Appendix E

ENVIRONMENTAL RESOURCES AND CONSERVATION OPPORTUNITIES

A Background Report for the Yolo County Parks & Open Space Master Plan

PREPARED FOR:

Yolo County Department of Planning and Public Works
Parks and Resource Natural Management Division
292 West Beamer Street
Woodland, CA 95695

PREPARED BY:

The Dangermond Group
&
Roberts, Kemp & Associates LLC

ENVIRONMENTAL RESOURCES AND CONSERVATION OPPORTUNITIES

A Background Report for the Yolo County Parks & Open Space Master Plan

Contents

Attachments

List of Figures

List of Tables

ENVIRONMENTAL RESOURCES AND CONSERVATION OPPORTUNITIES

A Background Report for the Yolo County Parks & Open Space Master Plan

SUMMARY

The existing Yolo County parks and open spaces have environmental or conservation-related resource values in addition to their values for public recreation and other purposes. This background report considers the potential utility of the park units for conserving environmental resources, including individual sensitive species as well as the collective native biological diversity present in Yolo County.

A substantial amount of information has been compiled regarding "sensitive species" in Yolo County; this "heritage program" information is often used with respect to environmental regulatory processes [including the processes underlying the existing draft Habitat Conservation Plan (HCP) in Yolo County, as well as the processes underlying the nascent Natural Community Conservation Plan (NCCP)]. However, the databases of information available for addressing many of these species appear to lack site-specific details with respect to the existing County park units, apparently as a consequence of uneven sampling for sensitive species across the County's geography. There are indications, nonetheless, that park units do provide habitat for plant or wildlife species that are identified in these heritage programs. The lack of reliable occurrence information also limits the County's ability to use this kind of information for screening potential parkland acquisitions, either in the sense of avoiding potential sites that are highly constrained or in the sense of acquiring important sites for conservation purposes.

An additional focus for conservation planning in Yolo County could adopt a landscape-level focus. This focus would be based upon the natural abundances and distributions of species, species groups, and habitats, and would identify areas in which natural biological diversity is high as important for conserving the biological legacy of the region. An initial application of this approach, based on existing data compiled by the California Department of Fish and Game, discloses a natural biodiversity pattern in Yolo County such that the western mountainous part of the County hosts greater biodiversity than the more populated eastern part of the County, indicating a need to increase the importance of the mountainous western regions in considering conservation strategies within the County. Also important in terms of biodiversity are the river and creek riparian corridors, particularly for wintering bird species. In addition, the native fish species richness in the Cache Creek basin is a

regional highlight of the County; a similar high diversity of native fish species was not identified for other Sacramento River tributary streams in the Central Valley.

With respect to conserving native species and natural habitats, several existing park units are evidently significant, including: (1) Elkhorn Regional Park, which has an occurrence of high-value riparian habitat; (2) the Cache Creek Canyon Regional Park, which presents a combination of riparian habitat, oak-dominated foothill woodlands, and chaparral, and which also provides a broad continuity with similar habitat types in the park's vicinity and part of a regionally significant linkage corridor along Cache Creek; (3) the Otis Ranch Open Space Park, which provides the same kinds of habitat that are present at the Cache Creek Canyon Regional Park on a larger scale, with less habitat degradation because of past and current uses; and (4) the Putah Creek Access Parks, which provide a combination of riparian habitat and oak woodland habitat, in combination with linkages to other habitats in the park's vicinity, including the regionally significant Putah Creek corridor. While several other park units do provide more limited habitat values, the conservation values of these four units are noteworthy.

This report suggests basic guidelines for recognizing and managing conservation values in existing park units, including: (1) identifying important conservation resources within existing facilities, (2) incorporating conservation purposes into park unit management and operations, and (3) adaptively managing park units to maintain conservation values.

This report also suggests an approach to screening potential future parkland acquisitions for conservation benefits, including: (1) addressing known key regional habitats, including oak woodlands, grasslands, riparian habitats, wetlands, vernal pools, and instream habitat values for native fish; (2) adopting a landscape-scale focus, incorporating core reserves, buffers, and linkages; (3) using a watershed-based approach for ecological processes, and incorporating regional ecological dynamics and disturbance regimes; (4) incorporating habitat needs of known sensitive species; (5) conducting pre-acquisition inventories that address the factors influencing conservation value, including geology, hydrology, other physical factors, general vegetation and wildlife use patterns, the presence of sensitive species or their habitats, and the presence of the key regional habitat types; and (6) coordinating County plans with those of other governments and appropriate non-governmental organizations regarding conservation goals and programs.

1.0 INTRODUCTION AND FOCUS

The Yolo County park and open space units exist within a conservation context that is relevant for the Parks and Open Space Master Plan in at least two ways. The first is the need for consistency between management practices that are carried out under the Master Plan and the requirements of federal, state, and local laws or regulations that govern impacts to sensitive species. Additional regulations apply with respect to wetlands or to other environmentally sensitive features that are directly or indirectly regulated under one or more federal, state, or local laws. A basic understanding of these sensitive environmental resources is helpful for developing and implementing the Parks and Open Space Master Plan.

The second way in which each unit's conservation values should be considered addresses the roles that the County's parklands should play in regional conservation planning and management. The park units demonstrate a variety of habitat values, and the units may play a variety of roles in protecting biological diversity in the County and in the larger region of which Yolo County is a part. Comments made during the Parks and Open Space Master Plan preparation process by County staff, by County advisory committee members, and by members of the public all indicated that managing the park units in a manner that protects and conserves regional biological diversity is an important goal for the Parks and Open Space Master Plan. Accomplishing this goal requires a basic understanding of the conservation values present in the park units, as well as an understanding of the larger conservation context in which the park units are embedded.

Identifying the full conservation setting of Yolo County's parklands is, however, a task well beyond the scope of this study. Preparing detailed inventory studies for the park units covered by the Plan, or developing the degree of information that might be necessary to seek approvals from state or federal regulatory agencies, was not included in the scope of work. This background report for the Parks Master Plan has been developed on the basis of reconnaissance-level field observations and general scientific principles known to be relevant for such considerations, as well as on the basis of the preparers' general knowledge of environmental regulation and policy.

The focus of this background report is limited, therefore, to the following objectives:

- Identify the general biological and ecological setting of selected park units. Several of the existing units are located in contexts that were judged by the consultant team to result in limited or no conservation utility, and these facilities were not included in the reconnaissance-level environmental resource field work for this report; the following facilities were not visited: Dunnigan Community Park, Airport Park, and the Yolo County Historical Museum.
- Identify, at a reconnaissance level, biologically or ecologically significant elements that occur at the park units visited for this report. This identification of sensitive elements relies heavily upon natural heritage inventory data maintained by the State of California and by certain nonprofit organizations, and upon the physical, biological, and ecological features of these environmental resources that allow their recognition in the field (see below).

- Identify conceptually any adverse effects for environmental resources that are initially evident during the reconnaissance-level field surveys that may be related to existing park unit management or operations.
- Identify appropriate actions that may assist County staff and decision-makers in planning for, protecting, or enhancing conservation-related environmental resource values at existing park units.
- Identify, based on known literature, the conservation setting in the larger region in which the Yolo County park units occur, and describe a conservation model for Yolo County. This model could allow County staff, decision-makers, and members of the public to join in discussions about protecting the conservation values in the region through managing existing park units appropriately and enacting future parklands acquisitions in a manner that helps the County enact a regional conservation plan.

As suggested by these objectives, this report is intended to provide information about conservation considerations for the park and open space units that extends beyond the direct management of the units themselves, including considerations that are germane for the County's HCP/NCCP and the General Plan's Conservation Element. Because the park units are already publicly owned land, it is reasonable to expect that park units may be called upon by the County's decision-makers and the public to play important roles in the extended NCCP and/or Conservation Element deliberations. Appropriate decisions regarding the roles that the park and open space units should play in these larger conservation contexts requires that existing and potential conservation values in the units be considered. This report presents a possible framework within which such considerations may begin.

2.0 METHODS

2.1 Field Studies

Reconnaissance-level field observations were made at a number of the existing park units as part of this study. For a number of the units additional reconnaissance-level information was available from visits to these units prior to the inception of this project. The objective of these observations was to compile enough information to be able to identify the major biological and conservation-related values at the visited units. The field studies did not include: (1) detailed scientific data collection (e.g., pertaining to geology, hydrology, biology, or ecology), or quantitative sampling; or (2) data collection that would be necessary to prepare environmental documents for any implementation projects that may be included in or conducted pursuant to the Parks and Open Space Master Plan. Such studies were beyond the scope of the present project.

The types of field observations made at the County park units are summarized in Table 1. Observations were recorded in the field in a field notebook and through annotations on printed copies of the parts of USGS 7.5-minute quadrangles that included the visited units (Source: National Geographic Society 2003) and USGS aerial photos downloaded from the Terraserver website (URL: http://terraserver-usa.com/).

Table 1. Summary of Reconnaissance-level Studies Carried Out at Selected Yolo County Parks.

Criterion	Methods and Objectives
Landforms and important geological and geomorphological characteristics	(1) Review existing regional geological information and identify geological and geomorphic setting. (2) Locate and note in the field general geomorphic features such as river terraces, floodplain deposits, eroded slopes, or unvegetated rock faces, in combination with vegetation or habitat conditions associated with these features.
Drainages, other water features, and hydrological processes	(1) Review existing maps and aerial photos and identify hydrological setting. (2) Locate and note in the field general indications of water flows, floodplain deposits, ponded waters, elevated groundwater (if present), and other indicators of surface and groundwater hydrology.
Plant associations / habitat types	(1) Consider and identify the primary vegetation associations present in each unit. (2) Identify dominant plant species (i.e., the species or species combination that makes up more than 50 percent of the cover) in each vegetation unit.
Bird species	(1) Record the identities of all species randomly encountered during the fieldwork at each unit. (2) Periodically sample and record identities of bird species within the units.

Criterion	Methods and Objectives
Potential effects on conservation values that relate to existing facilities or apparent management	(1) Identify relationships in the field between environmental resources and non-biological facilities in each unit. (2) Observe and note relationships between site use and environmental resources. (3) Observe and note options for environmental resource enhancement that could be associated with unit management or operations.

Evident geological, geomorphological, and hydrological features were identified in the field. Plant species were initially identified in the field, and vegetation samples of the dominant species were retained and subsequently identified or confirmed according to the Jepson Manual (Hickman 1993). Plant formations were identified conceptually according to the classification established by Sawyer and Keeler-Wolf (1995); the related assignment of wildlife habitat types followed to the habitat classifications used in the California Wildlife Habitat Relationships (CWHR) program (CDFG 2002), based on Mayer and Laudenslayer (1988). Birds and other wildlife encountered during the field surveys were identified on the basis of a variety of reference field guides, as appropriate.

2.2 Environmentally Sensitive Species Identification

The existing park units may provide habitat for species that are considered to be environmentally sensitive under federal or state law; some habitat types are also considered environmentally sensitive under state law. The majority of these sensitive elements are identified by the software package that incorporates the records in the California Natural Diversity Data Base (a part of the CDFG) called "RareFind3" (CNDDB 2003). The content of this software package was consulted in preparing this report, including the database's 7.5-minute USGS quadrangle references for species occurrences. This report includes a listing of CNDDB occurrences for the County as a whole, included because the combined "nine-quad lists" [1] for the quads having park units is essentially the combination of all quads in the County. This report also includes a separate listing for the quadrangles in which park units are located (see Section 5.0, below).

A similar research process was carried out for sensitive plant species identified by the California Native Plant Society (CNPS). The CNPS online Inventory permits data queries for individual 7.5-minute quadrangles, as well as "nine-quad" searches, and the same results were obtained as for the CNDDB assessment.[2] See Sections 3.2 and 5.0 for additional information.

---

1 Currently the convention among biologists in regulatory contexts is to report the occurrence data for the USGS quadrangle in which a project site is located, plus the occurrences in the eight quads sharing a border contact with the central quad (four sides plus four corners). This procedure is considered more likely to identify the potentially sensitive species occurrences related to the project than is the set of occurrences restricted to the central quad.

2 See URL: http://www.cal.net/~levinel/cgi-bin/cnps/sensinv.cgi. Viewed April 2005.

The California Department of Fish and Game (CDFG) maintains a listing, available online, of wildlife "species of special concern," which constitutes a separate assessment of wildlife species sensitivity in California that is comparable to the CNPS database for plant species.[3] Species included in the complete list were reviewed and a sub-list was identified as potentially present in Yolo County park units. See Section 3.2, below, for additional information.

The National Audubon Society has for many years maintained a "watchlist" of bird species considered to be sensitive to impacts from land uses that modify or remove habitat.[4] The Watchlist was reviewed, and a sub-list was prepared for the habitat types occurring in Yolo County park units. See Section 3.2 for additional information.

A final source of sensitive-species information for Yolo County is the list of species covered by the nascent Yolo County NCCP. This list is included in the County JPA's agreement with the U. S. Fish and Wildlife Service (USFWS) and CDFG regarding the study. See Section 3.2 for additional information.

3 See URL: http://www.dfg.ca.gov/hcpb/species/ssc/ssc.shtml. Viewed October 2004.

4 See URL: http://www.audubon.org/bird/watchlist/. Viewed October 2004.

3.0 General Environmental Setting for Yolo County Parks Units

3.1 Biophysical Setting

Yolo County's physical environment includes geological and hydrological contexts that have led to the physical geography of the County. The physical setting is also associated with ecological conditions that shape the biological landscape in the County. While a detailed description of the County's physical and biological setting exceeds the scope of work for this project, a summary of the setting is useful in considering the conservation setting of the County's park and open space units.

3.1.1 Geology and Geomorphology

The essential geological setting of Yolo County is available in summary form from webpages maintained by the University of California, Davis, including a geological summary description for the Putah-Cache Bioregion (Moores and Moores 2001; this is included in this report as Attachment C) and the geological webpages for the University of California Natural Reserve System elements at the McLaughlin Reserve[5] and the Stebbins-Cold Canyon Reserve.[6]

Yolo County is underlain at depth by Mesozoic-age sedimentary rocks that originated in erosion from highlands in the central region of what is now thought of as North America. These 100-million-year-old rocks are part of the GREAT VALLEY FORMATION, the foundation of most of the interior Coast Range. The formation of the Coast Range deformed the originally flat strata and tilted the eastern part of the GREAT VALLEY FORMATION upward; the GREAT VALLEY FORMATION rocks form the spine of the Blue Ridge/Rocky Ridge crest at the western County line. Farther northwest and westward from Yolo County the deformation was even more severe and the rock matrix was jumbled into a "mélange" that is usually identified as the FRANCISCAN FORMATION.

The lower slopes of the GREAT VALLEY FORMATION are overlaid in most of western Yolo County by much younger sedimentary deposits (about one to three million years old) that are part of the TEHAMA FORMATION. Some of the later-deposited sediments near the valley floor that were effectively part of the same depositional processes that formed the TEHAMA FORMATION have been identified by different names (the MODESTO FORMATION, the RIVERBANK FORMATION, and so forth), but the genesis of all of these materials is essentially erosion from the rising Coast Range mountains. These sedimentary deposits have been variably eroded by surface streams and now form much of the lower slopes and foothills along the eastern front of the Coast Range, including the Dunnigan Hills and the Plainfield Ridge (also in the Potrero Hills in Solano County).

5 URL: http://nrs.ucdavis.edu/mclaughlin/naturalhis/geology.htm. Viewed October 2004.

6 URL: http://nrs.ucdavis.edu/stebbins/natural/geology.htm. Viewed October 2004.

The flatter lands in the eastern two-thirds of Yolo County are sedimentary deposits relatively much younger in age. These deposits overlie the GREAT VALLEY FORMATION (or other rocks, potentially including an underthrust slab of FRANCISCAN FORMATION material) to the extent of as much as 5,000 vertical feet of alluvial sediment. The source of most of the sediment was the rising Coast Range (and, in the eastern part of the County, the Sierra Nevada), and the central part of Yolo County consists of several interleaved alluvial fans (a bajada), with the individual alluvial fans of Cache Creek, Putah Creek, Cottonwood Creek, and Chickahominy Slough forming the most prominent elements (see Figure 2-3 in Jones and Stokes Associates 1996 for a particularly clear illustration of these alluvial fan deposits). The youngest sedimentary deposits in the County occur in direct association with these watercourses, particularly Cache Creek. The easternmost part of the County includes a depositional basin for fine sediments delivered by overbank flows of the Sacramento River, a process that continued throughout the period of deposition of the TEHAMA FORMATION.

