Appendix B. Public Outreach Summary

Public Outreach Summary

In April 2015, the California Department of Fish and Wildlife (CDFW) mailed the following letter to local landowners and stakeholders, and posted a notice, to announce public scoping of the Knoxville Wildlife Area (KWA) Land Management Plan (LMP). The notice (included at the end of this appendix) was posted at the KWA's front gate, at the CDFW office in Yountville, at the Napa County Library in Yountville, and at the Bureau of Reclamation Lake Berryessa Visitor Center.

To: Interested Stakeholders and Members of the Public

From: California Department of Fish and Wildlife, Lead Agency

Subject: Notice of Public Scoping Meeting for the Knoxville Wildlife Area Land Management Plan

Project location and description: The California Department of Fish and Wildlife (CDFW) is preparing a land management plan (LMP) and associated environmental compliance document for the Knoxville Wildlife Area (KWA). The KWA is a 21,509-acre mix of oak woodland, grassland, chaparral, and riparian habitats, located approximately 1.5 miles north of Lake Berryessa in eastern Napa County.

An LMP was prepared in 2005 for the northern portion of the KWA; however, significant land has been added to the KWA since that time. CDFW is updating the LMP to account for these land acquisitions, to reflect current resource conditions in the KWA, and to respond to changes in CDFW policy. The LMP will establish management goals and tasks that will ensure the long-term conservation of wildlife (invertebrates, amphibians, reptiles, birds, and mammals), special-status plants and plant communities, and their habitats on the KWA. The LMP also will describe appropriate public uses of the KWA and provide environmental analysis of land management tasks and public uses, pursuant to the California Environmental Quality Act (CEQA). The LMP and CEQA document will be developed over approximately 18 months, with a final LMP and CEQA document expected in September 2016.

Public scoping meeting: Interested stakeholders and members of the public are invited to attend a public scoping meeting to provide input on development of the LMP. Representatives of CDFW will give an overview of the KWA and the LMP process. They will solicit written and verbal input on goals, objectives, and tasks that could be integrated into the LMP and that are consistent with CDFW's mission and overall goals for management of the KWA. All public comments will be recorded and considered during development of the LMP and CEQA document.

Comments also may be submitted by email or regular mail until 11 June 2015. Comments emailed or postmarked after this date will not be considered during initial development of the LMP; however, the public will have another opportunity to comment once the public draft LMP and CEQA document are complete, in spring or summer 2016.

Meeting date and time: Tuesday, May 12, from 5:00 to 7:00 p.m.

Location: Bureau of Reclamation Lake Berryessa Visitor Center, 5520 Knoxville Road, Napa, CA 94558

Contact information: To obtain additional information or to provide written comments, contact:

Mr. Conrad Jones
Senior Environmental Scientist Supervisor
California Department of Fish and Wildlife
Bay/Delta Region (3)
7329 Silverado Trail
Napa, CA 94558
707-944-5544

Please include your name and address when submitting written comments.

On May 12, 2015, the public scoping meeting was held at the Lake Berryessa Visitor Center. A map of the KWA and posters showing photographs of popular public uses were on display. Mr. Conrad Jones of CDFW made a brief presentation explaining the LMP and CEQA process. Attendees were invited to write on comment cards or make verbal comments.

The following section lists the attendees and summarizes the discussion at the public scoping meeting.

Knoxville Wildlife Area (KWA)
Land Management Plan (LMP)

SUMMARY OF PUBLIC COMMENTS

(Verbal; Recorded on May 12, 2015, and Summarized by Heather Ogston)

Attendees

Name and Contact Information	Organization
Mike Malone. Mmalonegeologist@gmail.com. 707-829-5511. 1247 Jean Drive, Sebastopol, 95472	Member of public, KWA user
Damon Brown. Dbrown@ebagroup.com. 707-544-0784. Box 521, Sebastopol, 95473	Member of public, KWA user
George Gamble. Ggambull@aol.com. 707-966-9205. 11060 Knoxville Road, Napa	Member of public, neighboring landowner (Gamble Ranch)
Tracy Cline. Tcline@blm.gov. 707-468-4058. 2550 N. St. Street, Ukiah.	Bureau of Land Management
Stacy Martinelli	California Department of Fish and Wildlife
Conrad Jones	California Department of Fish and Wildlife
Theresa LeBlanc	California Department of Fish and Wildlife
Matt Wacker, John Hunter, Heather Ogston	H. T. Harvey & Associates

The following topics and main points were discussed at the public scoping meeting.

LMP/CEQA Process

- The attendees asked if and how the land management plan (LMP) would dovetail with California Environmental Quality Act (CEQA) review.
- California Department of Fish and Wildlife (CDFW) representatives were asked to summarize the differences between the old and new LMPs. (CDFW emphasized the grazing plan addition, identification of major new sensitive habitats and watersheds; revision of management actions to address new resources; prioritization of water resources and biological resources.)

