebrates, vernal pool tadpole shrimp were detected adjacent to the project site during general biological surveys in 1992.

Notable Species Not Included in this Assessment

Protocol-level botanical surveys were conducted during the appropriate floristic window by Mary Bailey, consulting botanist, Lyna Black, environmental scientist, and Shirley Innecken, senior botanist. Surveys were conducted on April 14, and 19, 2004, July 26, 2004, and March 10, 14, and 24, 2005. Reference populations located within Stillwater Plains in the City of Redding, Vina Plains in Tehama County, and the Enloe Preserve in Chico, were located and

Highway 32 Widening ***Action Area***

City of Chico, Butte County, CA.
Map Date: Nov. 11, 2005.

0 500 1,000 1,500 2,000 Feet

GALLAWAY CONSULTING, INC.

Figure 5.

observed prior to the field surveys to identify blooming status and visual characteristics. Surveys were conducted specifically for BCM, Hoover's spurge, hairy orcutt, and Greene's tuctoria. Butte County meadowfoam was the only special-status botanical species located within the survey extent.

Anadromous Fisheries

The proposed project will be constructed during the dry season to avoid construction related impacts to anadromous fish. Although some water may still be present during construction, there is not enough water to support anadromous fish. Additional, anadromous have a low potential to occur within Little Chico Creek, which Dead Horse Slough is a tributary to, within the proposed project site according to Paul Ward, CDFG and Michael Aceituno, NOAA fisheries (January 4, 2005, # 151422SWR2004SA20169:HLB). Although Little Chico Creek does not support a self-sustaining population of Central Valley steelhead and Central Valley spring-run Chinook salmon, they have been observed within Little Chico Creek and may occasionally use the creek for migration, spawning, or rearing (**Appendix B**). However, in a separate letter written for formal consultation for the Humboldt Road Bridge Crossing, which occurs less than a mile downstream, the National Marine Fisheries Service (NMFS) determined a not likely to adversely affect for the same species based on the following (March 2006, 151422SWR2006SA00098:HLB, **Appendix B**):

- Dead Horse Slough and Little Chico Creek are not hydrologically connected to the Sacramento River or any other anadromous streams, and it is unlikely that federally listed Central Valley spring-run Chinook salmon and Central Valley steelhead can access this stream channel and be directly or indirectly affected by the proposed action (referring to the bridge replacement).

- The action area is not designated as critical habitat of Central Valley spring-run Chinook salmon and Central Valley steelhead.

The project will have no direct impacts on anadromous fish species within the action area. Congress defined essential fish habitat (EFH) for federally managed fish species as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Any habitat utilized by Chinook salmon is considered EFH and guidelines to protect these areas are put forth by the Magnuson-Stevens Act. No direct impacts will occur to EFH based on the assumption that bridge construction will be conducted in June through October, when anadromous fish are not present (NOAA letter of Concurrence, March 2006 151422SWR2006SA00098:HLB). Thus, since Dead Horse Slough is a tributary to Little Chico Creek, it is assumed that the determination would be the same.

Delta smelt

No riverine, drainages, or continuous watercourses that are hydrologically connected to a known delta smelt population occur within the project site; therefore, the possibility of this species occurring on-site is null.

Conservancy fairy shrimp

The conservancy fairy shrimp is federally listed as endangered. Its original range is unknown but is thought to include the central valley and southern coastal regions. It is currently found in several conservancies throughout the valley. Conservancy fairy shrimp prefer moderately turbid, deep, cool-water vernal pools. They have been collected from early November to early April.

Although the project occurs within the historical range of the Conservancy fairy shrimp, they are not expected to occur. The 1996 BO for the Enloe Project (currently known as Meriam Park) states that Conservancy fairy shrimp were not detected during surveys and that the pools within the Enloe [Meriam Park] project area are too shallow to provide sufficient ponding (BO, 1-1-95-F-9, 1996). These pools are similar in size, shape, and characteristics to the pools located within the project site. In addition, they are hydrologically connected to the vernal pools that occur on the south side of SR 32. The closest known population is located within the Vina Plains Preserve, which is located at the northernmost point of Butte County (Eriksen and Belk 1999). Additionally, a recent BO issued for the project located just south of 20th Street with similar vernal pool habitat determined that suitable habitat for Conservancy fairy shrimp was not present (Jarvis Gardens BO 1-1-06-F-0135, 2006).

California red-legged frogs

California red-legged frogs (CRFs) typically breed from November through March although earlier breeding has been recorded in southern localities (Storer 1925). Males appear at breeding sites from two to four weeks before females (Storer 1925). They typically call in small, mobile groups of three to seven individuals to attract females (Jennings and Hayes 1985). Females individually move toward a male or male calling group. Female CRFs deposit egg masses on emergent vegetation so that the masses float on the surface of the water (Hayes and Miyamoto 1984). Egg masses contain about 2,000 to 5,000 moderate-sized (2.0 to 2.8 mm in diameter; 0.08 to 0.11 inches), dark reddish brown eggs (Storer 1925, Jennings and Hayes 1985). Eggs hatch in 6 to 14 days (Storer 1925). Larvae undergo metamorphosis 3.5 to 7 months after hatching (Storer 1925, Wright and Wright 1949, Jennings and Hayes 1990). Egg predation is infrequent; most mortality probably occurs during the tadpole stage (Licht 1974) although eggs are susceptible to being washed away by high stream flows. Schmeider and Nauman (1994) report that the CRF eggs have a defense against predation, which is possibly related to the nature of the egg mass jelly. Schmieder and Nauman (1994) report that CRF larvae are highly vulnerable to fish predation; larvae appear to be most vulnerable to fish predation immediately after hatching when the nonfeeding larvae are relatively immobile. Sexual maturity can be attained at two years of age by males and three years of age by females (Jennings and Hayes 1985); adults may live 8 to 10 years (Jennings et al. 1992) although the average life span is considered to be much lower.