Yolo County has a number of geological faults that offset its rocks. The most important for the purposes of this summary is the "horizontal" blind thrust fault that is associated with a shortening of the width of the Central Valley.[7] This is the essential cause of the elevation of the Coast Range, and is associated with a continued warping or buckling of the GREAT VALLEY FORMATION in the western part of the County (see Attachment C).

West and northwest of Yolo County the Coast Range includes additional geological elements that are functionally derived from tectonic motions summarized by Moores and Moores (2001), including the emplacement of ophiolitic materials associated with a tectonic plate convergence zone, the deposition of volcanic materials as a consequence of convergent-margin geological processes, and deposition of sediments eroded from the rising Coast Range. These parent materials resulted in the formation of soils that have important biological implications, particularly for ophiolitic deposits; however, these materials do not occur in Yolo County, and are not addressed further here.

Geomorphologically the western third of Yolo County is dominated by erosional processes, and the eastern two-thirds of Yolo County are dominated by depositional processes. Putah Creek and Cache Creek are primary landscape-dominating features, representing "antecedent" streams that formed and continued to cut downward through the weakly consolidated sediments as the Coast Range mountains were elevated. These major waterways, as well as other smaller streams, have carried erosional products to the Central Valley that represent the land surfaces seen in most of Yolo County today.

3.1.2 Ecoregional Setting

The general ecoregional setting for this report is adequately summarized in the California extension of the "ecoregion" concept prepared under the direction of Miles

7 The larger geological context for Yolo County includes the "collision" of the North American Plate with the Pacific Plate. This plate convergence is the ultimate source of the faulting and the Central Valley's narrowing. See Attachment C.

and Goudey (1997; see Attachment A).[8] The processes used to derive this set of descriptions included adopting a variety of assumptions or conventions, one of the most important being that the natural variability present in the ecosystems covered by the classification would be captured using the vegetation series identified in Sawyer and Keeler-Wolf (1995). A second important convention adopted in the unified agency effort was the agreement that "potential natural vegetation" would be identified, and would be considered to indicate the ecological capability of the elements identified in the classification.

The ecological landscape of Yolo County includes parts of two "sections" within the classification of ecoregion elements, the **Northern California Interior Coast Ranges** and the **Great Valley** (see Attachment A).

The Blue Ridge/Rocky Ridge axis, the spine of the western mountains, is included in the subsection of the **Northern California Interior Coast Ranges** section called *Western Foothills*. This subsection also includes the lower-elevation foothills east of the Blue Ridge/Rocky Ridge crest. The ecological setting for this subsection has been described as indicating a variegated vegetation pattern, with the following important vegetation associations present:

Grasslands: California annual grassland series.

Shrublands: Chamise series, Chamise – wedgeleaf ceanothus series, Scrub oak series, Wedgeleaf ceanothus series, Whiteleaf manzanita series.

Forests and woodlands: Birchleaf mountain-mahogany series, Blue oak series, California buckeye series, Foothill pine series, Interior live oak series.

The **Northern California Interior Coast Ranges** section also includes the *Dunnigan Hills* subsection, which has been identified as having less biological diversity, providing the following vegetation series:

Grasslands: California annual grassland series.

Forests and woodlands: Blue oak series.

The **Great Valley** section includes a subsection named the *Winters Terraces*, located east of the *Western Foothills*. This subsection corresponds to the TEHAMA FORMATION deposits along the inner margin of the Coast Range north of Winters. Ecologically this subsection has been described as providing the following vegetation series:

Grasslands: California annual grassland series, Needlegrass series.

Vernal pools: Northern hardpan vernal pools.

Forests and woodlands: Blue oak series, Fremont cottonwood series.

Eastward from the *Winters Terraces* this section includes a geographically extensive subsection called the *Yolo Alluvial Fans*, which corresponds to the bajada that extends between and includes the Putah Creek and Cache Creek alluvial fans. Ecologically the

8 An online version of this publication (which is the basis for Attachment A) may be viewed at URL: http://www.fs.fed.us/r5/projects/ecoregions/. Viewed October 2004.

potential natural vegetation that would occur in this area (most of which has been converted to agricultural land uses) has been described as including:

Grasslands: California annual grassland series, Purple needlegrass series.

Forests and woodlands: Fremont cottonwood series, Mixed willow series, Valley oak series.

The fifth ecological formation occurring in Yolo County is a third subsection of the **Great Valley** section called the *Yolo-American Basins*, which includes the depositional basin on both sides of the Sacramento River. This subsection, now primarily agricultural in aspect, has been considered to have once offered the following potential natural vegetation series:

Wetlands: Bulrush series, Bulrush – cattail series, Cattail series, Sedge series.

Forests and woodlands: California sycamore series, Fremont cottonwood series, Mixed willow series.

Need for Information About General Habitat Conditions. The ecoregional summary indicates the "best" habitat conditions that might occur in the subregions identified within Yolo County. These are projections about the natural vegetation that would have been present in the County prior to substantial alteration of the natural landscape. Many of the vegetation series that were present under unmodified conditions are, however, no longer present in the County, having been converted to agricultural and other land uses, particularly in the eastern and central parts of the County. The primary exceptions are within the wilder lands in the western mountains (the *Western Foothills*, the *Dunnigan Hills*, and the *Winters Terraces*); in these subsections the existing vegetation still resembles the potential natural vegetation.

Describing further the range of natural vegetation series that actually exist on the land surface exceeds the scope of this study. In a general sense the vegetation series described in this section capture the range of variability that exists; identifying the actual location and extent of vegetation series requires applied research significantly beyond the efforts allowed for this project (see, however, the brief descriptions of vegetation observed at selected park units later in this report). This lack of detailed habitat mapping does not, however, prevent a broad-scale discussion of the potential contribution that the Yolo County park and open space units can make to conserving natural diversity in Yolo County, and this report addresses this subject.

An adequate understanding of the range and extent of vegetation types in the County, particularly in the wilder western part of the County, will be necessary for long-range conservation planning in the County (including, ultimately, the roles of the County park and open space units). Fortunately, both the Yolo County General Plan Update and the Yolo County Natural Community Conservation Plan (NCCP) are expected to produce adequate mapping and associated descriptions of plant associations and wildlife habitat in the County to address site-specific vegetation questions.

3.2 Sensitive Species

"Sensitive" species may be identified by one or more of a variety of criteria, including: (1) species that are listed under the federal or state Endangered Species Act,

(2) species that are listed or covered by one or more additional federal or state regulatory programs., and (3) species that are considered to be environmentally "at risk" by one or more non-profit conservation or professional organizations.

Sensitive species have emerged as a primary indicator of biological diversity in environmental planning (but not the only indication, or even the best indication; see Section 4.0 below). Uncommon species may serve as indicators of high habitat importance for other "relictual" species, indicating areas of high biological value (Stein and others 2000, CDFG 2003b). Uncommon species may also indicate an evolutionarily significant association with unusual habitat conditions, such as plant species evolved to tolerate "ultramafic" soils. Generally, uncommon species may be lost from a landscape fairly rapidly as a consequence of habitat area reductions, habitat fragmentation, or other anthropogenic or natural processes. This is the essential reason why attention to "sensitive" plant and wildlife species is a conservation focus in many environmental and land use plans.

3.2.1 Species Identified in the California Natural Diversity Data Base

Known occurrences of many uncommon species are included in the California Natural Diversity Data Base (CNDDB). This is a geographically based repository of sensitive species occurrence data maintained by the California Department of Fish and Game. The database is available as a computer software package, RareFind3 (CDFG 2003b), which is widely used in environmental screening processes in California.

The database consists of element occurrence information that has been reported to CDFG. An "element" is a sensitive species, or occasionally a sensitive habitat type.[9] An "occurrence record" is established when a reported occurrence is submitted to the CNDDB and accepted. Element occurrence records may be relatively general or quite location-specific. The database is a "standard" reference when considering sensitive species in impact assessment or in conservation contexts.[10] A summary of CNDDB element occurrences for Yolo County is presented in Table 2.

Table 2. Summary of CNDDB element occurrences for Yolo County, including 7.5-minute USGS quads in "nine-quad" arrays around County park units (see text).

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Agelaius tricolor	Tricolored Blackbird	--/--/SC/--

9 The Sawyer and Keeler-Wolf (1995) manual incorporated sensitivity ratings for vegetation series from the unpublished "Holland" list. Generally, a vegetation series that is uncommon may be considered to be a "sensitive" element. This classification was subsequently revised by the Department of Fish and Game, and the successor is used by biologists to identify "sensitive" plant associations. See URL: http://www.dfg.ca.gov/whdabpdfs/natcomlist.pdf.

10 Several elements included in Table 2 lack formal status under any of the federal or state laws identified in this report, but are nonetheless still included in the CNDDB list of sensitive elements. Adverse effects to these elements would be considered to be a significant effect pursuant to the requirements of the California Environmental Quality Act.

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Ambystoma californiense	California Tiger Salamander	FPT/--/SC/--
Ardea alba	Great Egret	--/--/-- /--
Ardea herodias	Great Blue Heron	--/--/--/--
Astragalus tener var. *ferrisiae*	Ferris's Milk-vetch	--/--/-- /1B
Astragalus tener var. *tener*	Alkali Milk-vetch	--/--/--/1B
Athene cunicularia	Burrowing Owl	--/--/SC/--
Atriplex cordulata	Heartscale	--/--/--/1B
Atriplex depressa	Brittlescale	--/--/--/1B
Atriplex joaquiniana	San Joaquin Saltbush	--/--/--/1B
Branchinecta conservatio	Conservancy Fairy Shrimp	FE/--/--/--
Branchinecta lynchi	Vernal Pool Fairy Shrimp	FT/--/--/--
Branchinecta mesovallensis	Midvalley Fairy Shrimp	--/--/--/--
Buteo swainsoni	Swainson's Hawk	--/CT/ --/--
Castilleja rubicundula ssp. *rubicundula*	Pink Creamsacs	--/--/--/1B
Charadrius alexandrinus nivosus	Western Snowy Plover	FT/--/SC/--
Charadrius montanus	Mountain Plover	--/--/SC/--
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	FC/CE/--/--
Cordulatus palmatus	Palmate-bracted Bird's-beak	FE/CE/--/1B
Corynorhinus townsendi townsendi	Townsend's Western Big-eared Bat	--/--/SC/--
Desmocerus californicus dimorphus	Valley Elderberry Longhorn Beetle	FT/--/ --/--
Egretta thula	Snowy Egret	--/--/--/--
Elanus leucurus	White-tailed Kite	--/--/--/--
	Elderberry Savanna	(S2.2)*
Emys (=Clemmys) marmorata marmorata	Northwestern Pond Turtle	--/--/SC/--
Eriogonum nervulosum	Snow Mountain Buckwheat	--/--/--/1B
Erodium macrophyllum	Round-leaved Filaree	--/--/--/2
Falco mexicanus	Prairie Falcon	--/--/SC/--/
Falco peregrinus anatum	American Peregrine Falcon	--/CE/--/--/
Fritillaria pluriflora	Adobe-lily	--/--/--/1B
	Great Valley Cottonwood Riparian Forest	(S2.1)*
	Great Valley Mixed Riparian Forest	(S2.2)*
Harmonia hallii	Hall's Harmonia	--/--/--/1B
Hesperolinon breweri	Brewer's Western Flax	--/--/--/1B
Hibiscus lasiocarpus	Rose-mallow	--/--/--/2

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Juglans hindsii	Northern California Black Walnut	--/--/--/1B
Layia septentrionalis	Colusa Layia	--/--/--/1B
Lepidium latipes var. *heckardii*	Heckard's Pepper-grass	--/--/--/1B
Lepidurus packardi	Vernal Pool Tadpole Shrimp	FE/--/--/--
Linderiella occidentalis	California Linderiella	--/--/--/1B
Navarretia leucocephala ssp. *bakeri*	Baker's Navarretia	--/--/--/1B
Neostapfia colusana	Colusa Grass	FE/CE/--/1B
Nycticorax nycticorax	Black-crowned Night Heron	--/--/--/--
Plegadis chihi	White-faced Ibis	--/--/SC/--
Pogonichthys macrolepidotus	Sacramento Splittail	--/--/SC/--
Rana boylii	Foothill Yellow-legged Frog	--/--/SC/--
Riparia riparia	Bank Swallow	--/CT/--/--
Spea (=Scaphiopus) hammondii	Western Spadefoot	--/--/SC/--
Streptanthus breweri var. *hesperidis*	Green Jewel-flower	--/--/--/1B
Thamnophis gigas	Giant Garter Snake	FT/CT/--/--
Tuctoria mucronata	Crampton's tuctoria or Solano Grass	FE/CE/--/1B
	Valley Oak Woodland	(S2.1)*

Notes:

- FE — Listed as "Endangered" under the federal Endangered Species Act
- FT — Listed as "Threatened" under the federal Endangered Species Act
- FC — Candidate for listing under the federal Endangered Species Act
- CE — Listed as "Endangered" under the California Endangered Species Act
- CT — Listed as "Endangered" under the California Endangered Species Act
- FPT — Proposed for listing as "Threatened" under the federal Endangered Species Act
- SC — Listed by the California Department of Fish & Game as a "Species of Special Concern"
- 1B — Listed by the California Native Plant Society as "Rare, Threatened, or Endangered in California and Elsewhere"
- 2 — Listed by the California Native Plant Society as "Rare, Threatened, or Endangered in California but More Common Elsewhere"
- * — Rankings assigned pursuant to Heritage Program Status Ranks; see Sawyer and Keeler-Wolf (1995). State "threat" rankings generally are considered as:
  - "S2" = 6-20 Element Occurrences OR 1,000-3,000 individuals OR 2,000-10,000 acres
    - "S2.1" – Very Threatened;
    - "S2.2" – Threatened;

The general meaning of terms used in sensitive species contexts may not always coincide with common perception. As used in this section, the following meanings (which are paraphrases or quotations of relevant sections of federal or state law) are intended:

- Endangered: A species listed under the federal or state Endangered Species Act that is at significant risk of extinction in all or parts of the species' range because of habitat loss, habitat alteration, overexploitation, predation, competition, or disease.
- Threatened: A species listed under the federal or state Endangered Species Act that is at significant risk of becoming endangered in all or a significant part of the species' range absent special protection and management efforts by state or federal agencies. This term includes, under California law, species that were formerly considered as "rare" by the state of California, and the term "rare" is no longer used.
- Candidate: A species that has been formally noticed as under review or as proposed for listing under the California Endangered Species Act. Under the federal Act, "candidate" refers to a species that the relevant federal agency has determined to propose for listing.
- Proposed: A species that the relevant federal agency has formally proposed for listing under the federal Endangered Species Act.

See the following section for information about California's "Special Concern" species, the CNPS list, and other sources of sensitive species information.

In reviewing the CNDDB occurrence information, an existing heavy distribution of occurrences in the eastern and central parts of Yolo County was noted, together with a corresponding dearth of occurrence data in the mountainous western third of the County. The conclusion cannot be avoided that few occurrence records exist in the western part of the County because qualified field biologists have either or both: (1) not been on the ground in the western part of the County, or (2) have not reported the results of field surveys to the CNDDB. The dearth of adequate field-based survey information significantly limits the utility of the RareFind3 database for screening existing parklands for management sensitivity that is based on "sensitive species." In addition, the lack of reliable occurrence information also limits the County's ability to use this kind of information for screening potential parkland acquisitions, either in the sense of avoiding potential sites that are highly constrained or in the sense of acquiring important sites for conservation purposes. Two management considerations that the County should implement for the park management program are:

- Qualified biologists should conduct more comprehensive fieldwork to inventory the existing park and open space units for all "sensitive species" that may occur in those units, in order to provide the County with baseline information useful for management of environmentally sensitive species and habitats within these existing facilities.
- Qualified biologists should conduct appropriate inventory field surveys of all potential parkland acquisitions by the County prior to acquisition, or of acquired units soon after acquisition, in order to establish appropriate management directions for the new units.

3.2.2 Sensitive Species Identified in Other Contexts

CDFG Species of Special Concern. The California Department of Fish and Game maintains a listing of wildlife species (excluding plants) that are considered to merit "special concern" because of small population sizes, habitat loss, and other biological and ecological concerns.[11] The list contains 257 species or subspecies overall, many of which cannot or do not appear in Yolo County. The "Special Concern" species that appear to have a reasonable likelihood of appearing in Yolo County are listed in Table 3.