Biological Resources

- Restoration/rehabilitation of ponds and other surface water resources was encouraged—CDFW should focus on and fund maintenance of these priority resources.
- CDFW was exhorted to achieve its goals using sound science—avoid overprotecting some resources (e.g., serpentine soil–based rare plants) based on perceived sensitivities.
- Some attendees pointed out that grazing is not always bad for sensitive plants.

Biological Monitoring

- The group discussed problems and solutions for monitoring the deer population. Attendees asked to know what other biological resources were receiving attention, besides the deer population and rare plants. (CDFW responded that camera monitoring of deer would yield data on predators and other organisms. CDFW also is doing surveys for western pond turtle and foothill yellow-legged frog. Deer are the most costly to manage because of the major public use component.)

Public Uses

Access

- The attendees appreciate the level of access currently provided at the KWA. Part of its appeal is the tough landscape and the low visitation.
- They do not want either more or less access: closing roads, requiring permits, or designating a "wilderness area" would reduce access undesirably and concentrate people around the limited access points. Improving or adding roads or parking would increase visitation and diminish the appeal of the KWA. CDFW should maintain a balance between preservation and access.
- "Wildlife areas" are sometimes misinterpreted to mean "wilderness areas." The attendees felt that there is pressure to restrict hunting and fishing in more and more places, and that a "wilderness" designation would exacerbate the problem. The group discussed possibly reiterating and underscoring an assessment done by UC Davis for the existing LMP that distinguishes between "wilderness" and "wildlife" areas.

Hunting/Deer Management

- The group discussed putting limits on deer hunts, by setting a tag limit per season or other period, enacting a draw for the opener or for the whole season, or some other approach. The reasons for limiting deer hunting are several-fold:
  - Deer populations don't recover from one season to the next.
  - Hunters arriving after opening day find that few deer are left to hunt.
  - Deer hunts on neighboring properties are adversely affected when the KWA is "shot out."
  - Crowding during the opener creates an unpleasant and potentially unsafe experience for people.
- The attendees were concerned primarily with the health and resilience of the deer population. They asked about deer surveys and how CDFW can better inventory and manage the population.

Infrastructure and Facilities Maintenance

- Attendees asked CDFW to integrate more positive information about hunting into its signage, website content, and information distributed to other user groups. CDFW was encouraged to explain hunting's role in wildlife conservation to inform, rather than frighten, other users. It can point out that hunting provides a revenue stream that can fund conservation, monitoring, and infrastructure projects.
- The group discussed restoring ponds and other surface water sources, many of which are in disrepair. Restored ponds, 'guzzlers,' and other water facilities should be wildlife-friendly and not easily damaged or removed by animals or people.
- The attendees were not in favor of adding or expanding parking facilities or roads.

Administration and Funding

- The attendees were concerned that the KWA would be changed, or have a change of management, if a National Monument were designated nearby. The Bureau of Land Management (BLM) representative at the meeting stated that there would be more coordination between BLM and CDFW, and possibly more visitation, but that CDFW would continue to own and manage the KWA.
- The attendees asked who the other authorities in the area are. (CDFW named the State Water Resources Control Board and the Bay Area Air Quality Management District. BLM has no authority.) They also asked which other organizations are expected to provide feedback on the LMP.
- As mentioned above, the group favored restoring/repairing ponds and other surface water sources.
- The group discussed sources of revenue for the KWA, such as from cattle grazing leases, federal funds, and Natural Resources Conservation Service funds awarded to lessees.