Habitat

California red-legged frogs have been found at elevations that range from sea level to about 1,500 meters (5,000 feet). The frog uses a variety of habitat types, which include various aquatic systems, riparian, and upland habitats. There is much variation in how frogs use the environment and in many cases frogs may complete their entire life cycle in a particular area without using other components (i.e., a pond is suitable for each life stage and use of upland habitat or a riparian corridor is not necessary). California red-legged frogs are adapted to survive in a

variable Mediterranean climate and survive temporal and spatial changes in habitat quality; the frog's variable life history enables it to change habitat use according to the year-to-year conditions and in response to adverse conditions. Populations appear to persist where a mosaic of habitat elements exists, embedded within a matrix of dispersal habitat. Here, local extinctions may be counterbalanced by recolonizations of new or unoccupied areas of suitable habitat. This interpretation corresponds with the notion that CRFs persist in what ecologists refer to as metapopulation; a collection of sub-populations that exchange dispersers.

Breeding Habitat

Breeding sites of the CRFs are in aquatic habitats; larvae, juveniles and adult frogs have been collected from streams, creeks, ponds, marshes, sag ponds, deep pools and backwaters within streams and creeks, dune ponds, lagoons and estuaries. California red-legged frogs frequently breed in artificial impoundments such as stock ponds given the proper management of hydro-period, pond structure, vegetative cover, and control of exotic predators. The importance of riparian vegetation for this species is not well understood. While frogs successfully breed in streams and riparian systems, high spring flows and cold temperatures in streams often make these sites risky egg and tadpole environments. When this vegetation type is present, frogs spend considerable time resting and feeding in it; it is believed the moisture and camouflage provided by the riparian plant community provide good foraging habitat and may facilitate dispersal in addition to providing pools and backwater aquatic areas for breeding. Radio telemetry studies showed that individual CRFs move within the riparian zone from vegetated areas to pools (USFWS 1999).

Breeding adults are often associated with dense, shrubby riparian or emergent vegetation and areas with deep (>0.7 meter) still or slow-moving water (Hayes and Jennings 1988); the largest summer densities of CRFs are associated with deep-water pools with dense stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha latifolia*) (Jennings 1988). However, frogs often successfully breed in artificial ponds with little or no emergent vegetation and have been observed in stream reaches that are not cloaked in riparian vegetation. An important factor influencing the suitability of aquatic breeding sites is the general lack of introduced aquatic predators (USFWS 1999).

California red-legged frogs are sensitive to high salinity, temperature, and hydroperiod. Water quality requirements for eggs and tadpoles include low salinity [below 4.5 parts per thousand (ppt) for eggs and up to 7.0 ppt for tadpoles (USFWS 2005)] and temperatures between 48 and 73 degrees Fahrenheit. Nussbaum et al. (1983) found that early CRF embryos are tolerant of temperatures only between 48 and 70 degrees Fahrenheit. Jennings and Hayes (1990) found that when eggs are exposed to salinity levels greater than 4.5 ppt, 100% mortality occurs. They also found that larvae die when exposed to salinities greater than 7.0 parts per thousand. In addition, water bodies suitable for tadpole rearing must remain watered at least until the tadpoles metamorphose into adults, typically between July and September (USFWS 2005).

Dispersal and Use of Uplands

At any time of the year, juvenile and adult CRFs may move from breeding sites. They can be encountered living within streams at distances exceeding three kilometers (1.8 miles) from the

breeding site and have been found up to 30 meters (100 feet) from water in adjacent dense riparian vegetation for up to 77 days (Rathbun et al. 1993). During periods of wet weather, starting with the first rains of fall, some individuals may make overland excursions through upland habitats. Most of these overland movements occur at night. Evidence from marked frogs on the San Simeon coast of California suggests that frog movements via upland habitats of about one mile are possible over the course of a wet season and frogs have been observed to make long-distance movements that are straight-line, point to point migrations rather than using corridors for moving in between habitats (USFWS 1999). Dispersing frogs in northern Santa Cruz County traveled distances from one-quarter mile to more than two miles without apparent regard to topography, vegetation type, or riparian corridors (USFWS 1999).