Table 3. "Species of Special Concern" Identified by the California Department of Fish and Game That Are Expected to be Present in Yolo County.

Common Name	Taxonomic Name
Fish	
Sacramento splittail	*Pogonichthys macrolepidotus*
Sacramento perch [A]	*Archoplites interruptus*
Hardhead	*Mylopharodon conocephalus*
Amphibians	
California tiger salamander	*Ambystoma californiense*
California red-legged frog	*Rana aurora draytonii*
Foothill yellow-legged frog	*Rana boylii*
Western spadefoot	*Scaphiopus hammondii* (= *Spea hammondii*)
Northwestern pond turtle	*Clemmys marmorata marmorata*
Birds	
Marsh hawk (= northern harrier)	*Circus cyaneus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperi*
Swainson's hawk [B]	*Buteo swainsoni*
Golden eagle [C]	*Aquila chrysaetos*
Merlin	*Falco columbarius*
Mountain plover	*Charadrius montanus*
Long-billed curlew	*Numenius americanus*
Burrowing owl	*Athene cunicularia*
Willow flycatcher [B]	*Empidonax traillii*
Loggerhead shrike	*Lanius ludovicianus*
Purple martin	*Progne subis*
Bank swallow [B]	*Riparia riparia*
Yellow warbler	*Dendroica petechia*
Yellow-breasted Chat	*Icteria virens*

11 The CDFG Species of Special Concern are identified online at the following URL: http://www.dfg.ca.gov/hcpb/species/ssc/ssc.shtml. Viewed October 2004.

Common Name	Taxonomic Name
Tricolored blackbird	*Agelaius tricolor*

Notes
A Special Concern status for Clear Lake population; Watch List for populations outside of native range.
B Subsequently listed by the State of California pursuant to the California Endangered Species Act.
C Also identified as a "Fully Protected Species" by the Department.

The 24 species in Table 3 include several that are now listed pursuant to the CESA, as well as several other species that are listed pursuant to the federal ESA (see section 3.2.1 above). Regardless of formal listing status, these species are indicators of environmental sensitivity. Where Yolo County park units provide habitat for these species, potential actions that could affect those habitats may warrant modifications to avoid those effects.

California Native Plant Society. The California Native Plant Society (CNPS) rare plant program uses a classification process that includes collective assignments of native species, subspecies, or varieties to one of several lists:[12]

> List **1B.** *Plants that are Rare, Threatened, or Endangered in California and elsewhere*. CNPS biologists have determined that "(t)he 1021 plants of List 1B are rare throughout their range. All but a few are endemic to California. All of them (the taxa in List 1B) are judged to be vulnerable under present circumstances or to have a high potential for becoming so because of their limited or vulnerable habitat, their low numbers of individuals per population (even though they may be wide ranging), or their limited number of populations. Most of the plants of List 1B have declined significantly over the last century."
>
> List **2.** *Plants that are Rare, Threatened, or Endangered in California but more common elsewhere*. CNPS biologists have also determined that "(e)xcept for being common beyond the boundaries of California, the 417 plants of List 2 would have appeared on List 1B."
>
> List **3.** *Plants about which more information is needed – a review list*. CNPS biologists have opined that some of the List 3 taxa are eligible for listing under the California ESA.
>
> List **4**. *Plants of limited distribution – a watch list*. CNPS biologists have opined that few of the List 4 taxa are likely to be eligible for listing under the California ESA.

The process through which these assignments are made is described on the website identified above (and in the published Inventory). In essence, the CNPS inventory represents a determination by a "quasi-professional" scientific organization[13] about the

12 The California Native Plant Society also has developed other lists (such as plant species that are extinct in California) that are not important for identifying species that are sensitive to management or development activities; these lists are not addressed in this report.

13 Many CNPS volunteers are professional botanists and field ecologists, and the decision-making functions of the CNPS are conducted in a manner much like those of a professional

taxa of plants occurring in California (and thus in Yolo County) that should be considered "sensitive." The CNPS maintains an online inventory of sensitive plant species occurrence that is independent of the CNDDB, based on occurrence information compiled by CNPS members. This database[14] may be queried for existing occurrence records in a geographical context, including a pattern of "nine-quad" searches for the 7.5-minute USGS quadrangles that include the existing Yolo County park units, a process essentially identical to the CNDDB queries described above. The query results are summarized in Table 4.

Table 4. Summary of CNPS-listed Sensitive Plant Species Occurring in 7.5-Minute USGS Quadrangles with Yolo County Park Units.

Scientific Name	Common Name	CNPS List [A]
Asclepias solanoana	Serpentine milkweed	List 4
Astragalus breweri	Brewer's milk-vetch	List 4
Astragalus clevelandii	Cleveland's milk-vetch	List 4
Astragalus rattanii var. *jepsonianus*	Jepson's milk-vetch	List 1B
Astragalus tener var. *ferrisiae*	Ferris's milk-vetch	List 1B
Astragalus tener var. *tener*	Alkali milk-vetch	List 1B
Atriplex depressa	Brittlescale	List 1B
Atriplex joaquiniana	San Joaquin spearscale	List 1B
Collomia diversifolia	Serpentine collomia	List 4
Cordylanthus palmatus	Palmate-bracted bird's-beak	List 1B
Cryptantha excavata	Deep-scarred cryptantha	List 4
Eriogonum nervulosum	Snow Mountain buckwheat	List 1B
Erodium macrophyllum	Round-leaved filaree	List 2
Fritillaria pluriflora	Adobe-lily	List 1B
Fritillaria purdyi	Purdy's fritillary	List 4
Harmonia hallii	Hall's harmonia	List 1B
Hesperevax caulescens	Hogwallow starfish	List 4
Hesperolinon drymarioides	Dry maria-like western flax	List 1B
Hibiscus lasiocarpus	rose-mallow	List 2
Lasthenia ferrisiae	Ferris's goldfields	List 4
Layia septentrionalis	Colusa layia	List 1B
Lepidium latipes var. *heckardii*	Heckard's pepper-grass	List 1B
Lessingia hololeuca	Woolly-headed lessingia	List 3
Lomatium hooveri	Hoover's lomatium	List 4
Malacothamnus helleri	Heller's bush mallow	List 4
Microseris sylvatica	Sylvan microseris	List 4

society.

14 See URL: http://www.cal.net/~levinel/cgi-bin/cnps/sensinv.cgi. Viewed April 2005.

Scientific Name	Common Name	CNPS List [A]
Navarretia cotulifolia	Cotula navarretia	List 4
Navarretia jepsonii	Jepson's navarretia	List 4
Navarretia leucocephala ssp. *bakeri*	Baker's navarretia	List 1B
Neostapfia colusana	Colusa grass	List 1B
Psilocarphus brevissimus var. *multiflorus*	Delta woolly-marbles	List 4
Senecio clevelandii var. *clevelandii*	Cleveland's ragwort	List 4
Tuctoria mucronata	Crampton's tuctoria or Solano grass	List 1B

Notes:

A See text for descriptions of the CNPS Lists.

The CNPS Online Inventory includes substantially more listed taxa than does the RareFind3 database. Presumably the discrepancy has arisen because CNPS volunteers have not submitted the occurrence data included in the Inventory to the Department of Fish and Game. The enhanced CNPS list indicates a higher degree of biological sensitivity in the vicinity of the Yolo County park units than is indicated by the CNDDB occurrence data.

The geographical occurrence locations of most of the additional records were not reviewed for this report. Based on the ecological associations in which many of the additional taxa occur, or on taxonomic affinities, it appears that many of the additional taxa in the CNPS list are wetland-related and/or vernal pool species, and would be anticipated to occur in the central and eastern parts of the County. Some of the additional species (e.g., Snow Mountain buckwheat and Hall's harmonia) are, however, clearly associated with habitats in the Coast Range. These taxa, all of which are indicators of biological sensitivity, occur within the vicinities of Yolo County park units; future park-related planning should include appropriate surveys for these taxa.

Audubon Watch List. The National Audubon Society, a conservation organization whose members are interested in birds and which has effective working relationships with professional ornithologists, has maintained a list of bird species that are considered to be sensitive to extinction pressures because of small population sizes, restricted ranges, habitat losses, and similar factors. The Audubon "Watch List"[15] includes species in the "*red*" category that have been identified by BirdLife International as "Threatened" or "Near-threatened" at the global level, and all species identified by Partners In Flight (PIF) as "Extremely High Priority" at the national level. Species in the "*yellow*" category include the remaining species identified by Partners In Flight at the national level as of "Moderately High Priority" or "Moderate Priority."

The Audubon Watch List includes a total of 160 continental species or subspecies at the present time (67 red-listed species or subspecies and 97 yellow-listed species or subspecies). The list of Watch List species that appear most likely to occur regularly in Yolo County's habitats is indicated in Table 5. There are at least half a dozen additional Watch List species that are reasonably likely to occur on occasion (e.g.,

15 See URL: http://www.audubon.org/bird/watchlist/. Viewed October 2004.

during migration) in Yolo County wetlands that are not included in Table 5, as well as at least one additional hummingbird species and an additional raptor species.

Table 5. Audubon Watch List Species with Expected Regular Yolo County Occurrences.

Watch Status	Common Name	Taxonomic Name
Yellow	Swainson's hawk	*Buteo swainsoni*
Yellow	Mountain quail [A]	*Oreortyx pictus*
Red	Long-billed curlew	*Numenius americanus*
Red	Mountain plover	*Charadrius montanus*
Yellow	Marbled godwit [B C]	*Limosa fedoa*
Yellow	Short-billed dowitcher [B C]	*Limnodromus griseus*
Yellow	Allen's hummingbird [B]	*Selasphorus sasin*
Red	Nuttall's woodpecker	*Picoides nuttallii*
Yellow	Lewis's woodpecker [C]	*Melanerpes lewis*
Yellow	Yellow-billed magpie	*Pica nuttalli*
Yellow	Oak titmouse	*Baeolophus inornatus*
Yellow	Willow flycatcher [B]	*Empidonax traillii*
Yellow	Wrentit	*Chamaea fasciata*
Yellow	Tricolored blackbird	*Agelaius tricolor*

Notes:
A Described by landowners in the Coast Range as occasional present at higher elevations.
B Expected to be present in appropriate Yolo County habitats during spring and/or fall migration.
C Expected to be present in appropriate Yolo County habitats during winter.

The Watch List should be considered as an indication of potential bird species sensitivity with respect to habitat loss and environmental change. While most of the listed species are uncommon or are associated with uncommon habitat types, it is noteworthy that several of the listed bird species are relatively common Yolo County birds, including the red-listed Nuttall's woodpecker and the yellow-listed yellow-billed magpie, oak titmouse, and wrentit. The habitats of these species, including the relatively common species, should be considered sensitive to disturbance and/or loss throughout Yolo County.

3.2.3 Sensitive Species Identified for the Yolo County Natural Community Conservation Plan

The County (through a Joint Powers Authority) entered into an agreement in 2004 with the California Department of Fish and Game and the U. S. Fish and Wildlife Service that is expected to result in the development of a Natural Community Conservation Plan (NCCP) and Habitat Conservation Plan (HCP) for the County. The NCCP agreement includes a list of "covered species," which effectively constitutes a selection of sensitive species for which the County has agreed to develop a

conservation strategy and program. The list of "covered species" is reproduced in Table 6.

Table 6. Species Proposed For Coverage Under NCCP Planning Agreement No. 2810-2003-003-02, August 18, 2004.

Common Name	Scientific Name	Federal	State	CNPS
PLANTS				
Heckard's peppergrass	*Lepidium latipes* var. *heckardii*	---	---	List 1-B
Brittlescale	*Atriplex depressa*	---	---	List 1-B
San Joaquin saltbush	*Atriplex joaquiniana*	---	---	List 1-B
Alkali milkvetch	*Astragalus tener var. tener*	---	---	List 1-B
Palmate-bracted birds beak	*Cordylanthus palmatus*	E	SE	List 1-B
Colusa grass	*Neostapfia colusana*	T	SE	List 1-B
Crampton's tuctoria	*Tuctoria mucronata*	E	SE	List 1-B
INVERTEBRATES				
Vernal pool tadpole shrimp	*Lepidurus packardi*	E	---	
Vernal pool fairy shrimp	*Branchinecta lynchi*	T	---	
Midvalley fairy shrimp	*Branchinecta mesovallensis*	SOC	---	
Conservancy fairy shrimp	*Branchinecta conservatio*	E	---	
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T	---	
AMPHIBIANS				
California tiger salamander	*Ambystoma californiense*	T	SSC	
Western spadefoot toad	*Scaphiopus hammondii*	SOC	SSC	
California red-legged frog	*Rana aurora draytonii*	T	SSC	
Giant garter snake	*Thamnophis gigas*	T	ST	
Northwestern pond turtle	*Clemmys marmorata marmorata*	SOC	SSC	
BIRDS				
White-faced ibis	*Plegadis chihi*	SOC	SSC	
Cooper's hawk	*Accipiter cooperi*	---	SSC	
Swainson's hawk	*Buteo swainsoni*	SOC	ST	
Northern harrier	*Circus cyaneus*	---	SSC	
Western yellow billed cuckoo	*Coccyzus americanus occidentalis*	FC	SE	
Short-eared owl	*Asio flammeus*	---	SSC	
Western burrowing owl	*Athene cunicularia*	SOC	SSC	
Bank swallow	*Riparian riparia*	SOC	ST	
Loggerhead shrike	*Lanius ludovicianus*	SOC	SSC	
Tricolored blackbird	*Agelaius tricolor*	SOC	SSC	

Common Name	Scientific Name	Federal	State	CNPS
California yellow warbler	*Dendroica petechia*	---	SSC	

Notes:
Federal Status:
Endangered (E) = listed as endangered under the federal ESA
Threatened (T) = listed as threatened under the federal ESA
FC = federal candidate species
SOC = federal species of concern
State Status:
Endangered (SE) = listed as endangered under CESA
Threatened (ST) = listed as threatened under CESA
SSC = Species of Special concern in California
CNPS Status:
1A = presumed extinct in California
1B = rare and endangered in California and elsewhere
2 = rare and endangered in California, more common elsewhere
3 = Plants for which we need more information

It is uncertain whether additional "covered species" may be added to this list.

At the present time it is unclear what relationship may be established between the NCCP/HCP and the County's park and open space units. Should an association be developed that links park unit planning and management to the NCCP, this group of species (and any additional species that may be added) would become one explicit focus of planning and management for the County's park and open space units. Some of the species in Table 6 likely would find suitable habitat in existing park units, particularly species associated with riparian habitats, grasslands, and seasonal wetlands/vernal pools. Depending on acquisition priorities and opportunities, future park and open space acquisitions could assist in conserving the species in Table 6.

3.2.4 General Consideration Regarding Sensitive Species and Yolo County Park and Open Space Units

Identifying species or other taxa that are "rare" or environmentally sensitive is a well-established method for identifying the sensitivity of a natural area during environmental reviews conducted under federal or state regulations; indeed, the CNPS approach appears to have been crafted explicitly to raise the level of sensitivity of the identified plant taxa during various environmental review processes as a method for calling attention to the impacts of proposed actions on the habitats that these taxa occupy. Because these requirements are part of existing federal and state law, the management program implemented for existing County park units ought to be based upon a substantial familiarity with those species, since it is clearly possible that County park unit management activities could affect these species and their habitats if they are present within the units.

As indicated in the following section, it appears that potential occurrences of various categories of sensitive plant and animal taxa/species in Yolo County park units, with the exception of Grasslands Park, have not been identified, or perhaps that such occurrences, though observed, have not been recorded. It also appears that potential occurrences within the park units of the habitats with which these taxa/species are

associated have not been mapped. Some of the identified species do occur within existing park units (e.g., valley elderberry longhorn beetle in the upper Putah Creek Access Parks); for other taxa, habitat is present, although the taxa themselves may not be. It is possible, in addition, that there are sensitive taxa in the park units that have not yet been included in the categories summarized above.

This report identifies, in the recommendations section, a need for adequate biological inventories of the existing Yolo County park and open space units, conducted by qualified biologists. The field studies will need to be conducted during appropriate seasonal "windows" for the taxa being sought. During the fieldwork the biologists should also look for species that may be environmentally sensitive, but which are not yet listed. The data should be reported and maintained in a geographically based mapping context, and the data should be forwarded to the CNDDB and other relevant repositories.