Knoxville Wildlife Area Land Management Plan

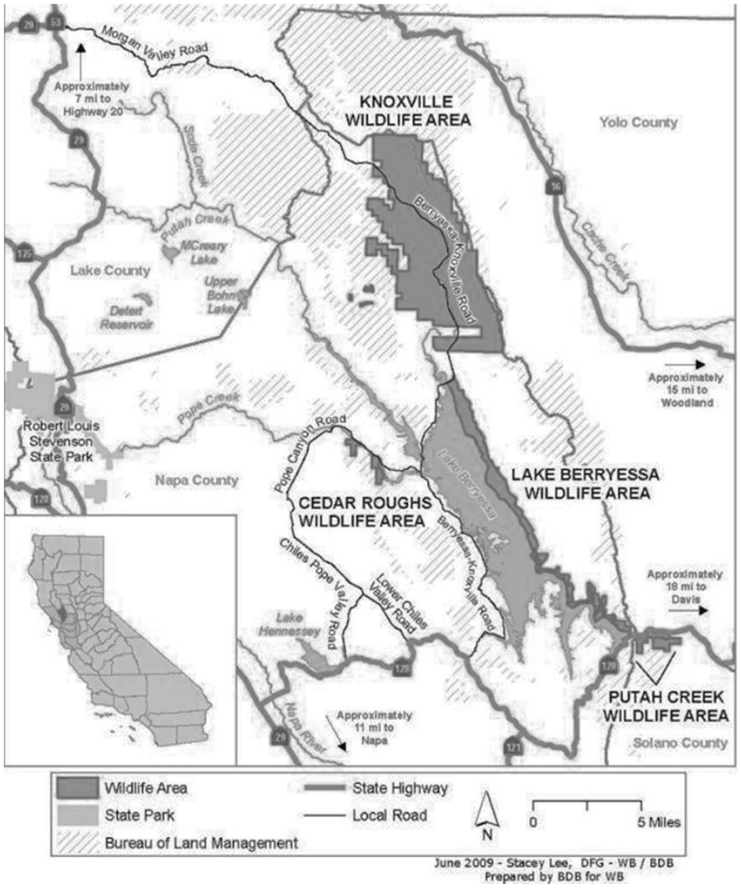
May 12, 2015, Public Scoping Meeting

What is the Knoxville Wildlife Area (KWA)?

The KWA is a 21,509-acre mix of oak woodland, grassland, chaparral, and riparian habitats, located approximately 1.5 miles north of Lake Berryessa in eastern Napa County. The area is managed by the California Department of Fish and Wildlife (CDFW) to conserve native plants, animals, and habitats and to allow compatible public uses, including hunting. Some of the resources in the KWA are rare or are protected by federal or state laws.

What is the Land Management Plan (LMP)?

The LMP is a planning document that will set out KWA management goals and objectives to ensure the long-term conservation of wildlife (invertebrates, amphibians, reptiles, birds, and mammals), special-status plants and plant communities, and their habitats. The plan will describe current natural resources in the area and list the specific tasks involved in meeting management goals. The LMP also will describe appropriate public uses of the KWA, such as hiking and hunting. Lastly, the plan will provide an analysis of the environmental effects of the management tasks and public uses, pursuant to the California Environmental Quality Act (CEQA).



Why is the plan going through a public review process?

An LMP was prepared in 2005 for the northern portion of the KWA, but significant land has been added to the KWA since then. CDFW is updating the LMP to account for these land acquisitions, to reflect current resource conditions in the KWA, and to respond to changes in CDFW policy. The plan and its attendant goals and tasks represent a "project" under CEQA because a state agency (i.e., CDFW) is considering approval of a plan that may result in changes in the physical environment. Therefore, the management tasks and public uses detailed in the LMP must go through a public review process, and their environmental effects will be disclosed to the public in a CEQA document.

What are the next steps?

The LMP and CEQA document will be developed over approximately 18 months, with a final LMP and CEQA document expected in September 2016.

All public comments received will be recorded and considered during development of the LMP and CEQA document.

What is the process for developing the LMP and CEQA document?

Broadly, the process is as follows:

1. Through surveys and mapping, CDFW will document the current status of natural resources in the KWA.
2. CDFW will conduct scoping to identify issues of concern to the public, neighboring landowners, and agencies.
3. CDFW will write the LMP based on state policy, management goals, and the results of public scoping and surveys.
4. CDFW will prepare an initial study of possible environmental effects, and propose mitigation for potentially significant effects.
5. If all potential significant effects can be effectively avoided or mitigated, CDFW will prepare a mitigated negative declaration (MND) under CEQA.
6. CDFW will issue a notice of availability (NOA) to initiate public review of the IS/MND and LMP.
7. The public and agencies will review the IS/MND and LMP for adequacy over a 30-day period, and will provide comments.
8. Review comments will be considered; CDFW decision-makers will approve the IS/MND if it is found to be adequate.
9. CDFW will issue a notice of determination (NOD), allowing the LMP to be adopted.

How can I submit comments or questions?

At the public scoping meeting, you can fill out a comment form or submit a comment verbally. After the meeting, and until 11 June 2015, contact:

Mr. Conrad Jones, Senior Environmental Scientist and Supervisor; California Department of Fish and Wildlife, Bay/Delta Region (3); 7329 Silverado Trail, Napa, CA 94558. You can also call Mr. Jones at 707-944-5544.

Comments postmarked or telephoned after 11 June 2015 will not be considered during initial development of the LMP, but you will have another opportunity to comment once the public draft LMP and CEQA document are complete, in spring or summer 2016.

Appendix C. Initial Study/Negative Declaration

Negative Declaration

Pursuant to Sections 15070 and 15071 of the California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines), the California Department of Fish and Wildlife (CDFW) proposes to adopt this negative declaration.