Summer Habitat

California red-legged frogs often disperse from their breeding habitat to forage and seek summer habitat. This could include boulders or rocks and organic debris such as downed trees or logs; industrial debris; and agricultural features, such as drains, watering troughs, spring boxes, abandoned sheds, or hay-ricks. California red-legged frogs use small mammal burrows and moist leaf litter (Jennings and Hayes 1994); incised stream channels with portions narrower and deeper than 46 centimeters (18 inches) may also provide habitat (USFWS 1999). This type of dispersal and habitat use, however, is not observed in all red-legged frogs and is most likely dependent on the year-to-year variations in climate and habitat suitability and varying requisites per life stage. For the CRF, this habitat is potentially all aquatic and riparian areas within the range of the species and includes any landscape features that provide cover and moisture (USFWS 1999).

Distribution in the Sierra Nevada Foothills and Central Valley

The CRF was probably extirpated from the floor of the Central Valley before 1960 (USFWS 1996). The last verifiable record of this species on the valley floor was a sighting in Lodi (San Joaquin County) in 1957, and the last record of a reproducing population on the valley floor is from the vicinity of Gray Lodge Wildlife Area (Butte County) around 1947, although this record is unverified (Jennings *et al.* 1992). Elimination of the frog from the valley floor was particularly significant in that it isolated Sierra-Nevada foothill populations that may have depended on immigrants from the valley floor (Jennings *et al.* 1992). However, CRFs may never have been widespread on the valley floor as specimen-based records are scarce north of the Kern River drainage.

California red-legged frogs historically occupied portions of the western slope of the Sierra Nevada from Shasta County south to Tulare County, but these populations have been fragmented and nearly eliminated. In 1960, isolated populations were known from at least 30 Sierra Nevada foothill drainages bordering the Central Valley. Records show that the lower elevations of some National Forests and Yosemite National Park were once occupied by CRFs (Jennings *et al.* 1992). Adjacent to and in the vicinity of the Plumas National Forest (Butte, Yuba, and Plumas Counties), many sightings of CRFs were reported in the early 1960s near Lake Oroville. Specifically, frogs were verified from the North Fork Feather River and the South Fork Feather River in 1961. In El Dorado County, records exist for Rock Creek in 1974 and Traverse Creek in 1975. Within the vicinity of the Stanislaus National Forest, CRFs were seen in San Antonio

Creek (Calaveras County) in 1975, in Jordon Creek in 1967, and in Piney Creek from 1972 to 1984 (Mariposa County). Within the vicinity of the Tuolumne River, many historic sites exist. For example, a collection from the Mather vicinity was taken in 1922, and again in 1945. Within Yosemite National Park, collections were made from Gravel Pit Lake (about 1,500 meters [5,000 feet]) in 1940, Swamp Lake (1,500 meters [5,000 feet]) from 1938 to 1941, and Miguel Meadows (1,600 meters [5,200 feet]) in 1939 (M. Jennings *et al. in litt.* 1992). These collections represent the highest elevation records for the California red-legged frog in the Sierra Nevada. No confirmed sightings have been observed or collected in the Tuolumne River drainage for several decades. In the southernmost Sierra foothills, CRFs were historically located within Kern County, particularly in streams and irrigation ditches near Bakersfield (California Natural Diversity Data Base 2001).

Currently, only a few drainages in the foothills of the Sierra Nevada are known to support CRFs, compared to over 60 known historic localities and 18 historic sites where specimens were collected (Jennings and Hayes 1992, Barry 1999). In 1991, CRFs were observed at Pinkard Creek in Butte County (1,200 meters [3,500 feet]) (Hayes 1991). However, intensive surveys in subsequent years have failed to reveal additional observations of this species. In recent surveys a population of mountain yellow-legged frogs (*Rana muscosa*) was observed, suggesting that the original observation may have been a mountain yellow-legged frog misidentified as a CRF. Additional locations in Butte County include French and Indian Creeks. The French Creek population, also referred to as the Swayne Hill/Chino Creek population, was discovered in 1997; at least a few hundred adults plus tadpoles and juveniles have been observed and reproduction appears to be highly successful at this site (USFWS 2002). California red-legged frogs have been observed on Indian Creek, near the town of Woodleaf from 1973 to 1983 (USFWS 2002). Each of these Butte County populations is located on private lands, adjacent to the Plumas National Forest. An additional site in Butte County was located in 2000, on the Feather River Ranger District of the Plumas National Forest on a tributary to the North Fork Yuba River west of New Bullards Bar Reservoir (C. Roberts pers. comm. 2000, Barry 2000). In El Dorado County near Placerville, a confirmed population of California red-legged frog was discovered in an impoundment (Spivey Pond) in the North Fork of Weber Creek. In 2 years of surveys at this site (1997 and 1998), adults, egg masses, and tadpoles have been observed. In 2001, a CRF was documented near the confluence of Rubicon River and the Middle Fork of the American River in Placer County (USFWS 2002). This locality is on U.S. Forest Service land. Much of the Sierra Nevada range is unsurveyed, particularly on private lands, and therefore the true status in this region is largely unknown.

Environmental Baseline for the City of Chico Sphere of Influence

The mechanisms for decline of the CRF are poorly understood. Although presence of CRFs is correlated with stillwater pools deeper than about 0.5 meter, riparian shrubbery, and emergent vegetation (Jennings and Hayes 1985), there are numerous locations in the historical range of the frog where these elements are well represented yet CRFs appear to be absent. The cause of local extirpations therefore does not appear to be restricted to absolute loss of aquatic habitat (Shaffer and Fisher 1996). The most likely causes of local extirpation are thought to be changes in faunal composition of aquatic ecosystems, i.e., the introduction of non-native predators and competitors; and landscape-scale disturbances that disrupt CRF population processes, such as

dispersal and colonization. Subtle environmental changes, such as the introduction of contaminants or changes in water temperature, may also play a role in local extirpations. These changes may also promote the spread of predators, competitors, parasites and diseases (USFWS 1999).