Decisions about park unit management should be based on knowledge of the presence or absence of these or similar taxa or their habitats, and decisions should appropriately address possible impacts to these taxa and the associated mitigation needs.

4.0 REGIONALLY BASED CONSERVATION PLANNING CONSIDERATIONS FOR YOLO COUNTY PARKS

As noted in an earlier, preliminary report,[16] there has been a general recognition during the process of developing the Yolo County Parks and Open Space Master Plan that the park and open space units can serve a role in protecting or conserving regional biological diversity. The discussion heretofore has focused on providing a regional conservation background, and discussion below provides a brief survey of existing conditions in several of the units. Appropriate conservation planning also requires consideration of issues that transcend the scale of individual park units, even extending to regional scales that are larger than the County as a whole.

Yolo County is currently pursuing an update of many of its General Plan elements, and at the same time it (jointly with the cities in the County) is pursuing the development of a Natural Community Conservation Plan (NCCP). As noted above, it is possible that some of the park and open space units may be called upon to provide important habitat elements for meeting the NCCP and/or General Plan objectives for conservation. The considerations in this section are important in this context.

4.1 Biological Diversity at Regional Scales

A basic conservation question pertains to the natural biological diversity patterns in the landscape: in a general sense, where in the County occur the natural highs and lows of species richness, or of habitat structural diversity, or of other measures of biological richness? One answer to this question would be suggested by the occurrences of "sensitive" species in Yolo County; however, there is reason to believe that observer sampling patterns for such "heritage" species have not been particularly thorough, so that the observed occurrences of "heritage" species may not reflect the actual distribution patterns or abundances of those species in Yolo County (that is, knowledge about the distributions of those species may be incomplete). In addition, while uncommon species are an important element of the native biodiversity in Yolo County, such "heritage" data are not an unbiased estimate of the distribution of most plant and wildlife species. For valid ecological reasons, the vast majority of species are <u>not</u> "uncommon" throughout most of their ecological distributions. Biodiversity protection is increasingly recognized as requiring a second, complementary approach to identifying and protecting species and their habitats, an approach that relies on maintaining the ecological patterns that support a broad range of plant and wildlife species, in addition to an approach that addresses measures of "rarity."[17] Applying

16 A discussion of environmental and conservation concerns for County park and open space units can be found in a preliminary version of this appendix prepared as part of the Parks & Open Space Master Plan project: Existing Conditions and Resources Assessment report; Attachment C – Conservation Planning Considerations (November 2004).

17 Landscape-scale conservation planning is focused on maintaining ecosystem processes, or on maintaining ecological functions at a landscape scale. An underlying presumption in conservation biology is that maintaining the ecological processes that support the majority of species can prevent their becoming "rare" and thus a potential subject for the laws that protect "heritage" species. Maintaining ecosystem functions is also a key requirement for maintaining

this approach begins with a consideration of existing patterns of species commonness; that is, this approach begins by looking at the "normal" distribution of abundances of species.

In 2003 the California Department of Fish and Game (CDFG) published a useful summary of biological diversity information for the State of California that illuminates the relative importance of various parts of the state for biodiversity (CDFG 2003a), based on an abstraction of data compiled by the Jepson Herbarium, the California Native Plant Society, the CDFG's Natural Diversity Data Base, and the Wildlife Habitat Relationships database regarding the geographical occurrences of plants and wildlife. Selected results for Yolo County are abstracted in the Table 7.

Table 7. Comparison of Biological Diversity Elements between Western Yolo County and Eastern Yolo County.

Group	Blue Ridge/Rocky Ridge and Terraces [A]	Bajada and Basins [A]
Plant Species	1409 - 1705	719 - 838
Amphibian Species	11 - 17	4 - 6
Reptile Species	19 - 25	6 - 11
Bird Species (Summer)	109 - 127	91 - 108
Bird Species (Winter)	118 - 143	144 - 187
Mammal Species	40 - 47	22 - 39

Notes

A It is unclear whether species associated with riparian corridors or other habitats adjacent to the Sacramento River and other watercourses are included in the species counts for either area. For reasons summarized below, this assessment presumes that species associated with riparian habitats are included in the CDFG data for the two regions considered. The association of riparian-related bird species with habitats that were historically more common in the eastern part of Yolo County appears to be a partial exception to the general pattern described by these data (see below).

The patterns of species occurrence data were aggregated by CDFG according to the report authors' interpretations of landscape-level biological processes in California; the authors' interpretations reflect their perceptions of natural landforms and biogeographic regions in the state, including Yolo County. The center column in Table 7 reflects the diversity in the identified taxonomic groups that occurs in the western mountain and foothill regions in Yolo County, including the Blue Ridge/Rocky Ridge crest, the front ranges farther east in the County, and the TEHAMA FORMATION terraces and the Dunnigan Hills. The right column reflects diversity in the flatter, agriculturally dense lands east of the mountains, including the bajada[18] east of the foothills as well as the wetland basins and the Yolo Bypass near the Sacramento River.

---

viable populations of the "heritage" species in habitat areas set aside for their protection. See Meffe and Carroll 1994 and Noss and others 1997 for additional considerations.

18 A "bajada" is a coalesced alluvial fan at the base of a mountain range. For Yolo County, the bajada is the interwoven alluvial fans of Cache Creek, Cottonwood Creek, Chickahominy Slough, and Putah Creek, as well as the sediment deltas of smaller streams at the eastern base of the Coast Range. See JSA (1996) for mapping results that confirm this determination.

The basic taxonomic richness in the western mountains is substantially greater, across taxa, than the richness in the eastern part of the County. The primary exception occurs with wintering bird species, which are considered further below. Except for birds, the observed taxonomic richness in the western foothills and mountains is two or three times the richness in the eastern basins. This result is quite important from a regional conservation planning perspective; it suggests that conservation planning in Yolo County (and in the Central Valley and in the Coast Range) could be focused preferentially on these mountainous western regions, because that is where the majority of the native species richness occurs.

There is a biologically coherent explanation for this pattern. Western Yolo County is included in the CDFG (2003a) maps for oak woodlands and chaparral (the entire mountainous west) and native grasslands (the Dunnigan Hills), but none of these important natural community or habitat types is mapped in the eastern part of the County. Oak woodlands are widely identified as being among the most important habitat types for wildlife in California (see, for instance, CalPIF 2002), and chaparral and grassland habitats are also considered to be important in preserving the state's native flora and fauna (CalPIF 2000, 2004). Two of the generally accepted relationships from the past 50 years of ecological studies indicate that species richness is positively correlated with both the range of habitat conditions available and habitat structural complexity (Mayer and Laudenslayer 1988, many others), although a complete explication of these relationships is beyond the scope of this report. The structural complexity of the woodland and chaparral habitats in the western part of the County, as well as the range of habitat conditions there, are substantially greater than in the eastern two-thirds of the County.

The "flatlands" in the central and eastern parts of the County are not without important habitat values. These lands include mapped vernal pool complexes, for example, which are absent from the mountainous areas to the west.[19] The wetland areas in the eastern part of the County also provide important habitat values for wintering waterfowl, shorebirds, and cranes, part of a regionally significant wintertime concentration area for wetland-related birds (CalFed 2000).

One important pattern that does not fit very well within the contrast set up in Table 7 is the pattern of native fish diversity associated with watercourses. The Sacramento River and the east-west oriented Cache Creek watershed were mapped by CDFG (2003a) as regionally important native fish habitats (with 15–21 species and 11–14 species, respectively). Moyle [1999 (included in this report as Attachment B); also see the regional habitat-based discussion in Moyle 1996] described the Cache Creek basin as "including most of the fish that inhabit Central California;" the basin lacks large impoundments between Clear Lake and the Sacramento Delta, which may have allowed many native fish populations in the basin to persist, even given the

19 While the County's vernal pools are primarily found in the eastern part of the County at the present time, CDFG mapped vernal pools north of Winters and west of Woodland, in an area identified in JSA (1996) as having potential natural vegetation that included seasonal wetlands; under appropriate physical conditions, vernal pools also may occur in the western part of the bajada region.

hydrological alterations associated with agricultural water uses in Yolo County. From a conservation perspective, the native fish species richness in the Cache Creek basin is one of the more significant region-scale facts about Yolo County; no other tributary stream basin in the Central Valley shows such a high diversity of native fish species.

The CDFG (2003a) map portraying riparian habitat areas includes narrow corridors along the Sacramento River, Putah Creek, and Cache Creek; the map also includes smaller areas of mapped riparian habitat along the eastern margins of the Yolo County foothills at the inland edge of the Coast Range, including Enos Creek, Chickahominy Slough, Cottonwood Creek, Buckeye Creek, and other foothill streams in the western part of the County. The map does not include the existing narrow riparian corridors along Willow Slough, Dry Slough, and other creeks in the central and eastern parts of the County. All of this riparian habitat is classified by the Department as "Valley Foothill Riparian," which is the habitat type designation used in the CWHR classification (CDFG 2002) for all Central Valley riparian habitats. In a sense, while this designation indicates the general importance of this habitat type, it does not adequately indicate whether the habitat values vary geographically (which they do, substantially). CDFG's (2003a) existing mapping indicates that this habitat type is distributed throughout Yolo County, and that its value as habitat is also broadly distributed throughout the County.

Riparian habitat is well established as a significant habitat for wildlife species of many varieties:

> "More than 225 species of birds, mammals, reptiles, and amphibians depend on California's riparian habitats. Riparian ecosystems harbor the most diverse bird communities in the arid and semiarid portions of the western United States (references omitted). Riparian vegetation is critical to the quality of in-stream habitat and aids significantly in maintaining aquatic life by providing shade, food, and nutrients that form the basis of the food chain (references omitted). Riparian vegetation also supplies in-stream habitat when downed trees and willow mats scour pools and form logjams important for fish, amphibians, and aquatic insects. The National Research Council (2002) concluded that riparian areas perform a disproportionate number of biological and physical functions on a unit area basis and that the restoration of riparian function along America's waterbodies should be a national goal.
>
> "Riparian vegetation in California makes up less than 0.5% of the total land area, an estimated 145,000 hectares (reference omitted). Yet, studies of riparian habitats indicate that they are important to ecosystem integrity and function across landscapes (references omitted). Consequently, they may also be the most important habitat for landbird species in California (reference omitted). Despite its importance, riparian habitat has been decimated over the past 150 years. Today, depending on bioregion, riparian habitat covers 2% to 15% of its historic range in California (references omitted).
>
> "Due to their biological wealth and severe degradation, riparian areas are the most critical habitat for conservation of Neotropical migrants and resident birds in the West (references omitted). California's riparian habitat provides important breeding and over wintering grounds, migration stopover areas, and corridors for dispersal (references omitted). The loss of riparian habitats may be the most important cause of population decline among landbird species in western North America (reference omitted)." – RHJV (2004)

It should be noted with respect to bird use of riparian habitats that there is a well-known change in use by "migrant" species between the breeding season in spring and summer and use during the winter. Most of the "Neotropical migrants" that are present during the breeding season are absent in the winter, and a different complement of "winter migrant" bird species is encountered then (in addition to resident species that are present in all seasons). Studies in the Central Valley (e.g., Hehnke and Stone 1979, Motroni 1979, Gaines 1980) have indicated that the absolute numbers of wintering riparian birds may equal or even exceed the numbers present in the breeding season. The combination of this seasonal exchange in the avifaunal use of riparian habitats and the wintertime appearance of shorebirds and waterfowl in wetlands in the Yolo Bypass appears likely to be the underlying ecological reason for the relative importance of the central and eastern parts of Yolo County for wintering birds shown in Table 7 above.

4.2 Landscape-Scale Conservation Planning

While many conservation programs (including the NCCP process now underway in Yolo County) have focused to a significant degree on sensitive species, conservation biologists have recognized certain potential disadvantages in such approaches, which are identified in a general sense as "heritage programs" (including the CNPS and CNDDB database programs). Heritage programs have some inherent limitations for biodiversity planning: they are often focused on rarity and on small, mappable locations. This focus does not always work when dealing with elements that are not limited to small, mappable locations, such as large-carnivore home ranges and other conservation elements that have large-area requirements (Noss and Cooperrider 1994). Also, as noted by Noss and Cooperrider, such programs work through "successive approximations," which suppose that surveys are being conducted in various parts of the landscape over time, so that, eventually, the entire landscape will get adequate coverage. The intermittent coverage of sensitive species in the USGS quadrangles that include the Yolo County park and open space units suggests that the limitation of the "heritage program" approach described by Noss and Cooperrider is operating in Yolo County.

The alternative to the heritage planning approach is a "landscape-level" conservation planning approach. This approach has evolved from a relatively recent scientific innovation called "landscape ecology" (Forman and Godron 1986, Forman 1997), which addresses "landscape-scale" ecological processes. Included among these would be questions concerning the conservation of environmental resources that are only noticeable at scales larger than small, mappable occurrences, such as the use of the landscape by mountain lions or bears, or the sub-population interactions of patchily distributed sensitive plant or butterfly species. Landscape ecology is concerned with the *spatial distribution of the ecological elements* that have conservation interest, as well as with the maintenance of *spatially based ecological processes* that support the elements of conservation interest. While a complete explication of the application of landscape ecology to conservation in Yolo County is beyond the scope of this report, elements of a possible landscape-scale application to Yolo County conservation planning can be summarized relatively easily.

The basic element in a landscape-scale conservation approach is a "network" of lands that are managed for conservation purposes. The central features of these conservation networks are "core areas," generally known as "reserves," which are often areas with high value in protecting biodiversity; such areas might demonstrate locally high densities of several sensitive species, or they might be areas with the highest regional densities of a variety of species, such as the mountains in western Yolo County. The core reserve areas are buffered from adverse effects by having additional areas adjacent to the reserves in which land uses may be authorized that have more intense effects on the protected resources; these areas are often identified in conservation plans as "multiple-use areas," or sometimes as "buffer areas." The landscape generally also includes areas that are not specifically protected for biodiversity-maintenance purposes, although maintaining potential habitat utilities in these areas remains important from a conservation perspective; these areas are often identified as the "matrix" in which the conservation network is embedded.

Conservation planning at a landscape level needs both "reserves" and "multiple-use areas." These areas work in concert in a landscape perspective, with the reserve areas providing habitat and the multiple-use areas providing buffering as well as other uses of the land. A widely known landscape-scale conservation model begins with "Multiple Use Modules," or MUMs (Noss and Harris 1986). This model uses core reserves to encompass "biodiversity hotspots." Core areas are linked by corridors. Core areas and linkages are protected with layers of multiple-use buffers in which the intensity of potentially damaging land uses increases with distance away from the core, and protection of ecological processes decreases with distance away from the core. The buffers are embedded in a "matrix" of general-use lands (Figure 1).

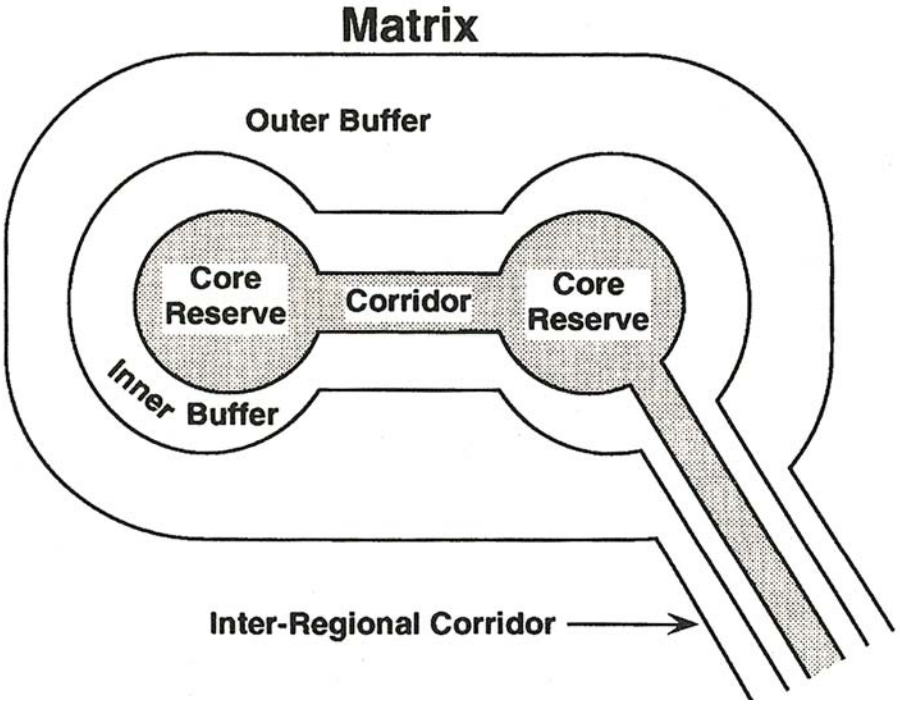

Figure 1. The "Multiple Use Module" concept pioneered by Reed Noss and Larry Harris for building conservation networks in landscapes that have areas with high conservation value in a "working landscape matrix." See text for additional discussion and Noss and Harris (1986) for a complete explanation.