1. **Title and Short Description of Project:** Knoxville Wildlife Area (KWA) Land Management Plan (LMP):

The California Department of Fish and Wildlife is proposing to adopt an LMP for the KWA to help guide maintenance, operations, and planning for the wildlife area. The KWA is an approximately 20,900-acre mix of oak woodland, grassland, chaparral, and riparian habitats, located in eastern Napa County and western Yolo County. An LMP was prepared in 2005 for the northern portion of the KWA; however, significant land has been added to the KWA since that time. CDFW has updated the LMP to account for these land acquisitions, to reflect current resource conditions in the KWA, and to respond to changes in CDFW policy.

CDFW, as part of the Resources Agency of the State of California, has the following mission to guide its planning and operations: "to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public."

CDFW develops management plans for all lands that it administers. Its purpose in preparing each plan is multifold:

1. Guide the adaptive management of habitats, species, and programs to achieve the department's mission to protect and enhance wildlife values.

2. Serve as a guide for appropriate public uses of the property.

3. Serve as a descriptive inventory of fish, wildlife, plants, and habitats that occur on the property.

4. Provide an overview of the property's operation and maintenance and the personnel needed to implement management goals. Serve as a budget planning aid for annual regional budget preparation.

5. Present the environmental documentation necessary for compliance with state and federal statutes and regulations, provide a description of potential and actual environmental impacts that may occur during plan management, and identify mitigation measures to avoid or lessen these impacts.

In addition, the KWA LMP applies an ecosystem approach to the management of the KWA, in a manner that promotes cooperative relationships with owners and managers of adjoining private and public lands.

2. **Location of Project:** The KWA is approximately 20,900 acres in size, and is located north of Lake Berryessa in eastern Napa County. A small northern portion of the KWA overlaps Yolo County.

3. **Project Proponent:** California Department of Fish and Wildlife.

4. **Said project will not have a significant effect on the environment for the following reasons:**

The proposed project is the adoption of a land management plan, which by itself would cause no environmental impacts. Implementation of the LMP may result in actions that would physically alter the environment. Actions that may result from the implementation of the LMP were anticipated and analyzed at a programmatic level.

Although implementation of some elements of the LMP could cause environmental impacts, these would not be substantial. The LMP includes required tasks that, when implemented, would avoid significant impacts. Also, most management activities would enhance rather than degrade the environment. Lastly, all activities that may be implemented in the future as a result of adopting the LMP will be subjected to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine whether additional CEQA documentation is needed. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

5. **As a result thereof, the preparation of an environmental impact report pursuant to CEQA (Division 13 of the Public Resources Code of the State of California) is not required. In accordance with CEQA Section 21082.1, CDFW has reviewed and analyzed the initial study/negative declaration for the proposed project and finds that it reflects the independent judgment of CDFW.**

Print Form

Appendix C

Notice of Completion & Environmental Document Transmittal

2017042067

SCH #

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
Street Address: 1400 Tenth Street, Sacramento, CA 95814

Project Title: Knoxville Wildlife Area (KWA) Land Management Plan (LMP)

Lead Agency: California Department of Fish and Wildlife — **Contact Person:** Conrad Jones

Mailing Address: 7329 Silverado Trail — **Phone:** 707-944-5544

City: Napa — **Zip:** 94558 — **County:** Napa

Project Location: County: Napa — City/Nearest Community: Guinda

Cross Streets: Berryessa-Knoxville Rd and Morgan Valley Rd, N of Project — **Zip Code:** 94558

Longitude/Latitude (degrees, minutes and seconds): 38 ° 45 ' 14.86" N / -122 ° 17 ' 03.07" W **Total Acres:** 20,905

Assessor's Parcel No.: multiple — **Section:** multi **Twp.:** multi **Range:** multi **Base:** MDM

Within 2 Miles: State Hwy #: NA — Waterways: Creeks: Eticuera, Zim Zim, Knoxville, Foley, Adams.

Airports: Myst. Val. Airpt., Strip N of Lak — Railways: NA — Schools: NA

Document Type:

CEQA: ☐ NOP ☐ Early Cons ☒ Neg Dec ☐ Mit Neg Dec ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ☐ Other:

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI ☐ Other: ☐ Joint Document ☐ Final Document ☐ Other:

Governor's Office of Planning & Research

APR 25 2017

STATE CLEARINGHOUSE

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan ☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan ☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.) ☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other: Land Mgmt Plan

Development Type:

☐ Residential: Units ____ Acres ____
☐ Office: Sq.ft. ____ Acres ____ Employees ____
☐ Commercial: Sq.ft. ____ Acres ____ Employees ____
☐ Industrial: Sq.ft. ____ Acres ____ Employees ____
☐ Educational: ____
☐ Recreational: ____
☐ Water Facilities: Type ____ MGD ____
☐ Transportation: Type ____
☐ Mining: Mineral ____
☐ Power: Type ____ MW ____
☐ Waste Treatment: Type ____ MGD ____
☐ Hazardous Waste: Type ____
☐ Other: NA: Land Management Plan for State Wildlife Area