The processes described above are known to be heightened by urbanization, which is occurring rapidly in the City of Chico Sphere of Influence. For instance, an increase in certain native and nonnative predators and competitors accompanies an increase in the local human population; disruption of dispersal likely results from an increase in barriers and sinks; and changes in hydroperiod, water temperature, and chemical composition of water bodies are readily traced to irrigation, gray water disposal, and urban runoff (USFWS 1999). These factors along with the complete lack of documented occurrences in the Central Valley since 1956 make a strong argument for the absence of the CRF in the Action Area and the City of Chico Sphere of Influence as a whole. Therefore, projects within the City of Chico Sphere of Influence will not affect CRF for the following reasons: 1) the project area does not occur within designated critical habitat, a core recovery area, Priority 1, 2, or 3 Areas, or in an adjacent watershed to any of these areas, 2) based on the best available information, CRF does not occur on the valley floor, and 3) the City of Chico Sphere of Influence does not provide suitable habitat for CRF (pers comm Holly Herod and Karen Leyse, USFWS, June 5, 2006 and the Jarvis Gardens BO, 1-1-06-F-0135).

The bald eagle (*Haliaeetus leucocephalus*)
The bald eagle is a bird of aquatic ecosystems, frequenting large lakes, rivers, estuaries, reservoirs and some coastal habitats. It feeds primarily on fish, but waterfowl, gulls, cormorants, and a variety of carrion may also be consumed. Bald eagles usually nest in trees near water, but may use cliffs in the southwest United States, and ground nests have been reported from Alaska. Adults use the same breeding territory, and often the same nest, year after year. They may also use one or more alternate nests within their breeding territory (USFWS 2006).

The timing and distance of dispersal from the breeding territory varies. Individuals that breed in California may make only local winter movements in search of food, staying in the general vicinity of their breeding territory while others may migrate hundreds of miles to wintering grounds such as the Klamath Basin remaining there for several months. Eagles seek wintering (non-nesting) areas offering an abundant and readily available food supply with suitable night roosts that typically offer isolation and thermal protection from winds.

Bald eagles have not been detected within the Action Area during biological resource surveys. Nor are they known to nest within 5 miles of the project site. Although there is some potential for infrequent wintering bald eagle occurrence in the Action Area when Little Chico Creek contains water during winter months and after heavy precipitation events, the Action Area does not provide suitable aquatic habitat supporting nesting or wintering bald eagles and it is highly unlikely this species will be affected as a result of the proposed project.

Western yellow-billed cuckoo

A CNDDB query reported no occurrences of yellow-billed cuckoo within the "Chico, CA" 7.5-minute USGS quadrangle. It is known to occur in two of the eight surrounding quadrangles, which include portions of the Sacramento River. This species is a riparian forest nester, nesting in extensive riparian forests of willow, cottonwoods, and blackberry, none of which occur within or immediately adjacent to the assessment area.

Consultation to Date

The USFWS was contacted August 3, 2006 for documentation regarding a list of special-status species likely to occur within the USGS quadrangle on which the project occurs (**Appendix A**). A formal delineation of waters of the United States was completed by Gallaway Consulting, Inc. verified (#200501152) by the COE December 30, 2005 (**Appendix D)**.

Preliminary contact with Rick Kuyper, USFWS (7 June 2005), Howard Brown, (National Oceanic and Atmospheric Administration (NOAA) Fisheries) (December 9, 2004), and Paul Ward, (California Department of Fish and Game (DFG) Fisheries) (December 28, 2004) was established to determine potential impacts to listed species, establish construction windows, discuss mitigation options, and review alternatives. On June 23, 2005 representatives from Gallaway Consulting, Inc. and Rick Kuyper, visited the site to review alternatives, discuss mitigation options, and provide input on the project. In addition, multiple discussions via phone and email were conducted to further discuss environmental impacts and mitigation options.

Current Management Direction

The lead agency under California Environmental Quality Act (CEQA) is the City of Chico (City); the lead agency under NEPA is the COE. They are required to establish the presence or absence of state or federally listed rare, endangered, threatened, and candidate species through literature review and field surveys. The CNDDB, and the most recent available list of special-status species documented by the USFWS, were reviewed and appropriate field surveys were performed.