"Core reserve" selection is an important step in designing landscape-level conservation networks. Noss and Cooperrider (1994) offered the following "empirical generalizations for reserve design:"

"1. Species well distributed across their native range are less susceptible to extinction than are species confined to small portions of their range.

"2. Large blocks of habitat containing large populations of a target species are superior to small blocks of habitat containing small populations.

"3. Blocks of habitat close together are better than blocks far apart.

"4. Habitat in continuous blocks is better than fragmented habitat.

"5. Interconnected blocks of habitat are better than isolated blocks, and dispersing individuals travel more easily through habitat resembling that preferred by the species in question.

"6. Blocks of habitat that are roadless or otherwise inaccessible to humans are better than roaded and accessible habitat blocks."

An important concept in the landscape-level approach is "connectivity," which involves the ability of the landscape to support the movement and interchange of individuals among population segments of species of conservation interest. In some ways this is

more a function of matrix permeability than it is of discrete corridors or linkages, although conservation plans usually include corridors or linkages. Linkages, or "connectivity," on a landscape scale is an important conservation topic, since linkages may be associated with adverse effects (e.g., because of enhanced disease transmission) as well as positive effects. Part of the importance of considering landscape linkages is that it leads to identifying natural connections across landscape elements.

At a conference held in San Diego, CA, in 2000, conservation biologists from around the state identified known or expected biological or conservation linkages in areas in which they worked. [20] An excerpt from the resulting statewide linkages map is shown in Figure 2. The general opinion among conservation biologists was (and remains) that Putah Creek and Cache Creek are important east-west landscape linkages. A north-south linkage corridor was identified along the Blue Ridge/Rocky Ridge crest. An additional north-south linkage was identified in the lower foothills/terraces, at the margin of the Central Valley flatlands.

The linkages illustrated in Figure 2 serve two broad purposes. First, the linkages were selected, in part, to interconnect relatively large areas of publicly owned land, such as the BLM lands in western Yolo County. The second purpose was to illustrate and support migration routes among important wildland habitats regardless of ownership. The mountainous regions of western Yolo County were recognized as significant wildland habitats which also served to link similar habitats to the north and south. Putah Creek and Cache Creek were recognized as important connections from the Coast Range to the Sacramento River corridor, and additional linkages were identified between the Sacramento River and the Sierra Nevada foothills. In any landscape-level conservation model for Yolo County these linkages would need serious consideration, together with a designated corridor along the Sacramento River.

The "linkages" provided by riparian habitat corridors along major streams are considered by many landscape ecologists to be among the most important elements in landscape-level conservation plans. For example, a major USDA Forest Service study addressing wildlife habitat values in the Blue Mountains of Oregon (Thomas 1979) included the following conclusions: "riparian zones are the most critical wildlife habitats in the Blue Mountains;" "riparian zones are the most critical zones for multiple use planning in the Blue Mountains;" and "riparian habitat alterations will affect wildlife far more than indicated by the proportion of the total area." The Blue Mountains report noted that 285 of the 378 terrestrial wildlife species (75 percent) in the Blue Mountains either depended on riparian zones or used them more than other habitats. Similar results have been reported from numerous other studies of riparian ecosystems.

20 The resulting publication, with maps that can be downloaded as JPG files, is located at URL: http://www.calwild.org/resources/pubs/linkages/.

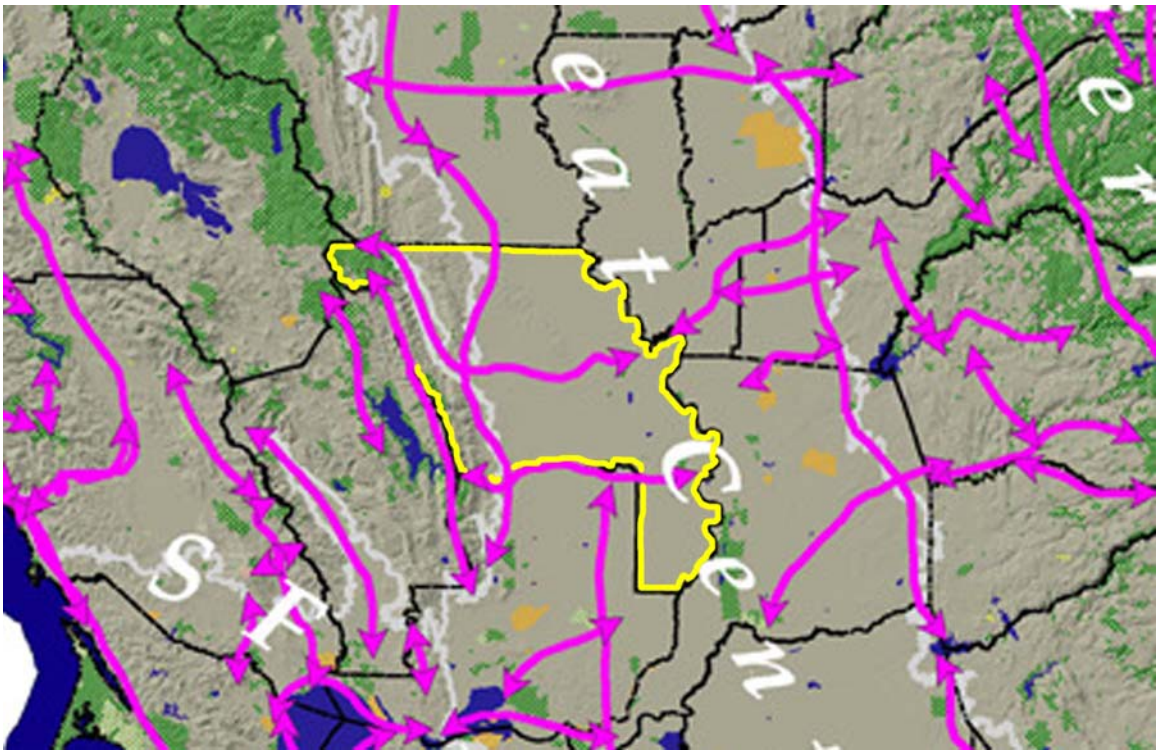

Figure 2. Excerpt from the "Statewide Linkages Map," showing Yolo County (yellow boundary) and the landscape-scale linkages (pink arrows) that exist in and near the county. Mapped county linkages include Putah Creek, Cache Creek, the Blue Ridge / Rocky Ridge axis, and a foothill woodland corridor. An additional corridor (not mapped) is the Sacramento River and its riparian corridor.

Riparian ecosystems are sensitive to the hydrological dynamics of the adjacent streams or rivers, because riparian habitat is functionally affected by inadequate streamflow (Winter and others 1998, NRC 2002). Landscape-level conservation plans typically include considerations about watershed management [such as the Willow Slough Watershed IRMP (JSA 1996)]; in Yolo County such a plan would also need to include water-supply considerations, inasmuch as both Cache Creek and Putah Creek are hydrologically affected by water-supply management requirements. For the Cache Creek linkage corridor, the linkage elements in the conservation plan would also need to address other hydrologically focused questions, such as floodplain management.

The size of the area that is necessary for landscape-level conservation planning is an important consideration for any planning effort, including Yolo County's Parks and Open Space Master Plan. The minimum scale for landscape-level conservation planning is conceptually related to "the smallest area in which all of the processes that affect the landscape recur" with a frequency that maintains the elements. This is functionally the "minimum dynamic area" of Pickett and Thompson (1978) and Pickett and White (1985), which includes disturbance regimes (such as fire) as well as the landscape areas through which matter and energy cycle (such as watersheds). Typically the area that is needed is much larger than the average disturbance patch; an appropriate focus of the landscape-scale conservation plan is to perpetuate the

natural disturbance regime (Baker 1992), and the "minimum dynamic area" may be larger than the 40,000± acres that burned in the Rumsey fire in October 2004.

In landscape-level conservation planning, suitable management elements for the core reserves and the multiple-use buffer areas must be identified that accomplish the plan's goals (often some consideration will be given, as well, to "matrix" areas near the buffers). Table 8 provides an example of a set of management guidelines (modified from Noss 1993) for a conceptual conservation plan.

Table 8. Conceptual Landscape-Level Conservation Plan Guidelines. [A]

Core Reserves:
No new road construction or reconstruction.
Close all pre-existing roads other than major highways; restore roadbeds to prior conditions. Reduce overall road density under 0.5 miles road / square mile of reserve.
No off-highway vehicles (including bicycles).
No horses (they introduce exotic species).
No mineral or energy leasing.
No logging or other commercial extraction of plants or biological materials.
No commercial extraction of other natural objects.
Limited grazing and agricultural activities in association with habitat management.
Eliminate exotic species.
Limit fire suppression.
Recreational activities such as hiking, primitive camping, nature study, environmental education, non-motorized restoration of degraded areas, and non-manipulative research may be encouraged.
Eliminate inholdings.
Multiple-use Buffer:
Limit new road construction to those consistent with protecting core reserve environmental resource values. Reduce or maintain overall road density under 1.0 miles road / square mile of buffer land.
No motorized off-high vehicles on public land.
Protect environmentally sensitive resources, particularly riparian areas, oak woodlands, and habitats for sensitive species.
Vegetation manipulation, including grazing, logging, or other extractive activities, must be consistent with restoration and management goals for protecting core reserve environmental resource values.
Restore degraded areas and eliminate exotic species.
Develop criteria to avoid detrimental edge effects.
Manage fire suppression to be consistent with protecting core reserve environmental resource values.
Recreational activities, including hiking, low-impact camping, nature study, environmental education, non-motorized restoration of degraded areas, and non-manipulative research are encouraged.
Eliminate inholdings, or establish easement restraints over inholdings.

Matrix Near Buffer:
Require sustainable resource management approaches, including those for agricultural and timberland management.
Protect environmentally sensitive resources, particularly riparian areas, oak woodlands, and habitats for sensitive species.
Restore degraded areas.
Eliminate exotic species.

A Modified from Noss (1993).

5.0 SUMMARY OF CURRENT ENVIRONMENTAL CONDITIONS AT EXISTING PARK UNITS

Existing environmental conditions vary considerably among the park units, including conditions that are related to conservation concerns. Some units, particularly those with larger areas in more remote locations, provide a substantial degree of natural habitat conditions and interest from a conservation perspective. Others, particularly those in urban settings, provide relatively few natural habitat conditions and are unlikely to contribute significantly to the County's conservation goals.

The following brief descriptions summarize the results of reconnaissance-level field observations conducted for the Master Plan preparation process.

5.1 Cache Creek Canyon Regional Park

The developed areas within the Cache Creek Canyon Regional Park are located in the "inner gorge" of Cache Creek, which the creek has cut through time into the "country rocks" of the GREAT VALLEY FORMATION (see Section 3.1). This unit includes extensive upland areas that are soil-mantled slopes of this material (Figure 3). The existing developed areas are located on at least two sets of river terrace deposits, which are composed of stream-deposited sediments, generally less than 10,000 years old, that are no longer part of the active channel or floodplain. These terraces may reflect prior climatological patterns and higher runoff flows (and thus a greater capacity for sediment movement) than exists today. There are large areas of colluvial debris accumulation near the bases of mountain slopes, and some areas where the "toes" of the slopes have been eroded by Cache Creek, resulting in slope failure. Some of the steeper slopes and cliffs in this unit are barren exposures of GREAT VALLEY FORMATION rock outcrops. The Cache Creek stream course is generally located within a floodplain composed of recent alluvial material, most of which is periodically reworked by the stream during wintertime periods of high streamflow.

The terraces near Cache Creek and the lower hillslopes near the creek provide extensive areas of foothill woodland, an important habitat type for wildlife. "Foothill woodland" is a descriptive name for habitats dominated by a mixture of blue oak (*Quercus douglasii*), foothill pine (*Pinus sabiniana*), and a variety of other woody species in a habitat matrix that includes trees and shrubs above an ***Annual Grassland*** ground cover. This habitat type includes mixtures of habitat types identified in the California Wildlife Habitat Relationships database, including ***Blue Oak Woodland***, ***Blue Oak—Foothill Pine***, and limited areas of ***Valley Oak Woodland***.

Other important plant species in this habitat type include valley oak (*Q. lobata*) in valley bottoms, interior live oak (*Q. wislizenii*) on moister slopes and near streams, California buckeye (*Aesculus californica*), wedge-leaf ceanothus (*Ceanothus cuneatus*), toyon (*Heteromeles arbutifolia*), birch-leaf mountain-mahogany (*Cercocarpus betuloides*), and (variably) other species that occur in plant series with which the

foothill woodland intergrades. The ground cover in foothill woodlands is typically dominated by naturalized Eurasian annual grasses.

Cache Creek Canyon Regional Park provides a relatively intact corridor of ***Valley Foothill Riparian*** habitat, dominated by sandbar willow (*Salix exigua*), Pacific willow (*S. lucida* ssp. *lasiandra*), Fremont cottonwood (*Populus fremontii*), and other woody species, located near the stream margin but also occupying low terraces near the creek (although this has been affected by recreational uses near the existing campground and picnic areas). This riparian corridor, together with Cache Creek itself, forms an important biological linkage between the Central Valley and the upper Cache Creek watershed in the interior Coast Range.

The park also has areas of ***Mixed Chaparral*** at higher elevations, dominated in a patchy fashion by chamise (*Adenostoma fasciculatum*), wedge-leaf ceanothus, white-leaf manzanita (*Arctostaphylos viscida*), toyon, birch-leaf mountain-mahogany, and leather oak (*Quercus durata*), with a variety of other species also present. The overall habitat mixture in the Cache Creek Canyon Regional Park demonstrates a mosaic pattern characteristic of fire-prone landscapes.

Figure 3. Cache Creek Canyon Regional Park. Cache Creek is at lower right, at the location of the Lower Picnic Area. Habitats present include foothill woodland in middle distance, chaparral and annual grassland on hillslopes in background, and valley foothill riparian in a narrow corridor along Cache Creek.

This park presents a significant diversity of wildlife species, owing to its location within the Coast Range, as well as to its habitat diversity. The environmental importance of the Cache Creek Canyon Regional Park, however, is derived from the combination of its large size, the presence of ecologically significant oak woodland and riparian habitat types, and the Park's role in providing ecological linkages within the watershed and the interior Coast Range.

Existing records in the California Natural Diversity Data Base (CNDDB) indicate occurrences of five elements within the 7.5-minute USGS quadrangle that includes Cache Creek Canyon Regional

Park (Table 9). It does not appear that any of these known occurrences lie within the park; however, it is unclear that detailed ecological inventory studies have ever been conducted for the park, and it is uncertain whether these species, or other species that are considered environmentally sensitive pursuant to state or federal law, are absent from the park. The occurrence records indicate that there is a potential that any or all of the identified species may occur within the park.

Table 9. CNDDB Sensitive Species in the Glascock Mountain 7.5-minute Quad.

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT/--/--/--
Falco mexicanus	Prairie falcon	--/--/SC/--
Fritillaria pluriflora	Adobe-lily	--/--/--/1B
Layia septentrionalis	Colusa layia	--/--/--/1B
Rana boylii	Foothill yellow-legged frog	--/--/SC/--

Notes:
FT Listed as "Threatened" under the federal Endangered Species Act
SC Listed as a "Species of Special Concern" by the State of California
1B Listed by the California Native Plant Society as "Rare, Threatened, or Endangered in California and Elsewhere"

The CNPS inventory data for the same USGS quad are shown in Table 10. Both of the sensitive plant species identified in the CNPS Inventory are also identified in the CNBBB inventory.