Project Issues Discussed in Document:

☒ Aesthetic/Visual
☒ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☐ Coastal Zone
☐ Drainage/Absorption
☐ Economic/Jobs
☐ Fiscal
☐ Flood Plain/Flooding
☒ Forest Land/Fire Hazard
☒ Geologic/Seismic
☒ Minerals
☒ Noise
☒ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☐ Schools/Universities
☐ Septic Systems
☐ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☐ Solid Waste
☒ Toxic/Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☐ Water Supply/Groundwater
☒ Wetland/Riparian
☐ Growth Inducement
☒ Land Use
☒ Cumulative Effects
☐ Other:

Present Land Use/Zoning/General Plan Designation:

Agricultural Watershed (Napa Co.) and Public Open Space and Agriculture Extensive (Yolo Co.)

Project Description: *(please use a separate page if necessary)*

CDFW has prepared an LMP for the KWA. The KWA is an approximately 20,900-acre mix of oak woodland, grassland, chaparral, and riparian habitats, located north of Lake Berryessa in eastern Napa County. An LMP was prepared in 2005 for the northern portion of the KWA; however, significant land has been added to the KWA since that time. CDFW has updated the LMP to account for these land acquisitions, to reflect current resource conditions, and to respond to changes in CDFW policy. The LMP establishes management goals and tasks that will ensure the long-term conservation of wildlife (invertebrates, amphibians, reptiles, birds, and mammals), special-status plants and plant communities, and their habitats on the KWA. The LMP also describes appropriate public uses of the KWA and provides environmental analysis of land management tasks and public uses.

State Clearinghouse Contact: TP (916) 445-0613

State Review Began: 4 - 25 - 2017

SCH COMPLIANCE 5 - 24 - 2017

Please note State Clearinghouse Number (SCH#) on all Comments

SCH#: 2017042067

Please forward late comments directly to the Lead Agency

AQMD/APCD 2

Project Sent to the following State Agencies

- X Resources
- ____ Boating & Waterways
- ____ Coastal Comm
- ____ Colorado Rvr Bd
- X Conservation
- ____ CDFW # ____
- X Delta Protection Comm
- ____ Cal Fire
- ____ Historic Preservation
- X Parks & Rec
- X Central Valley Flood Prot.
- ____ Bay Cons & Dev Comm.
- X DWR
- ____ OES
- ____ Resources, Recycl. & Recovery

CalSTA

- X Aeronautics
- ____ CHP
- X Caltrans# 4
- ____ Trans Planning

Other

- ____ HCD
- ____ Food & Agriculture

State/Consumer Svcs

- ____ General Services

Cal EPA

- ____ ARB: Airport & Freight
- ____ ARB: Transportation Projects
- ____ ARB: Major Industrial/Energy
- ____ SWRCB: Div. of Drinking Water
- ____ SWRCB: Div. Drinking Wtr #____
- ____ SWRCB: Div. Financial Assist.
- ____ SWRCB: Wtr Quality
- ____ SWRCB: Wtr Rights
- X Reg. WQCB # 5S
- ____ Toxic Sub Ctrl-CTC

Yth/Adlt Corrections

- ____ Corrections

Independent Comm

- X Delta Stewardship Council
- ____ Energy Commission
- X NAHC
- ____ Public Utilities Comm
- ____ State Lands Comm
- ____ Tahoe Rgl Plan Agency
- ____ ____ Conservancy

Other: ____

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "**X**".
If you have already sent your document to the agency please denote that with an "**S**".

X	Air Resources Board	____	Office of Historic Preservation
____	Boating & Waterways, Department of	____	Office of Public School Construction
____	California Emergency Management Agency	____	Parks & Recreation, Department of
____	California Highway Patrol	____	Pesticide Regulation, Department of
____	Caltrans District # ____	____	Public Utilities Commission
____	Caltrans Division of Aeronautics	X	Regional WQCB # S5
____	Caltrans Planning	____	Resources Agency
____	Central Valley Flood Protection Board	____	Resources Recycling and Recovery, Department of
____	Coachella Valley Mtns. Conservancy	____	S.F. Bay Conservation & Development Comm.
____	Coastal Commission	____	San Gabriel & Lower L.A. Rivers & Mtns. Conservancy
____	Colorado River Board	____	San Joaquin River Conservancy
____	Conservation, Department of	____	Santa Monica Mtns. Conservancy
____	Corrections, Department of	____	State Lands Commission
____	Delta Protection Commission	____	SWRCB: Clean Water Grants
____	Education, Department of	____	SWRCB: Water Quality
____	Energy Commission	____	SWRCB: Water Rights
____	Fish & Game Region # ____	____	Tahoe Regional Planning Agency
____	Food & Agriculture, Department of	____	Toxic Substances Control, Department of
X	Forestry and Fire Protection, Department of	X	Water Resources, Department of
____	General Services, Department of		
____	Health Services, Department of	____	Other: ____
____	Housing & Community Development	____	Other: ____
X	Native American Heritage Commission		