Description of Proposed Action

The proposed project would widen and improve approximately 2.6 miles of SR 32, beginning at the southbound SR 99 ramps at the west end of the project corridor and extending east past Yosemite Drive. State Route 32 will be widened from two to three lanes in each direction from the east side of the SR 99 interchange to just east of Fir Street. The roadway will then be widened from two to four lanes (two in each direction) from Fir Street to 1000 ft east of Yosemite Drive, where the roadway width would transition down from four lanes to the existing two lanes. The project will consist of modifications to the ramp terminal intersections and the couplet at the SR 99/SR 32 interchange. The intersections of SR 32 with Forest Avenue, El Monte Avenue, and Bruce Road will be widened to include separated left and right turn pockets and the existing signals will be modified. The intersections of SR 32 with Fir Street and

Yosemite Drive will be widened and new traffic signals will be installed. A delineated left turn pocket will be included for eastbound SR 32 traffic at Fir Street and separated left and right turn pockets will be included at Yosemite Drive. The improvements to the south leg of the Yosemite Drive/SR 32 intersection will be constructed by a proposed development.

For the widening portion between the SR 99 interchange and Fir Street, the roadway will consist of three 12-foot lanes in each direction with 8 foot outside shoulders and 2 foot inside shoulders. For the segment east of Fir Street, the roadway will consist of two 12-foot lanes in each direction with 8 foot outside shoulders and 2 foot inside shoulders. A 14-foot grassy center median will be included from east of Fir Street to Bruce Road. East of Bruce Road, the median will transition to a 6 foot paved section until the conform with the existing two lane roadway. The 14 foot median from east of Fir Street to Bruce Road will be set up to allow for a future raised median to be constructed; this median may be constructed once development in the area increases and traffic speeds drop.

The roadway widening will include the intersections of the SR 99 ramps, Fir Street, Forest Avenue, El Monte Avenue, Bruce Road, and Yosemite Drive. Fir Street will be converted from two-way to one-way northbound traffic only. Forest Avenue will be widened to include southbound thru, left, and right turn lanes and northbound dual lefts, right, and thru lanes. An additional southbound thru lane will be constructed south of SR 32, and a raised center island will be constructed to restrict southbound left turns from the existing driveway on the east side of the road between SR 32 and Humboldt Road.

El Monte Avenue will be widened to include separated left turns and a shared thru/right in the southbound direction. Northbound traffic will be accommodated with an exclusive left turn, a shared thru/left turn, and a separated right turn. Southbound left turns from the existing driveway on the east side of the roadway will be restricted with a raised center island.

Bruce Road will be widened to include dual left turns, two thru lanes, and an exclusive right turn in the northbound direction and a single left turn, two thru lanes, and a right turn lane in the southbound direction. The improvements on the northern leg of the intersection will conform to a widening project that is currently under construction, and the southern leg will conform to improvements constructed by an adjacent development.

Roundabouts

A second design option is being studied at the Bruce Road/SR 32 intersection. This alternative would replace the existing signalized intersection with a 2-lane roundabout with right turn bypass lanes. A separate Concept Approval Report (CAR) has been submitted to Caltrans for approval of this concept. The survey boundary was widened at this intersection, to account for any possible impacts.

Due to the acknowledged interest in the community for roundabouts, they were considered at four of the study intersections affected by the widening effort. The following summarizes the results of our initial assessment.

- SR 32/Forest Avenue - Roundabout considered and included in roundabout alternative analysis.
- SR 32/El Monte Avenue - Roundabout dismissed from consideration due to existing volumes of school-age children walking or riding bicycles across SR 32 without assurances of crossing guards at this location.
- SR 32/Bruce Road - Roundabout considered and included in roundabout alternative analysis.
- SR 32/Yosemite Drive - Roundabout dismissed from consideration due to the steep grade of SR 32 (seven percent) and minor street approaches to the intersection.

Based on the initial assessment, the roundabout alternative evaluation assumed roundabout control at the SR 32/Forest Avenue and the SR 32/Bruce Road intersections and signal control at the other two intersections.

The operations of the two roundabouts were evaluated for Year 2030 Conditions assuming signal control at the other study intersections. The results of the VISSIM (simulation analysis software) analysis show that for the SR 32/Forest Ave intersection, due to sufficiently high northbound left-turn volumes and eastbound through volumes, the roundabouts will not operate at an acceptable Levels of Service (LOS) or better for design year conditions and traffic would back from one intersection into the next. Therefore, the Roundabout Alternative was dismissed from further consideration at the SR 32/Forest Ave intersection.

The roundabout design option is still being considered at the SR 32/Bruce Road intersection. A sensitivity analysis to determine the failure year for the proposed roundabout is currently being completed. The results of this analysis, along with other features of the roundabout such as the geometry, sight distance, and fastest path, are included within a Concept Approval Report that is currently being prepared for approval by Caltrans.

Bridge and Culvert Design

The existing structure at Dead Horse Slough (Bridge No. 12-0135) will be widened to the north to accommodate the additional traffic lanes and widened shoulders. The existing structure is a four span reinforced concrete slab that is 123.5 feet long and 32.5 feet wide. The new structure will be widened by 49 feet; the new structure width will be 81.5 feet wide. The existing railings on the structure will be upgraded to current standards. The structure widening will be constructed in one phase, with the new bridge constructed to the north and joined to the existing structure with a closure pour. Both the existing and proposed abutments will be protected from scour with rock slope protection. A Location Hydraulic Study has been completed, and the existing bridge exceeds Caltrans freeboard requirements.

The existing 6 ft x 8 ft box culvert on Dead Horse Slough just east of Bruce Road will be lengthened to accommodate the roadway widening. The culvert will be widened approximately 60 feet to the north. The completed Location Hydraulic Study shows that the culvert meets Caltrans freeboard requirements and that additional capacity is not needed.