Table 10. CNPS Online Inventory Listing for Glascock Mountain 7.5-Minute USGS Quad.

Taxonomic Name	Common Name	Family	CNPS List
Fritillaria pluriflora	Adobe-lily	Liliaceae	List 1B
Layia septentrionalis	Colusa layia	Asteraceae	List 1B

Notes
List 1B Plants Rare, Threatened, or Endangered in California and Elsewhere

The relative scarcity of sensitive-species occurrence information for this park unit, when compared to the dense set of observation data farther east in Yolo County, suggests that there have been few systematic survey efforts for sensitive species in this area.

Cursory field observations identified the presence of two Audubon "watch list" species in the habitats of this unit: Nuttall's woodpecker (*Picoides nuttallii*) and oak titmouse (*Baeolophus inornatus*). It is considered likely that other species from this list occur in this unit [e.g., wrentit (*Chamaea fasciata*)], and several species that are included in the state's list of "special concern" species are also considered likely to occur in the habitat in this unit occasionally [e.g., golden eagle (*Aquila chrysaetos*); see Section 4.2].

5.2 Camp Haswell Park

Camp Haswell Park represents a wide river terrace surface located inside a bend in Cache Creek, at the head of the Capay Valley where the stream gradient begins to flatten and the sediment transport ability of the stream decreases. Cache Creek also is associated with recent, frequently reworked channel deposits below the terrace surface.

This park unit provides habitat values similar to those available in the Cache Creek Canyon Regional Park and the Otis Ranch Open Space Park, with which Camp Haswell is closely associated geographically. The small size of this unit limits the overall intrinsic environmental value of the park. The residual terrace habitat is open ***Blue Oak—Foothill Pine*** (foothill woodland) habitat that has manzanita, toyon, and other chaparral species intermixed with blue oak, interior live oak, and foothill pine.

The principal habitat value in the Camp Haswell Park is associated with the ***Valley Foothill Riparian*** habitat corridor located near Cache Creek and on low terraces near the creek. Important species in this habitat type include sandbar willow, button bush (*Cephalanthus occidentalis*), Pacific willow, white alder (*Alnus rhombifolia*), and Fremont cottonwood. The riparian habitat in the Camp Haswell Park contributes to the linear habitat feature that forms an important ecological linkage feature in the Yolo County landscape. An environmental resource management concern for the Camp Haswell Park results from the presence of abundant tamarisk (primarily *Tamarix parviflora*) in the riparian corridor adjacent to this park.

5.3 Otis Ranch Open Space Park

The Otis Ranch Open Space Park property includes primarily a set of mountain elements of the GREAT VALLEY FORMATION. The unit's "panhandle" crossing Cache Creek includes parts of at least one set of river terraces, as described for the Cache Creek Canyon Regional Park unit, with recent alluvial channel deposits associated within the creek's narrow floodplain.

The Otis Ranch Park unit shares many of the ecological values identified previously for the Cache Creek Canyon Regional Park. However, the Otis Ranch property covers a greater elevation range than occurs in the Cache Creek Canyon Regional Park, potentially increasing the range of habitats present. The large size of this property and the linkage that it provides to natural habitats on public lands both north and south of Cache Creek enhances its environmental resource value.

The occurrences of known elements in the Glascock Mountain 7.5-minute USGS quad were previously reported for Cache Creek Canyon Regional Park.

5.4 Vernon A. Nichols Park

Vernon A. Nichols Park includes a large area of Cache Creek terrace, a generally level, elevated plain above the level of the active creek channel. The park also includes an area of active creek channel and floodplain complex. The recent erosion of a part of

the terrace north of Road 57 represents the sorts of geomorphological dynamic events that are associated with land areas near active stream channels. The Cache Creek channel location currently is farther west on the northern side of the Road 57 bridge than it was historically, and farther east south of the bridge. This park appears to include a substantial area of the Cache Creek floodplain, but it is uncertain whether the County's floodplain ownership is above or below the Road 57 bridge.

Much of the terrace surface within the park is planted with annual grasses, most of which do not remain green through the Capay Valley summer. This part of the park provides little environmental resource value.

The park includes a narrow ***Valley Foothill Riparian*** habitat fringe along the eastern margin of the terrace, as well as a part of the Cache Creek floodplain below the terrace. The riparian habitat within the park is composed mostly of sandbar willow, with some Fremont cottonwood. The floodplain adjacent to the terrace (south of the bridge) is mostly unvegetated sediment, but already has a cover of tamarisk and giant reed (*Arundo donax*). As with the other Yolo County parklands that include the Cache Creek channel, floodplain, and riparian habitat, these occurrences are ecologically important within the region, serving to maintain a biological linkage at a landscape scale.

The bank erosion and channel migration at this park changed habitat conditions. The newly created floodplain east of the creek, north of the Road 57 bridge (which may no longer be County-owned), is in early stages of developing a vegetation cover of willows and cottonwoods. The groins and willows installed as part of the bank stabilization have also trapped sand that has developed a cover of sandbar willow and a variety of herbaceous species. [This area does have habitat value, even in its current state; during field work a rubber boa (*Charina bottae*) was observed in this sparsely vegetated habitat. This species has an affinity for rocky areas, and the rip-rap placed as part of the groins may be an important habitat feature.] A revegetation effort at the top of the bank stabilization area is beginning to provide significant cover as well.

Existing occurrence records for the USGS 7.5-minute quad that includes the Vernon A. Nichols Park are listed in Table 11. The existing CNDDB records do not appear to have come from the park, but the park does have several large elderberry shrubs that are identified by signs in the park as valley elderberry longhorn beetle habitat.

Table 11. CNDDB Sensitive Species in the Guinda 7.5-minute Quad.

Scientific Name	Common Name	Federal/ California/ DFG/CNPS
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT/--/--/--
Riparia riparia	Bank swallow	--/CT/--/--

Notes
FT Federal Threatened
CT California Threatened

The California Native Plant Society online database includes no records of sensitive species occurrence for the Guinda 7.5-minute USGS quadrangle.

5.5 Capay Open Space Park

Capay Open Space Park consists of approximately 41 acres bisected by Cache Creek; the area was dedicated to the County for public use as part of an aggregate mining company's development permit issued in 2002. Adjacent areas were mined for aggregate resources and subsequently reclaimed. The natural relationship between the valley-floor river terrace and the active channel in this general reach of Cache Creek has been obscured by gravel mining operations; reclamation, however, has resulted in the construction of a clearly marked channel margin and the restoration of a floodplain within the active channel area. The park unit includes the active floodplain as well as uplands on both sides of the creek.

These areas have limited habitat value under current conditions, but the habitat values in this park will increase through time as the site's biological communities develop. The site's approved Master Plan includes developing "oak savanna" conditions north of a riparian restoration element along the terrace margin in which riparian tree species have been placed. In the future this area will be improved with a parking area, trails, an education pavilion, and other amenities.

The park includes an area on the south side of Cache Creek that has existing riparian vegetation, primarily willows (*Salix* spp.) and cottonwoods (*P. fremontii*), as well as an active channel area as much as 500 feet wide that is currently only marginally vegetated gravel bars. The Cache Creek Conservancy recently treated the area to curtail the dominance of tamarisk and giant reed. The treated area is developing a scattered cover of young willows and cottonwoods, but remains largely unvegetated at the present time (fall 2004).

The plan for the Capay Open Space Park includes enhancing the environmental resource values. The development of mature riparian vegetation on both sides of the stream will enhance the ecological linkage values of this park unit in the larger biogeographic context of the Cache Creek basin. In addition, the development of riparian forest on the site will increase the habitat value of this site for riparian-associated wildlife species.

The CNDDB occurrences for the 7.5-minute USGS quad that includes the Capay Open Space Park are identified in Table 12. The CNDDB records do not indicate an occurrence of these species within the park; the records do indicate that these species occur in the vicinity and could occur within the park.

Table 12. CNDDB Sensitive Species in the Esparto 7.5-minute Quad.

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Buteo swainsoni	Swainson's hawk	--/CT--/--
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT/--/--/--

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Riparia riparia	Bank swallow	--/CT/--/--

Notes:
FT Federal Threatened
CT California Threatened

The California Native Plant Society online database includes no records of sensitive species occurrence for the Esparto 7.5-minute USGS quadrangle.

5.6 Knight's Landing Boat Launch

The Knights Landing Boat Launch site is located on recent alluvial sediments deposited by the Sacramento River and by Cache Creek.[21] The geomorphological setting is less clear; however, it appears that the levees and the channel on which the park unit is located are both historically constructed features.

This site is largely occupied by a paved parking area and the boat ramp, uses that have little environmental resource value. This site does, however, have a narrow vegetated strip between the parking lot and the adjacent County roadway, which is best identified as ***Valley Foothill Riparian*** habitat. The site immediately adjoins an area of state-owned land with substantial habitat of this type; the quality of the habitat on the state-owned land and the proximity of the vegetation within the two adjoining parcels increases the habitat value on the County-owned land.

The riparian forest on the state-owned land has a multi-layered vegetation structure, with an overstory dominated by Fremont cottonwoods, valley oaks, black walnuts (*Juglans californica*), and large Goodding willows (*Salix gooddingii*). Epiphytic wild grape (*Vitis californica*) is abundant. A second, shorter tree stratum includes Oregon ash (*Fraxinus latifolia*) and boxelder (*Acer negundo*). A shrub layer exists in areas with a canopy open enough to allow light to reach the ground; Himalayan blackberry (*Rubus discolor*), grape, and blue elderberry (*Sambucus mexicana*) are significant species present. The habitat structure on the adjacent CDFG-managed lands is suitable for a variety of riparian-associated songbirds and other wildlife.

Species records from the California Natural Diversity Data Base for the 7.5-minute USGS quadrangle that contains the Knight's Landing Boat Launch (Table 13) include records for species that could occur within this park (particularly Swainson's hawk and VELB). The descriptions of the existing records in the CNDDB database do not indicate that these observations came from this site, however.

Table 13. CNDDB Sensitive Species in the Knight's Landing 7.5-minute Quad.

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS

21 Knight's Landing Ridge is apparently an elevated sedimentary feature deposited by overbank flows from Cache Creek when it formerly occupied a location near Knight's Landing.

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Agelaius tricolor	Tricolored blackbird	--/--/SC/--
Buteo swainsoni	Swainson's hawk	--/CT--/--
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT/--/--/--
Hibiscus lasiocarpus	Rose-mallow	--/--/--/2
Riparia riparia	Bank swallow	--/CT/--/--
Thamnophis gigas	Giant garter snake	FT/CT/--/--

Notes
FT Federal Threatened
CT California Threatened
FC Federal Special Concern
SC California Special concern
CNPS 2 Plants Rare, Threatened, or Endangered in California, but more common elsewhere

The CNPS inventory data for the same USGS quad includes the same plant species identified in the CNDDB database (Table 14).

Table 14. CNPS Online Inventory Listing for Knight's Landing 7.5-Minute USGS Quad.

Taxonomic Name	Common Name	Family	CNPS List
Hibiscus lasiocarpus	Rose-mallow	Malvaceae	List 2

Notes
List 2 Plants Rare, Threatened, or Endangered in California but more common elsewhere

The riparian habitat present on the adjoining state-owned land is the preferred habitat type for several of the bird "species of special concern" identified by CDFG, including sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperi*), willow flycatcher (*Empidonax traillii*), yellow warbler (*Dendroica petechia*), and yellow-breasted chat (*Icteria virens*). Habitat of this type is required by the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), a federal "candidate" species.

This habitat is also potentially useful for at least three species on the Audubon Watchlist: Nuttall's woodpecker (*Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), and yellow-billed magpie (*Pica nuttalli*)

5.7 Elkhorn Regional Park

The geological origin of Elkhorn Regional Park is like the origin of the Knight's Landing Boat Launch; the Park is located on recent alluvial sediments deposited by the Sacramento River. The existing levees adjacent to the County road and the railroad appear not to be the first levees at this location, since the "mound" along the edge of the Sacramento River within this Park unit resembles levees more than any non-constructed feature. This park unit thus appears to be located on a feature that may have been "culturally" modified, and all of the environmental values of the unit

represent a "secondary" development of valuable habitat conditions rather than a remnant of "pre-settlement" habitat.

This park provides substantial environmental values. The park offers high-quality riparian forested habitat along the Sacramento River, in the context in which this habitat type occurred in pre-settlement times. The lands within the park (including the "mound") are vegetated with ***Valley Foothill Riparian*** habitat (Figure 4), with very large riparian trees, including many California sycamores (*Platanus racemosa*) greater than 30 meters tall, many equally large Fremont cottonwoods, and some equally large valley oaks (*Q. lobata*). The overstory canopy is generally not fully closed, and there is generally a lower tree stratum of willows (*S. lucida* ssp. *lasiandra, S. gooddingii*), black walnuts, boxelders, and other species. The ground and most of the other vegetation is covered with a dense growth of epiphytic wild grape. Dense button bush stands occupy the marginal strips separating land and water.

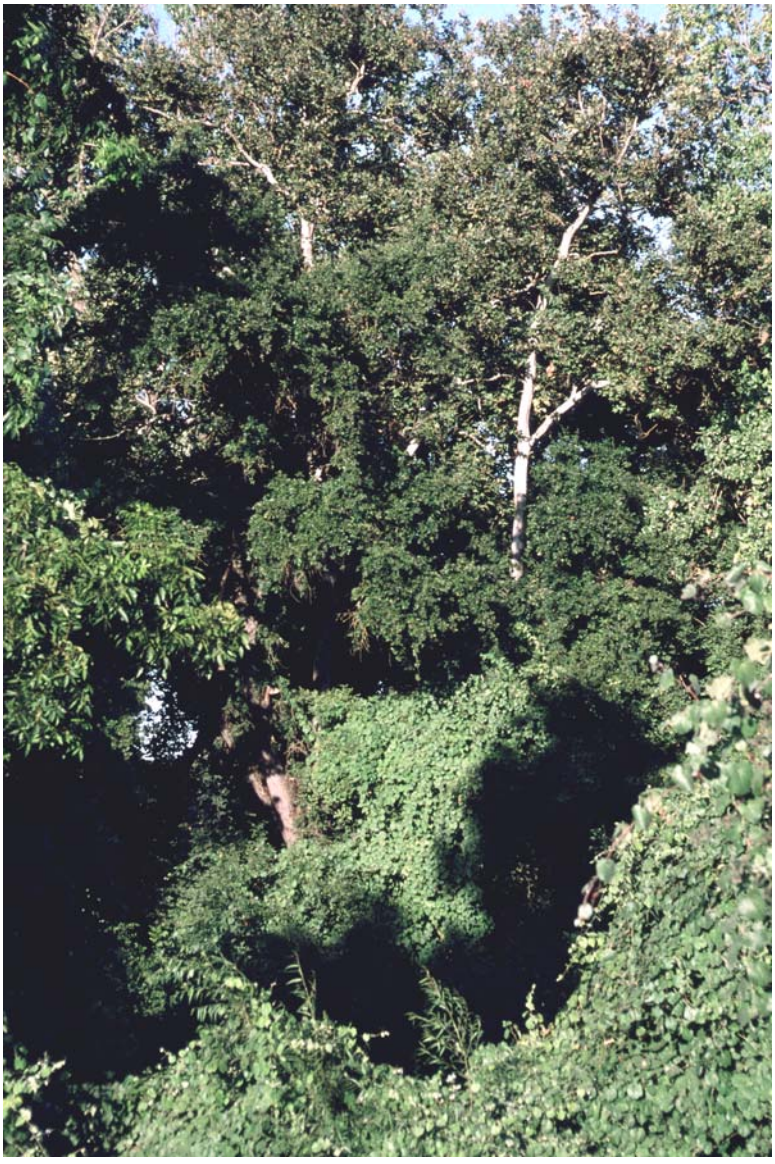

Figure 4. Elkhorn Regional Park. Photo shows high-quality valley foothill riparian habitat: large California sycamores, Fremont cottonwoods, California black walnuts, and valley oaks, with abundant epiphytic wild grape.

The occurrences identified within the 7.5-minute USGS quadrangle that includes this park, as identified in the California Natural Diversity Data Base, are listed in Table 15. The record for Sacramento splittail includes the river adjacent to the park. The park includes a roost location for great egrets, with a strong suggestion of nesting activity. Because snowy egrets typically share roosting preferences with great egrets, the park is likely also used for roosting by this species. The habitat structure in the park is consistent with the known preferences of Swainson's hawks. The other species listed in Table 15 may not occur in the park, although the potential exists that they do.