Local Public Review Period (to be filled in by lead agency)

Starting Date April 24, 2017 Ending Date May 24, 2017

Lead Agency (Complete if applicable):

Consulting Firm: H. T. Harvey & Associates
Address: 1331 Garden Highway, Suite 300
City/State/Zip: Sacramento, CA 95833
Contact: Mr. Matthew Wacker
Phone: (916) 779-7350

Applicant: California Department of Fish and Wildlife
Address: 7329 SilveradoTrail
City/State/Zip: Napa, CA 94558
Phone: (707) 944-5500

Signature of Lead Agency Representative: Scott Wilson **Date:** April 21, 2017

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

1.0 Environmental Checklist

PROJECT INFORMATION	
1. Project Title:	Knoxville Wildlife Area (KWA) Land Management Plan (LMP)
2. Lead Agency Name and Address:	California Department of Fish and Wildlife (CDFW) Bay/Delta Region (3) 7329 Silverado Trail Napa, CA 94558
3. Contact Person and Phone Number:	Mr. Conrad Jones, Senior Environmental Scientist Supervisor 707-944-5544
4. Project Location:	Except for its northeast corner, the KWA is located in northeast Napa County, centered roughly 5 miles north of Lake Berryessa, along Berryessa–Knoxville Road. The northeast corner of the KWA extends into northwestern Yolo County. The KWA can be found on the U.S. Geological Survey's Brooks, Guinda, Knoxville, and Walter Springs 7.5-minute quadrangle maps.
5. Project Sponsor's Name and Address:	CDFW Bay/Delta Region (3) 7329 Silverado Trail Napa, CA 94558
6. General Plan Designation:	Agriculture, Watershed & Open Space (Napa County), Open Space and Agriculture (Yolo County)
7. Zoning:	Agricultural Watershed (Napa County), Public Open Space and Agricultural Extensive (Yolo County)

8. Description of Project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)

CDFW has prepared an LMP for the KWA. The KWA is an approximately 20,900-acre mix of oak woodland, grassland, chaparral, and riparian habitats, centered approximately 5 miles north of Lake Berryessa in eastern Napa County. A small northern portion of the KWA overlaps Yolo County. An LMP was prepared in 2005 for the northern portion of the KWA; however, significant land has been added to the KWA since that time. CDFW has updated the LMP to account for these land acquisitions, to reflect current resource conditions in the KWA,

and to respond to changes in CDFW policy. The LMP establishes management goals and tasks that will ensure the long-term conservation of wildlife (invertebrates, amphibians, reptiles, birds, and mammals), special-status plants and plant communities, and their habitats on the KWA. The LMP also describes appropriate public uses of the KWA and provides environmental analysis of land management tasks and public uses. See Section 1 of the LMP for additional information on the purpose and content of the LMP.

9. Surrounding Land Uses and Setting: Briefly describe the project's surroundings:	See Section 2 of the LMP for a description of the property.
10: Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement):	None.
11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code Section 21080.3.1? If so, has consultation begun? Note: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts on tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (See Public Resources Code Section 21083.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per Public Resources Code Section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that Public Resources Code Section 21082.3(c) contains provisions specific to confidentiality.	In compliance with Public Resources Code Section 21080.3.1 and the CDFW Tribal Communication and Consultation Policy, CDFW requested a list of tribes potentially affected by the LMP from the Native American Heritage Commission. Upon receipt of the listed tribes and their contacts, CDFW provided official notification of the LMP to those tribal contacts on May 6, 2015, which resulted in one request for formal consultation on the LMP. An informational meeting occurred on July 17, 2015, with the Yocha Dehe Wintun Nation at the Middletown Rancheria. At the meeting, the range of alternatives to be considered in the plan was described. Additional information regarding the project timeline and recent cultural surveys was requested by the tribe and was provided by CDFW. No potential for significant impacts to affect tribal cultural resources was identified during correspondence or meetings with tribal representatives.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology / Soils
☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality
☐ Land Use / Planning	☐ Mineral Resources	☐ Noise
☐ Population / Housing	☐ Public Services	☐ Recreation
☐ Transportation / Traffic	☐ Tribal Cultural Resources	☐ Utilities / Service Systems
☐ Mandatory Findings of Significance		

DETERMINATION:

On the basis of this initial evaluation:

☒ I find that the proposed Project **could not** have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

❑ I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

❑ I find that the proposed Project **may** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT (EIR)** is required.