East of the SR 99 interchange, the roadway will be drained with a series of roadside ditches and cross culverts running underneath the side street intersections. The roadside drainage east of the interchange will drain to Dead Horse Slough.

Soundwalls

Soundwalls will be constructed at the existing right of way for portions of the project. The soundwalls will be located adjacent to the existing right of way line on the north side of the roadway from just east of Fir Street to El Monte Avenue, on the south side of the roadway from 1200 feet east of Fir Street to Forest Avenue, and on the north side of the roadway from 700 feet east of Bruce Road to Yosemite Drive. The soundwalls will be approximately 12 feet high and will consist of either masonry block or a soldier pile configuration.

Trees

Several trees will need to be removed to construct the widening. In addition, there are a number of trees located on the south side of the roadway from Fir Street to Forest Avenue that the City would like to remain. Some of these trees are within the proposed Clear Recovery Zone; an Advisory Design Exception Fact Sheet will be completed for these areas.

Pedestrians and Bicycles

Neither separated pedestrian facilities or delineated bicycle facilities will be included on SR 32. New sidewalks, crosswalks, and Class II bike lanes will be included along Forest Avenue, El Monte Avenue, and Bruce Road to allow pedestrians and bicycles a north /south crossing of SR 32. The City desires bicycles and pedestrians traveling east-west in this area to use new facilities along Humboldt Avenue (paralleling SR 32 to the south) or existing multi-use paths along Big Chico Creek (paralleling SR 32 to the north). Bicycles will be allowed to use the shoulders of SR 32, if desired.

Right-of-Way

The existing right of way through the project corridor is approximately 142 feet side. The majority of the proposed improvements will be within this existing right of way. A right of way acquisition will be necessary from one parcel in the northeast quadrant of the SR 32/Bruce Road intersection to accommodate the widening and box culvert modifications. This acquisition will total approximately 5000 feet and is from an un-developed commercially zoned parcel.

Action Area

State Route 32 in the project area serves primarily local traffic associated with residential development along the project corridor. There are five intersections along the project corridor: Fir Street, Forest Avenue, El Monte Avenue, Bruce Road, and Yosemite Drive. In addition, there are four intersections associated with the SR 99 Interchange (**Figure 5**).

Land uses along the project corridor vary from urban uses (offices and businesses) near SR 99 to residential uses further east. Land between SR 99 and El Monte Avenue is generally developed, primarily with residential uses on the north and office, commercial and residential uses on the south. Two park-and-ride lots are located between the eastbound and westbound lanes on both

sides of Fir Street. Dead Horse Slough Bridge crosses under SR 32 just east of Forest Avenue and again just east of Bruce Road. There are a few undeveloped parcels along this section; however, most of this area is developed. All of the residential development backs up to SR 32 with backyard fences and landscaping separating the residential development from the highway.

Land use between El Monte Avenue and Yosemite Drive along the project corridor is generally undeveloped with the exception of a residential development located on the north side of SR 32 between Bruce Road and Yosemite Avenue, and the recently built-out Parcels 1 and 9. The undeveloped land is characterized by an almost mima mound topography with nonnative annual grassland, isolated wetlands and vernal pools. Dead Horse Slough crosses under SR 32 in a culvert just east of Bruce Road. Hank Marsh Junior High School is located just south of SR 32 at the intersection of Humboldt Road and El Monte Avenue.

The existing drainage along SR 32 consists of roadside ditches that generally parallel the road and convey flow to Dead Horse Slough. There are no bicycle facilities existing or proposed along SR 32. There are several utilities that cross SR 32 in the project area including a Western Area Power Administration 230 kV transmission line just east of the Yosemite Drive intersection; however, there are no known utilities that parallel the facility.

The Action Area was expanded to include a 250 buffer in the eastern portion of the project in areas that were not previously developed. In areas that have been developed and had no potential for impacts, the action area was minimized to include the right-of-way only (**Figure 5**).

Data Sources

The biological and physical data for parcels between El Monte Avenue and Yosemite Drive have been gathered from many sources. Below is a list of the parcels, their location, surveys conducted and dates. For clarity, the parcels have been numbered (1-9) (**Figure 4**).

Parcel 1 Don Mulkey Property – Located East of El Monte Road between SR 32 and Humboldt Road. Botanical survey performed by Kingsley R. Stern titled *Survey for Sensitive Species of Vascular Plants, Don Mulkey Property, Located Between Humboldt Road and Highway 32, East of El Monte Avenue, Chico, Butte County, California.* The botanical survey was conducted on 12 and 13 April 1994. Wetland Delineation performed by Lisa R. Stallings and Rod Macdonald of Kelley & Associates Environmental Sciences, Inc, (K&AES) titled *Chico Wetlands Delineation, Mulkey Property Highway 32 and Humboldt Road, Butte County, California,* in August 1994 (APN:002-050-059 & 254). The land in Parcel 1 is currently under development (**Figure 4**).

Parcel 2 Don Mulkey Property – Located east of parcel 1 between SR32 and Humboldt Road. Surveys in this parcel are the same is in parcel 1. There are no plans for development due to the presence of BCM (**Figure 4**).