Elkhorn Regional Park appears to represent an important conservation node in a potential riparian forest corridor along the Sacramento River. The apparent length of the park along the river margin, combined with the breadth of the riparian corridor (approximately 250 to 300 feet in the area northwest of the parking lot), suggest that the park offers approximately 40 acres of relatively natural riparian forest habitat (excluding the parking lot and other developed areas).

The Yolo County Natural Community Conservation Plan (NCCP) may find this existing habitat useful for conservation planning purposes. The Joint Powers Authority may also wish to restore riparian habitat conditions adjacent to the Sacramento River; the existing habitat at the Elkhorn Regional Park could serve as an important "kernel" habitat area for this restoration approach, around which additional habitat restoration areas could be formed.

Table 15. CNDDB Sensitive Species in the Taylor Monument 7.5-minute Quad.

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Ardea alba	Great egret	--/--/--/--
Athene cunicularia	Burrowing owl	--/--/SC/--
Buteo swainsoni	Swainson's hawk	--/CT--/--
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT/--/--/--
Egretta thula	Snowy egret	--/--/--/--
Nycticorax nycticorax	Black-crowned night heron	--/--/--/--
Pogonichthys macrolepidotus	Sacramento splittail	--/--/SC/--
Thamnophis gigas	Giant garter snake	FT/CT/--/--

Notes
FT Federal Threatened
CT California Threatened
SC California Special concern

The riparian habitat present in this park unit is the preferred habitat type for several of the bird "species of special concern" identified by CDFG, including sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperi*), willow flycatcher (*Empidonax traillii*), yellow warbler (*Dendroica petechia*), and yellow-breasted chat (*Icteria virens*). Habitat of this type is required by the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), a federal "candidate" species.

This habitat is also potentially useful for at least three species on the Audubon Watchlist: Nuttall's woodpecker (*Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), and yellow-billed magpie (*Pica nuttalli*).

5.8 Putah Creek Access Parks

The Putah Creek Access Parks are similar in their geological setting to the Cache Creek Canyon Regional Park. The parks represent several geomorphological contexts.

The uppermost access (No. 1) and the lower two (Nos. 4 and 5) include areas that are located on a terrace above the Putah Creek floodplain; it is unlikely that this terrace will ever be reoccupied by creek flows absent a failure of Monticello Dam. There is also a second, lower terrace along parts of the Putah Creek channel that includes these units, not present in all locations.

Putah Creek also has a floodplain that appears to be reoccupied periodically by creek flows, particularly in units Nos. 2 and 3. Putah Creek is well entrenched into the active channel below this floodplain, and the creek apparently occupies most of its channel width most of the time, probably as a consequence of flow regulation by Monticello Dam.

These park units are generally closely confined to the terrace between the creek and Highway 128, and therefore do not include colluvial deposits and the bedrock slopes of the Coast Range.

Access unit No. 1 has an additional hydrological feature of interest: a tributary stream draining the canyon north of the creek is well entrenched in the terrace surface at the western end of the site. This unit is well vegetated with a form of ***Blue Oak—Foothill Pine*** habitat that has multiple vegetation layers and a variegated structure; this habitat is continuous with similar habitat in the valley to the north of Highway 128,

*Figure 5. Putah Creek Access Park No. 1. Photo illustrates an open oak woodland habitat on a Putah Creek terrace, with annual grassland in the open areas. Plant species shown include blue oak, interior live oak, western redbud (*Cercis occidentalis*), and buttonbush. This oak woodland is contiguous with foothill woodland habitat across Highway 128.*

thus forming a habitat connection to the more extensive foothill woodland habitats in the Coast Range.

The habitat in this unit is continuous with the same or similar habitats south of Putah Creek, and is thus part of a potential north-south landscape linkage through the Yolo/Solano County part of the Coast Range. This unit was observed in the field to be wildlife-rich. (For example, this site is apparently included in the foraging territory of pileated woodpeckers (*Dryocopus pileatus*), one of the largest American woodpecker species, an individual of which was detected immediately south of this unit in state-owned land on the other side of Putah Creek.) A part of this habitat value arises because the nearby habitats are diverse, with ***Mixed Chaparral*** habitat a short distance away and an evident mixture of vegetation along the environmental gradients in this small area.

The five "linear" access parks share a corridor of ***Valley Foothill Riparian*** habitat along Putah Creek (Figure 5). Typically there is a nearly continuous fringe of sandbar willow along the creek, with additional species higher on stream banks and on low terraces near the creek channel. Some prominent plant species present include Fremont cottonwood, Pacific or black willow, Oregon ash, black walnut, blue elderberry, and button bush. Depending on disturbance history, some of the cottonwoods and willows may be quite large. Epiphytic wild grape is common to abundant. This riparian corridor, and the associated stream course itself, is an important regional biological linkage between the interior of the Coast Range and the Sacramento River.

The third (the "middle" of the five) of the access units is infested with a substantial stand of tree-of-heaven (*Ailanthus altissima*), an invasive, woody alien species that is reducing the cover of desirable native species. This exotic vegetation is, however, largely located outside the extensive floodplain in this park, which provides a structurally complex riparian habitat dominated by black walnut, Fremont cottonwood and black willow, with an herbaceous understory dominated by a tall sedge (*Carex*) species.

The two lower access sites include areas on an elevated terrace surface that is virtually covered by ***Annual Grassland***; the dominant species in these grasslands is the highly invasive yellow starthistle (*Centaurea solstitialis*). These sites also include part of the riparian corridor along Putah Creek, which is part of the continuous riparian corridor along the stream described briefly above.

Sensitive species that are described in the California Natural Diversity Data Base for the 7.5-minute USGS quad that includes the five access parks are listed in Table 16. The occurrence record for the valley elderberry longhorn beetle (VELB) explicitly includes at least the upper three access parks. Although not listed in the CNDDB records, the Putah Creek canyon downstream from Monticello Dam is well known to provide regular foraging opportunities for bald eagles (*Haliaeetus leucocephalus*).

Table 16. CNDDB Sensitive Species in the Monticello Dam 7.5-minute Quad.

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT/--/--/--
Falco peregrinus anatum	Peregrine falcon	--/CE/--/--
Hesperolinon breweri	Brewer's western flax	--/--/--/1B
Rana boylii	Foothill yellow-legged frog	--/--/SC/ --

Notes
FT Federal Threatened
CE California Endangered
FC Federal Special Concern
SC California Special concern
CNPS 1B Plants Rare, Threatened, or Endangered in California and elsewhere

The CNPS inventory data for the same USGS quad indicate that at least one additional sensitive plant species is known from the area including these park units (Table 17).

Table 17. CNPS Online Inventory Listing for Monticello Dam 7.5-Minute USGS Quad.

Taxonomic Name	Common Name	Family	CNPS List
Fritillaria pluriflora	Adobe-lily	Liliaceae	List 1B
Hesperolinon breweri	Brewer's western flax	Linaceae	List 1B

Notes
List 1B Plants Rare, Threatened, or Endangered in California and Elsewhere

These park units have potential habitat value for several species on the CDFG "species of species concern" list: sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperi*), willow flycatcher (*Empidonax traillii*), purple martin (*Progne subis*), bank swallow (*Riparia riparia*), yellow warbler (*Dendroica petechia*), and yellow-breasted chat (*Icteria virens*).

The habitat areas present in these units were observed to host at least three species on the Audubon Watchlist: Nuttall's woodpecker (*Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), and yellow-billed magpie (*Pica nuttalli*).

5.9 Clarksburg Boat Launch/Public Access

The Clarksburg site is located on an elevated terrace surface between a levee road and the Sacramento River. The terrace is part of the floodplain of the Sacramento River.

The terrace surface provides only limited habitat value, owing to two circumstances: (a) the structure of the existing ***Valley Foothill Riparian*** habitat is simplified to a narrow longitudinal corridor, virtually a tree row wide near the water's edge, for most of the site, which limits the value that this habitat area might otherwise provide; and (b) the site is highly disturbed by human modifications and activities, which has substantially reduced the habitat values of the site. The "single-tree-row" riparian

corridor has many of the same tree species that occur at Elkhorn Regional Park (see above), including Fremont cottonwood, black walnut, Oregon ash, and Goodding willow, although this site lacks most of the ecological values found at the Elkhorn site.

Existing CNDDB records for the USGS 7.5-minute quadrangle that includes this park are listed in Table 18. There are numerous Swainson's hawk occurrence records in this region, and it is rather probable that Swainson's hawks will be found in this park on occasion; a few of the larger cottonwood trees could provide nest sites, except that the degree of human disturbance at this site is quite high. The occurrence record for western yellow-billed cuckoo is very old, and likely reflects habitat conditions near the Clarksburg site that no longer occur; this species is highly unlikely to occur in the riparian habitats that are present in the vicinity of this park unit today.

Table 18. CNDDB Sensitive Species in the Clarksburg 7.5-minute Quad.

Scientific Name	Common Name	Fed/Cal/ DFG/CNPS
Buteo swainsoni	Swainson's hawk	--/CT--/--
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	FC/CE/--/--

Notes
- CE California Endangered
- CT California Threatened
- FC Federal Candidate species

The California Native Plant Society online database includes no records of sensitive species occurrence for the Clarksburg 7.5-minute USGS quadrangle.

Owing to the limited value of the habitat at this park unit, and to the restricted distribution of riparian habitat elsewhere along this section of the river, the general utility of the habitat to CDFG "species of special concern," and the utility to Audubon Watch List species, is limited.

6.0 RECOMMENDATIONS

6.1 Conservation Considerations in Managing Existing Facilities

As described previously, several Yolo County park and open space units exhibit important environmental resources:

- Elkhorn Regional Park: The riparian habitat within and/or adjacent to this unit presents the tall trees and multiple canopy layers that are desirable in ***Valley Foothill Riparian*** habitats for riparian-associated birds and other wildlife. The layout of this unit includes a potential for maintaining substantial "patches" of high-quality habitat. Maintaining the existing habitat values, or potentially increasing habitat values at this unit, is consistent with a regional riparian habitat management program (RHJV 2004), and may be beneficial under the County's NCCP.
- Cache Creek Canyon Regional Park: This "jewel of the County Parks system" provides a combination of ***Valley Foothill Riparian*** habitat near Cache Creek and ***Blue Oak—Foothill Pine*** (foothill woodland), ***Mixed Chaparral***, and related habitat types in upland parts of the park. These are three of the more important habitats in central California on a regional scale (CalPIF 2002, CDFG 2003a, RHJV 2004). The riparian habitat "frontage" that this unit provides along Cache Creek is an important publicly owned component in an identified regional "linkage corridor."
- Otis Ranch Open Space Park: The large size of this unit and its varied elevation range allow the Otis Ranch unit to incorporate the same kinds of habitat benefits that are realized by the Cache Creek Canyon unit. Owing to the Otis Ranch unit's greater size and the greater variety in "aspect" and elevation range in this unit, the potential biological variability and value in the Otis unit may be greater than for the Cache Creek Canyon unit. This unit provides ***Blue Oak—Foothill Pine*** (foothill woodland), ***Mixed Chaparral***, and various intermixtures of oak woodland and chaparral. The Otis unit also provides ***Valley Foothill Riparian*** habitat near the creek, which contributes to the regional Cache Creek riparian "linkage."
- Putah Creek Fishing Access Parks: The Putah Creek units provide important ***Valley Foothill Riparian*** habitat protection within a designated regional "linkage corridor." Some of the riparian habitat areas provide the structural characteristics that produce significant habit values for riparian-associated birds and other wildlife (CDFG 2003a, RHJV 2004). The upper unit (closest to Monticello Dam) also provides ***Blue Oak—Foothill Pine*** (foothill woodland) habitat values and the unit is located so that it provide biological linkage functions to foothill woodland, ***Mixed Chaparral***, and related habitat types north and south of Putah Creek.

A general summary of management-related environmental resource concerns for the park units surveyed in this study is provided in Table 19.

Table 19. Conservation Concerns Arising From Current Management Directions and Possible Future Management Approaches at Yolo County Park and Open Space Units.

Park Unit	Conservation Concerns
Cache Creek Canyon Regional Park	• The presence of invasive species, tamarisk in particular, is a concern within the riparian forest of this park unit. • Potential future management for recreational uses in the hinterlands of this park unit should consider potential adverse effects to habitat values in the oak woodlands and other habitats. Potential future management for recreational uses (e.g., trail development) should avoid areas that have high site-specific conservation values.
Camp Haswell Park	• Controlled access of the parking lot and take-out point for recreational boat trips should be enhanced to protect environmental resources at the site. • The presence of abundant tamarisk in the riparian corridor is a management concern for this park unit.
Otis Ranch Open Space Park	• Low-intensity recreation, such as hiking trails, would likely not significantly affect the natural habitat values in this park unit. Potential future management for recreational uses (e.g., trail development) should be sensitive to areas that have high site-specific habitat values. • Intensive recreational uses that could have adverse effects on the environmental values at the site should be avoided or mitigate if considered during development of the site.
Vernon A. Nichols Park	• Major parts of the park within the Cache Creek floodplain have been invaded by, and are developing dense stands of, tamarisk and giant reed. The County should work with other stakeholders to eradicate these stands. • Management at this unit could be focused for conservation benefits on enhancing environmental values associated with Cache Creek.
Capay Open Space Park	• The presence of invasive exotic plant species is a principal environmental management concern at this unit, primarily tamarisk and giant reed in the Cache Creek channel and riparian corridor. Additional efforts should be focused on assuring that the creek channel, banks, and river bars, as well as the riparian corridor, are not dominated by these species.
Knight's Landing Boat Launch	• Environmental resources in this park would benefit from an increase in the area of mature trees around the parking lot. This could be achieved by planting additional native riparian tree species (particularly those species now present in the adjacent state-owned land) in areas that currently lack tree cover.
Elkhorn Regional Park	• Continue to limit uncontrolled human access into riparian areas. • Intensified recreational encroachments into the riparian

Park Unit	Conservation Concerns
	habitat, such as would be associated with intensively used trails or developed areas, could likely reduce the park's ecological values, particularly during the spring and early summer when riparian habitats are among the most important habitats in California for nesting birds.
Putah Creek Fishing Access Parks	• Areas of regionally significant riparian and oak woodland habitat are associated with these access units. Substantial increases in recreational uses in these units should be planned in a manner to avoid impacting habitat values. • An environmental management concern in the region of the access units is the relative abundance of exotic plant species, including tamarisk, yellow starthistle, and tree-of-heaven. Appropriate efforts should be dedicated to eradicating these invasive species. • Increases in uncontrolled public access would likely increase adverse impacts to the Putah Creek riparian corridor. Trails parallel to the stream should be carefully sited and located outside the riparian corridor, rather than near the stream.
Clarksburg Boat Launch	• Environmental management concerns for this site are related to the existing level of human disturbance and to the limited habitat structure. Environmental values could be enhanced by increased vegetative structure and species diversity within existing riparian habitat.

A variety of general management recommendations might be made for preserving or enhancing conservation values at the County's existing park and open space units. For example, Noss and Cooperrider (1994) provide numerous recommendations for protecting biodiversity elements in each of a variety of managed-ecosystem types; many of their recommendations would be germane for Yolo County park units. However, in a fundamental sense the relevant management program for conservation purposes in existing park units may be simplified to three basic guidelines:

- Identify Important Conservation Resources within Existing Park Units. Identify and manage for conservation purposes the parts of the existing park units that support important biodiversity components. This guideline has two essential components: (1) develop inventory information that will allow for informed judgements about the conservation value of the existing units; and (2) based upon the resulting knowledge, develop specific conservation resource management plans for important park units that will protect and/or enhance the biodiversity values.

  Qualified biologists should inventory the existing park units and describe the existing conditions (including GIS-based plant series mapping).[22] The

22 The NCCP process and the General Plan Update process may result in the development of useful vegetation-series mapping for the entire County, including all park units. The Department of Planning and Public Works should assure that these maps and the GIS technology to allow their use are available for future park planning and operations uses. Field studies to validate the vegetation mapping within the park units also should be carried out.

inventories should include data for all "sensitive species" or "sensitive habitats" that may occur in those units, in order to afford the County an opportunity to focus its management on environmentally sensitive elements within these existing facilities.[23]

Future revisions of the Parks and Open Space Master Plan should also incorporate identified management concerns regarding the conservation values of existing (and future) park units. This kind of focus also could be included in the NCCP, should the County's decision-makers continue to support the use of County-owned land for maintaining sensitive species and sensitive habitat in the County. County resource planning efforts should continue to incorporate a region-level conservation approach, as described earlier in this report, so that the ability of existing parks and open space areas to achieve regional conservation goals could be factored into management decision-making.