❑ I find that the proposed Project **may** have a "potentially significant impact" or 'potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **EIR** is required, but it must analyze only those effects that remain to be addressed.

❑ I find that although the proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier **EIR** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed Project, nothing further is required.

Scott Wilson

Scott Wilson, Regional Manager

April 21, 2017

Date

EVALUATION OF ENVIRONMENTAL IMPACTS

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a) Earlier Analysis Used. Identify and state where they are available for review.
   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared

or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

a) the significance criteria or threshold, if any, used to evaluate each question; and
b) the mitigation measure identified, if any, to reduce the impact to less than significance.

This initial study was prepared in accordance with the provisions of CEQA and the State CEQA Guidelines to identify and evaluate the potential environmental impacts of operating the KWA under the provisions of the updated KWA LMP. This initial study concludes that adoption and implementation of the LMP would result in "less-than-significant impacts" or "no impacts" on the environment.

The goals, tasks, and activities described in the LMP were evaluated for their potential effects on the environment. Also, actions that may result from adoption of the plan were anticipated and potential accompanying impacts were analyzed. The environmental analysis was conducted concurrent with the development of the LMP. Impact minimization measures were incorporated into the LMP wherever possible to help ensure that planned actions described in the LMP, including those to be implemented in the future, will not result in significant environmental impacts. Therefore, the CEQA analysis summarized herein is intended to be adequate for many future projects implemented in a manner consistent with the goals and tasks of the adopted LMP.

The LMP provides the environmental and regulatory setting description, as well as the project description, used for this CEQA analysis.

Sections 1 through 3 serve as the environmental setting: Section 1 provides the purpose of the management plan and the KWA and gives an overview of the planning process; Section 2 describes the physical and cultural characteristics and features of the KWA, including the history of its acquisition by CDFW, current and past land uses, the geological and hydrological setting, and the area's prehistoric and historical context; and Section 3 presents an inventory of plant communities and species that are found on or that may use the KWA.

Sections 4 through 6 serve as the project description: Section 4 defines the elements, goals, and objectives of the LMP; outlines the tasks that will be undertaken to meets these goals and objectives; and summarizes the environmental impacts expected to result from land management tasks; Section 5 summarizes the operations and maintenance tasks, personnel, and funds needed to meet the goals of the plan; and Section 6 summarizes CDFW's climate change strategies and actions that have been incorporated into the goals and tasks of the plan's elements.

Aesthetics

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
I. Aesthetics. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Discussion

a, b, c, and d. No impact. Adopting and implementing the KWA LMP would preserve or enhance native vegetation and natural visual resources, would not involve construction of new buildings or outdoor lighting, and would not alter views from any scenic vistas. Facility improvements called for by the LMP would be small in scale (e.g., signs and fencing), and goals and tasks in the LMP require that the style of these facilities be in keeping with the rural character and natural environment of the wildlife area. Therefore, adoption of the LMP would not adversely affect scenic vistas, views, visual character, or scenic resources, nor would it create light or glare effects. There would be no aesthetic impact.

Agriculture and Forest Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
II. Agriculture and Forest Resources.				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.				
Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location of nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion

a, b, c, and d. No impact.

Adoption and implementation of the KWA LMP would conserve existing land resources and continue to allow livestock grazing where it supports management goals and objectives for the preservation and enhancement of the wildlife area. It would not result in construction of new structures or impervious surfaces, beyond the installation of signs, kiosks, fencing, and, potentially, small devices needed for scientific research. The project would not convert lands from forest or agricultural use to other uses. The project therefore would not impede farming of agricultural lands, affect lands under Williamson Act contracts, or result in the loss or conversion of forest or farmland. There would be no impact.

Air Quality

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
III. Air Quality.				
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied on to make the following determinations.				
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

Discussion

a, b, and c. Less-than-significant impact. The KWA is located in both the Bay Area Air Quality Management District (BAAQMD) and the Yolo-Solano Air Quality Management District (YSAQMD). Thus, the applicable air quality plans are the *Bay Area 2010 Clean Air Plan* (BAAQMD 2010) and the *Triennial Assessment and Plan Update* (YSAQMD 2013). A project would conflict with or obstruct implementation of these regional plans if it would be inconsistent with the growth assumptions on which the plans are based, or would not conform to the rules and regulations by which plan objectives and goals would be attained.