Parcel 3 Fran Shelton – This is a wedge shaped parcel east of parcel 2, and contains portions of Bruce Road and Dead Horse Slough (**Figure 4**). Vernal pool species have the potential to occur, protocol level invertebrate surveys have not been conducted in this area. Federal and state

endangered BCM does occur on-site (**Figure 4**). Foothill Associates, Inc provided mapping data for this parcel.

Parcel 4 Pleasant Valley Assembly of God – A wedge shaped parcel located south of parcel 3, and north of Humboldt road (**Figure 4**). Surveys for BCM were conducted by Shirley Innecken, and Mary Bailey, botanists, during the appropriate survey window on March 11, and 14 of 2005 (*Biological Assessment for the Proposed Meriam Park Development, City of Chico, Butte County, CA, August 2005)*; surveys conducted in March 2004 were performed by Foothill and Associates and Jones and Stokes as a double blind study. Ken Whitney, with Sugnet and Associates, submitted a wetland delineation for verification to the COE in February 1994. In November 1994, the COE initiated Section 7 consultation with the USFWS and on July 10, 1996 the USFWS issued a Biological Opinion (BO, 1-1-95-F-9) addressing project related effects on vernal pool invertebrates and BCM. The land in parcel 4 is a proposed preserve that will be held in a conservation easement, designed with the avoidance of wetland habitats and special-status species in mind.

Parcel 5 Oak Valley – The Oak Valley residential development site is located south of State Road 32 and east of Bruce Road and parcel 3 (**Figure 4**). Dead Horse slough runs across the western and southern edges of the parcel. The former "Humboldt Road Burn Dump" was located in the southwestern portion of parcel 5. Below is a list of studies performed on-site as listed in the *Humboldt Road Burn Dump Remediation Project Biological Assessment* Dated July 29. 2004.

- An Initial Study/Mitigated Negative Declaration (IS/MND), titled *Initial Study/Mitigated Negative Declaration for the Humboldt Road Burn Dump Remediation Project. City of Chico, 2004.*

- A wetland delineation and an assessment of the potential for BCM, titled, *Wetland Delineation for the Humboldt Road Burn Dump Remediation Project. City of Chico.* March 24, 2004.

- Surveys for Butte County checkerbloom (*Sidalcea robusta*) were performed during the summer of 2003.

- A wetland delineation was performed for the Oak Valley project, titled, *Wetland Delineation for the Oak Valley Project East, 1995.*

- Special-status species surveys for the California Park South project, titled, *Final Report: California Park South, Chico: Evaluation of Natural Habitats, Wildlife and Sensitive-Species, 1995*.

- Biological surveys were proposed June 15, 19, and 30, 2004, for the Biological Assessment titled, *Biological Assessment, Humboldt Road Burn Dump Remediation Project.*

- Another BA was performed on the portions of the parcel not covered by the Burn Dump Biological Assessment. BCM surveys were conducted March 24 and 26, 2004; valley elderberry longhorn beetle (VELB) surveys were conducted March 24, and May 7, 2004.

- Elderberry shrub, wildlife, plant, and BCM surveys; as well as a jurisdictional wetland delineation were conducted during the winter and spring of 2002.

- A Butte County checkerbloom, BCM, general plant and wildlife surveys, and a wetland delineation were conducted during the spring of 1997.

Parcel 6 – Parcel 6 is located north of State Route 32 directly across from parcel 2 (**Figure 4**). There is no data available at this time for Parcel 6.

Parcel 7 Creekside Apartments – Parcel 7 is located to the north side of State Route 32 between parcel 6 and Bruce Road (**Figure 4**). David Kelley, plant and soil scientist conducted wetland delineations in 1990 and 1999. David Kelley conducted field surveys of parcel 7: however, the data is not available at this time. Parcel 7 is the future location of Creekside Apartments.

Parcel 8 - Parcel 8 is located north of State Route 32 between Bruce Road and California Park residential development. There is no data available at this time for Parcel 8.

Parcel 9 – Parcel 9 is located on the north side of State Route 32 east of California Park, it encompasses Yosemite Drive to the end of the assessment area. Development is finished at parcel 9; therefore, there are not biological concerns in that parcel.

A wetland delineation including botanical surveys was conducted within the entire project area along State Route 32. The surveys were conducted on April 14, and 19, 2004 by Mary Bailey, consulting botanist, and Lyna Black, environmental scientist, of Gallaway Consulting, Inc. During the design process a section of State Route 32 was added to the project; the delineation of waters and general botanical surveys in this section were performed on September 19, 2005 by Christy Dawson, biologist, and Shirley Innecken, botanist.

SPECIES ACCOUNTS AND STATUS OF SPECIES OCCURING IN THE ACTION AREA

Aquatic Invertebrates

Based on previous surveys the three species of aquatic invertebrates including vernal pool fairy shrimp, California linderiella, and vernal pool tadpole shrimp are assumed to occur in the project area. Protocol level surveys for these species have not been conducted within the BSA. However, previous protocol level surveys found special-status invertebrates in vernal pools within 0.5 miles of the project site that are hydrologically connected to vernal pools within the BSA. The previously surveyed areas had similar pool size and characteristics, creating a high probability that those species occur within the BSA as well. Vernal pool tadpole shrimp were found in 1992 adjacent to the project site during surveys in the vicinity of the Meriam Park

Project on the south side of Humboldt Road (**Figure 4**). For more information consult CNDDB occurrence number 78.