- Incorporate Conservation Purposes into Park Unit Management. Once the appropriate inventory and initial planning steps have been completed, the County should manage the park and open space units consistently with a conservation focus. This may involve some changes in the management of existing units, but the more important management component is likely to be a commitment to improve habitat values in the existing units. This should be a long-term goal for the County parks system, which should be revisited in implementation and subsequent plan updates.

  The County could decide to restore or enhance the ecological composition, structure, and functions that maintain the habitat values in environmentally important areas. This focus on ecosystem processes would include the restoration or enhancement of areas degraded by invasive species, the restoration of areas eroded or damaged by overuse, and the enhancement of particular habitat areas to serve conservation purposes that may not clearly have been present previously.

  Implementing this guideline should lead the County to address a variety of ecological processes, including disturbance regimes (such as fire cycles), and resulting plans will also consider the implications of dynamic changes in climate.[24]

  The County should minimize intrusions into areas within existing parks that are important for conservation purposes. The park management program should avoid adopting future management focuses for these units that would adversely affect the important conservation values of the units, such as

23 As noted earlier in this report, the existing sensitive species data for County park units suggest strongly that the sampling processes for sensitive species at County park units have not been very systematic or thorough, and it seems likely that more systematic sampling will result in identifying additional species in many of the units.

24 This guideline is not incompatible with conservation management for sensitive species, and habitat conservation planning approaches may use habitat restoration or enhancement to achieve the overall goal of promoting the long-term presence of the desired species in Yolo County.

allowing uncontrolled visitor access to points along Cache Creek or Putah Creek or to the riparian forest at the Elkhorn Regional Park.

- Adaptively Manage Park Units to Maintain Conservation Values. The County should conduct monitoring within the existing park units to verify that the intended conservation benefits from the adopted management approaches are being realized. If the management is not producing the expected conservation benefits, or if the management is creating adverse effects for sensitive species or habitats, then the County should alter the adopted management program and refocus its management. This approach is generally known as "adaptive management," and is commonly included in natural resources management programs adopted by nearly all federal and state agencies with responsibility for environmental resources.

6.2 Conservation Considerations for Future Expansions

Yolo County's parks are expected to fulfill multiple roles in the County's future, as discussed in the Parks and Open Space Master Plan. While providing recreation and other benefits, County park units could provide essential habitat for sensitive species, as well as participating in region-scale biodiversity conservation processes. The preceding subsection of this background report provided a brief consideration of the potential contributions of existing park units to such efforts, but it is also possible that future parkland acquisitions or easements by Yolo County could substantially contribute to protecting or promoting biological diversity in the County.

While developing a detailed plan for using parkland acquisitions for conservation purposes is beyond the scope of this report, future parkland acquisition and management for conservation purposes should address several key components (Table 20). The table summarizes a number of approaches and components that have been addressed in this report. The table also identifies landscape components and selected regional environmental resources in Yolo County. While some of these elements are captured by existing park and open space units, others are not; there are opportunities for future additions to the County park system that would substantially enhance the ability of the County's parklands to meet conservation objectives, consistent with other County policies and values.

Table 20. Recommended Long-Term Conservation Planning Considerations for Yolo County Park and Open Space Areas.

Yolo County Parks and Open Space Areas Recommended Conservation Planning Considerations	
I.	**Overall Scope of Coverage**
A.	Address key regional biodiversity elements:
	1. Oak woodlands
	2. Grasslands
	3. Riparian habitats
	4. Wetlands

Yolo County Parks and Open Space Areas Recommended Conservation Planning Considerations
5. Vernal pools 6. Aquatic habitats for native fish B. Address watersheds as the basis for ecological and physical processes C. Incorporate landscape scale conservation planning elements: 1. Reserves 2. Buffers 3. Linkages D. Consider disturbance regime and Minimum Dynamic Area (see Section 4.2) E. Regional Reserve acquisition guidelines: 1. Species well distributed across their native range are less susceptible to extinction than are species confined to small portions of their range 2. Large blocks of habitat containing large populations of a target species are superior to small blocks of habitat containing small populations 3. Blocks of habitat close together are better than blocks far apart 4. Habitat in continuous blocks is better than fragmented habitat 5. Interconnected blocks of habitat are better than isolated blocks, and dispersing individuals travel more easily through habitat resembling that preferred by the species in question 6. Blocks of habitat that are roadless or otherwise inaccessible to humans are better than roaded and accessible habitat blocks F. Address need of sensitive species
II. Key Ecosystem Types
A. Riparian Habitat: 1. Sacramento River corridor 2. Putah Creek corridor 3. Cache Creek corridor 4. Willow Slough corridor 5. Buckeye Creek corridors 6. Other creek riparian corridors B. Oak Woodlands: 1. Cache Creek Canyon Regional Park 2. Otis Ranch Open Space Park 3. Buckeye Creek Regional Park 4. Putah Creek to Rocky Ridge (Enos Creek) 5. Other regionally significant oak woodland areas C. Native Grasslands: 1. Dunnigan Hills 2. Other regionally significant native grassland areas

Yolo County Parks and Open Space Areas Recommended Conservation Planning Considerations
D. Aquatic Ecosystems: 1. Vernal pools/seasonal wetlands (including Grasslands Regional Park) 2. Yolo Bypass E. Instream/Fish Habitats 1. Putah Creek 2. Cache Creek 3. Willow Slough 4. Other creeks 5. Sacramento River/Yolo Bypass
III. Inventories
A. Inventory physical characteristics 1. Geology 2. Soils 3. Hydrology 4. Landforms 5. Other physical properties B. Inventory biological characteristics 1. Vegetation generally 2. Wildlife generally 3. Sensitive species 4. Key Habitats a. Wetlands b. Aquatic/instream habitats c. Riparian areas d. Oak woodlands e. Grasslands
IV. Coordinate Plans with Other Public & Private Agencies and Organizations
A. Bureau of Land Management B. University of California C. Department of Fish and Game D. Other federal and state agencies E. YCFCWCD and other local districts F. Adjacent counties G. Cities in County H. Farm Bureau I. Conservation and environmental organizations J. Watershed protection organizations

Yolo County Parks and Open Space Areas Recommended Conservation Planning Considerations
I. Other private or quasi-public conservancies, trusts, and foundations

The conservation planning considerations identified in Table 20 suggest that there may be future parkland expansions (whether by acquisition other means, such as easement or cooperative agreement) that would help to meet the County General Plan's conservation goals, together with other goals established by the Natural Community Conservation Plan. These considerations could guide or indicate locations for future parks and open space areas. Some of the future park units may involve existing programs, such as the gradual acquisition by the County of completed mining operations pursuant to the Cache Creek Resource Management Plan. Other future parkland could involve coordinated actions by Yolo County and other agencies, such as the California Department of Parks and Recreation, which has identified an interest in establishing new park units in the Central Valley.[25]

Identifying specific sites or resource areas for consideration for possible future parks and open space areas exceeds the scope of this report; the expansion of County parks and recreation opportunities must also be considered in the context of other County policies and values. In passing, there are four general geographical areas that are substantially underrepresented in County parklands:

- The mountainous region of western Yolo County remains a high priority for conservation purposes, and this area has also been identified as a priority for coordinated management in order to provide access to extensive areas of public lands in the region. Additional County parkland acquisitions in this region, in fee simple or easement, could help to accomplish both of these purposes.
- The central, agriculturally dominated part of the County includes important environmental resources, including the Cache Creek riparian corridor and the riparian corridors along other creeks, particularly the Willow Slough riparian corridor. The proximity of these areas to the populated parts of the County suggests that there may be public recreational benefits that would emerge from any public lands associated with these watercourses. There may be opportunities for acquisitions in these areas that would benefit both conservation and other public purposes.
- The Dunnigan Hills region holds considerable potential for conservation purposes, primarily as a consequence of remnant native and other annual grasslands associated with several of the species that will be addressed by the Yolo County NCCP/HCP. The Buckeye Creek basin was identified in the CDFG Biodiversity Atlas (CDFG 2003a) as providing mappable units of Valley Foothill Riparian habitat. The Buckeye Creek basin and associated habitat areas in the northern Dunnigan Hills may be worthy of serious consideration for County and/or State parkland acquisition.

25 See the California Department of Parks and Recreation's "Great Central Valley Strategy" webpage at URL: http://www.parks.ca.gov/pages/21491/files/cvreport.pdf. Viewed October 2004.

- The Sacramento River corridor offers additional opportunities in terms of both parklands and conservation areas. The conservation values associated with the river corridor should also be understood to include the Yolo Bypass and any habitat enhancements that may be effected in the Bypass region. This area already has substantial public recreation and amenity values, owing to its proximity to populated regions in Yolo County and the greater Sacramento region.

Beyond these "priority" areas, the County may have opportunities to obtain or participate in parkland and open space areas elsewhere. These opportunities could accomplish substantial conservation benefits, or they may accomplish other public benefits without greatly advancing conservation objectives. The conservation utility of the new areas would be enhanced if the factors identified in Table 20 were considered as part of the acquisition screening process.

7.0 REFERENCES

Baker, W. L. 1992. The ecology of large disturbances in the design and management of nature reserves. Landscape Ecology 7:181-194.

CalFed Bay-Delta Program. 2000. Ecosystem restoration program plan – strategic plan for ecosystem restoration. Final Programmatic EIS/EIR Technical Appendix. [Available online (October 2004) at URL: http://calwater.ca.gov/Programs/EcosystemRestoration/EcosystemVol2RestorationPlan.shtml.]

California Department of Fish and Game. 2002. California Interagency Wildlife Task Group. CWHR version 8.0 personal computer program. Sacramento, CA.

California Department of Fish and Game. 2003a. Atlas of the biodiversity of California. Sacramento, CA. This publication may be ordered online (but not downloaded) from URL: http://atlas.dfg.ca.gov/.

California Natural Diversity Database. 2003b. RareFind 3. Wildlife and Habitat Data Analysis Branch, California Department of Fish and Game. Version 3.0.3 (data from April 2004). Sacramento, CA.

CalPIF (California Partners in Flight). 2004. The coastal scrub and chaparral bird conservation plan: a strategy for protecting and managing coastal scrub and chaparral habitats and associated birds in California (J. Lovio, lead author). Version 2.0. PRBO Conservation Science, Stinson Beach, CA. [Available online (October 2004) at URL: http://www.prbo.org/calpif/plans.html.]

CalPIF. 2002. The oak woodland bird conservation plan: a strategy for protecting and managing oak woodland habitats and associated birds in California (S. Zack, lead author). Version 2.0. Point Reyes Bird Observatory, Stinson Beach, CA. [Available online (October 2004) at URL: http://www.prbo.org/calpif/plans.html.]

CalPIF. 2000. The draft grassland bird conservation plan: a strategy for protecting and managing grassland habitats and associated birds in California (B. Allen, lead author). Version 1.0. Point Reyes Bird Observatory, Stinson Beach, CA. [Available online (October 2004) at URL: http://www.prbo.org/CPIF/Consplan.html.]

EIP Consultants. 2001. Preliminary Draft, Yolo County Habitat Conservation Plan.

Forman, R. T. T. 1997. Land Mosaics - the Ecology of Landscapes and Regions. Cambridge Univ. Press; Cambridge, UK.

Forman, R. T. T., and M. Godron. 1986. Landscape Ecology. John Wiley and Sons, New York.

Gaines, D.M. 1980. The valley riparian forests of California: their importance for bird populations. Page 57-85, in: A. Sands (ed.), Riparian forests in California - their ecology and conservation. Univ. California Div. Agric. Sci. Publ. No. 4101.

Hehnke, M., and C. P. Stone. 1979. Value of riparian vegetation to avian populations along the Sacramento River system. Pages 228-235, in: R.R. Johnson and J.F. McCormick (Tech. Coord.), Strategies for protection and management of floodplain wetlands and other riparian ecosystems. U.S.D.A. For. Serv. Gen. Tech. Rep. WO-12; Washington, D.C.

Hickman, J. C. (ed.) 1993. The Jepson manual – higher plants of California. University of California Press, Berkeley.

Jones and Stokes Associates, Inc. (JSA). 1996. Final Willow Slough watershed integrated resources management plan (JSA 95-232). Prepared for Yolo County Resource Conservation District, Woodland, CA.

Mayer, K. E., and W. F. Laudenslayer, Jr. 1988. A guide to wildlife habitats of California. The California Resources Agency.

Meffe, G. K., and C. R. Carroll. 1994. Principles of conservation biology. Sinauer Associates, Sunderland MA.

Miles, S. R., and C. B Goudey. 1997. Ecological subregions of California – section and subsection descriptions. Publication R5-EM-TP-005. USDA Forest Service, Pacific Southwest Region, San Francisco. [Available online (October 2004) at URL: http://www.fs.fed.us/r5/projects/ecoregions/.]

Moores, E. M, and J. E. Moores. 2001. Geology of the Putah-Cache Region. URL: http://bioregion.ucdavis.edu/book/00_Entering/00_04_geo_int.html. Viewed October 2004.

Motroni, R.S. 1979. Avian density and composition of a riparian forest - Sacramento valley, California. Unpublished M. S. thesis, Sacramento State Univ., Sacramento.

Moyle, P. B. 1999. The Putah-Cache Bioregion Project: the curious naturalist's annotated fish list. [URL: http://bioregion.ucdavis.edu/where/fishlist.html. Webpage copyright University of California, Davis.]

Moyle, P. B. 1996. Status of aquatic habitat types. Sierra Nevada Ecosystem Project: final report to Congress, vol. II, assessments and scientific basis for management, pages 945-952. Davis, CA. [Available online (October 2004) at URL: http://ceres.ca.gov/snep/pubs/web/PDF/VII_C32.PDF.]

National Audubon Society. 2002. Audubon Watchlist – an early warning system for bird conservation. [URL: http://www.audubon.org/bird/watchlist/index.html.]

National Geographic Society. 2003. TOPO! California mapping software. Evergreen, CO.

National Research Council. 2002. Riparian areas – functions and strategies for management. National Academy Press, Washington, DC. xii + 428 pages.

Noss, R. F. 1993. A bioregional conservation plan for the Oregon Coast Range. Natural Areas Journal 13:276-290.

Noss, R. F., and A. Y. Cooperrider. 1994. Saving Nature's Legacy – Protecting and Restoring Biodiversity; Island Press, Covelo CA.

Noss, R. F., and L. D. Harris. 1986. Nodes, networks, and MUMs: preserving diversity at all scales. Environmental Management 10:299-309.

Noss, R. F., M. A. O'Connell, and D. D. Murphy. 1997. The science of conservation planning – habitat conservation under the Endangered Species Act. Island Press, Washington DC.

Pickett, S. T. A., and J. N. Thompson. 1978. Patch dynamics and the design of nature reserves. Biological Conservation 13:27-37.

Pickett, S. T. A., and P. S. White. (editors) 1985. The Ecology of Natural Disturbance and Patch Dynamics; Academic Press, New York.

RHJV (Riparian Habitat Joint Venture). 2004. The riparian bird conservation plan: a strategy for reversing the decline of riparian associated birds in California. Version 2.0. California Partners in Flight. [Available online (October 2004) at URL: http://www.prbo.org/calpif/pdfs/riparian.v-2.pdf.]

Sawyer, J. O., and T. Keeler-Wolf. 1995. A manual of California vegetation. California Native Plant Society, Sacramento.

Stein, B. A., L. S. Kutner, and J. S. Adams. 2000. Precious heritage; the status of biodiversity in the United States. The Nature Conservancy and the Association for Biodiversity Information. Oxford Univ. Press, New York.

Thomas, J. W. (technical editor). 1974. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. U. S. Department of Agriculture Forest Service Agriculture Handbook No. 553. 512 pages.

Winter, T.C., J.W. Harvey, O.L. Franke, and W.M. Alley. 1998. Ground water and surface water – a single resource. USGS Circular 1139. U. S. Department of the Interior, Denver, CO. viii + 79 pages. [Available online (October 2004) at URL: http://water.usgs.gov/pubs/circ/circ1139/.]