Vernal pool tadpole shrimp are small crustacean in the Triopsidae family and are federally listed as endangered. Their diet consists of organic debris and living organisms, such as fairy shrimp and other invertebrates. They inhabit vernal pools containing clear to highly turbid water, ranging in size from 54 square feet in the former Mather Air Force Base area of Sacramento County, to the 89-acre Olcott Lake at Jepson Prairie. The vernal pool tadpole shrimp is known from 18 populations in the Central Valley, ranging from east of Redding in Shasta County south to the San Luis National Wildlife Refuge in Merced County, and from a single vernal pool complex on the San Francisco Bay National Wildlife Refuge in the City of Fremont, Alameda County (USFWS 1996).

Vernal pool fairy shrimp are federally listed as threatened and are widespread but not abundant. Known populations extend from Stillwater Plain in Shasta County through most of the length of the Central Valley to Pixley in Tulare County. Along the central coast, they range from northern Solano County to Pinnacles National Monument in San Benito County. Four additional, disjunct populations exist: one near Soda Lake in San Luis Obispo County, one in the mountain grasslands of northern Santa Barbara County, one on the Santa Rosa Plateau in Riverside County, and one near Rancho California in Riverside County. The vernal pool fairy shrimp occupies a variety of different vernal pool habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools. Although the species has been collected from large vernal pools including one exceeding 25 acres, it tends to occur in smaller pools. It is most frequently found in pools measuring less than 0.05 acre. These are most commonly in grass or mud bottomed swales, or basalt flow depression pools in unplowed grasslands. Vernal pool fairy shrimp have been collected from early December to early May.

California fairy shrimp, also known as the California linderiella are a federal species of special concern and tend to live in large, fairly clear vernal pools and lakes. However, they can survive in clear to turbid water with a pH from 6.1 to 8.5, and they have been found in very small pools. They are tolerant of water temperatures from 41° to 85° F, making them the most heat tolerant fairy shrimp in California. The California fairy shrimp is the most common fairy shrimp in the Central Valley. It has been documented on most land forms, geologic formations and soil types supporting vernal pools in California, at altitudes as high as 3800 feet above sea level. Adults have been collected from late December to early May.

Conservancy fairy shrimp is a federally endangered species occurring in large, vernal pools and swales with a temperature between 41º F and 75.2º F, and with a pH between 6.8 to 7.5. The Conservancy fairy shrimp takes a longer time to mature than do other invertebrates found in the same pools. They were not found during the surveys conducted in hydrologically connected vernal pools, therefore they are not assumed present.

Vertebrates

Western spadefoot toad breeds from January to May in temporary pools where water temperatures must be between 48° F and 86° F. Typical of toads, they forage on a variety of insects, worms, and other invertebrates, including grasshoppers, true bugs, moths, ground beetles, predaceous diving beetles, ladybird beetles, click beetles, flies, ants and earthworms. Eggs are deposited on plant stems or pieces of detritus in temporary rain pools, or sometimes pools in ephemeral stream courses. Eggs hatch in 0.6-6 days depending on temperature. Larval development can be completed in 3 to 11 weeks and must be completed before pools dry. Age at sexual maturity is unknown, but considering the relatively long period of subterranean dormancy (8 to 9 months), individuals may require at least two years to mature. Historically, the western spadefoot ranged from Redding to northwestern Baja California throughout the Central Valley, Coast Ranges and coastal lowlands. The species is found mostly below 3000 feet, but can occur up to 4500 feet. The average elevation of sites where the species still occurs is significantly higher than the average elevation for historical sites, suggesting that declines have been more pronounced in lowlands.

Giant Garter Snake (GGS) is a federal and state listed threatened species. The GGS inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands in the Central Valley. Because of the direct loss of natural habitat, the GGS relies heavily on rice fields in the Sacramento and San Joaquin Valley, but also uses managed marsh areas in federal national wildlife refuges and state wildlife areas. Giant garter snakes are typically absent from larger rivers because of lack of suitable habitat and emergent vegetative cover, and from wetlands with sand, gravel, or rock substrates. Riparian woodlands typically do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations. However, some riparian woodlands do provide good habitat.

Primary habitat requirements consist of 1) adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; 2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; 3) grassy banks and openings in waterside vegetation for basking; and 4) higher elevation uplands for cover and refuge from floodwaters during the snake's dormant season.

Habitat loss and fragmentation, flood control activities, changes in agricultural and land management practices, predation from introduced species, parasites, water pollution and continuing threats are the main causes for the decline of this species. However, when abundant cover is available, GGS may be able to persist with numerous predators that share the same habitats (Hansen 1990).

Botanical Resources

Butte County meadowfoam and rosy meadowfoam (*Limnanthes douglassii* ssp. *rosea*) were detected during botanical surveys performed by Shirley Innecken, and Mary Bailey, botanists, during the appropriate survey window on March 10, 14, and 24, 2005. Botanical surveys were