The KWA LMP is consistent with the growth assumptions of these plans and conforms to the rules and regulations by which plan objectives and goals would be attained. Implementing the KWA LMP would not result in any population growth, nor would it increase the use of motor vehicles. Thus, implementing the LMP would not contribute to growth. The LMP incorporates applicable rules and regulations of BAAQMD

and YSAQMD into the activities implementing the plan (as described under the Facilities Maintenance Element in Section 4, "Management Goals and Environmental Impacts.") Therefore, this project (the KWA LMP) would not conflict with or obstruct implementation of an applicable air quality plan. This impact would be less than significant.

Implementation of the LMP's management tasks (e.g., road and parking area maintenance, weed control, installation of fencing and signs, and performance of resource monitoring or research tasks) may temporarily require vehicle trips or the limited use of construction equipment. The greatest emissions would result from routine restoration and minor construction activities involving off-road machinery. Table 1 lists the estimated emissions of criteria pollutants from such activities, and also provides the corresponding significance thresholds established or proposed by BAAQMD and YSAQMD. The results in Table 1 are based on a 7-day-long activity, and only one to several such activities might occur during implementation of the LMP; other management activities would produce much lower emissions. These modeling results demonstrate that the emissions resulting from implementing the KWA LMP are well below significance criteria, and thus do not violate air quality standards or contribute substantially to an existing or projected air quality violation. This impact would be less than significant.

The KWA LMP would not result in a cumulatively considerable net increase in any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard, for two reasons. First, the size and frequency of activities requiring equipment and vehicles would not increase measurably over current conditions. Second, as described above, the LMP is consistent with applicable air quality plans and incorporates the associated rules and regulations, and emissions from LMP activities would be well below the significance criteria that have been established to prevent less-than-significant emissions from accumulating to produce a net increase in criteria pollutants (Table 1). This impact would be less than significant.

In addition, before implementing any projects that are consistent with the LMP, CDFW would subject them to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine if additional CEQA documentation is necessary. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

Table 1. Modelled Emissions of Maximum-Size Activity and Applicable Significance Thresholds for Criteria Pollutants

	Unmitigated Emissions of Hypothetical Maximum-Size LMP Activity[1]		Significance Threshold			
Pollutant	Pounds per Day[2]	Tons per Year[3]	Current BAAQMD Threshold[4]	Proposed BAAQMD Threshold[5]	YSAQMD Threshold[6]	Significant Impact?
ROG	2	<0.1	80 lbs/day	54 lbs/day	10 tons/year	No
NO_x	24	<0.1	80 lbs/day	54 lbs/day	10 tons/year	No
PM10	19	<0.1	80 lbs/day	82 lbs/day	80 lbs/day	No
PM2.5	5	<0.1	—	54 lbs/day	—	No
CO	17	<0.1	550 lbs/day	—	—	No
CO_2e	3,168	7	—	1,200 tons/year	1,200 tons/year[7]	No

Notes: BAAQMD = Bay Area Air Quality Management District; CO = carbon monoxide; CO_2e = carbon dioxide equivalents; lbs = pounds; NO_x = oxides of nitrogen, PM10 = particulate matter less than 10 microns in diameter; PM2.5 = particulate matter less than 2.5 microns in diameter; ROG = reactive organic gases; YSAQMD = Yolo-Solano Air Quality Management District.

1 The hypothetical maximum-size LMP activity was assumed to have a 1-acre footprint and involve 7 days of construction, with three pieces of off-road equipment and four worker trips per day (at 50 miles each way, with 2.5 miles on unpaved roads). Emissions were modelled using CalEEMod.2013.2.2. In CalEEMod modeling, "City Park" was selected as most similar land use, and modeling assumed no off-site hauling and no operational changes (i.e., no increase in number of visitors, water or electricity consumption, or solid waste generation).

2 Based on maximum daily emissions of any phase of construction.

3 Sum of all emissions from 7-day activity.

4 Source: BAAQMD 1999.

5 Source: BAAQMD 2011; currently, BAAQMD is not recommending use of these thresholds.

6 Source: YSAQMD 2007.

7 Not an adopted YSAQMD threshold, but a YSAQMD-recommended Sacramento Metropolitan Air Quality Management District threshold (SMAQMD 2016).

d and e. No impact. Adoption and implementation of the KWA LMP would not result in generation of substantial pollutant concentrations, nor would it create objectionable odors affecting a substantial number of people. The single private residence located closest to the KWA is approximately 740 feet outside the southwest portion of the main wildlife area. A single CDFW staff residence is located within the KWA. Otherwise, there are no residences in or near the KWA. There are no schools, hospitals, or other sensitive receptors nearby. The region is mostly rural and undeveloped, with scattered and isolated ranch residences, natural area reserve residences, and small settlements such as Walter Springs and Hidden Valley Lake. These are typically more than a mile from the boundary of the KWA. Because there are so few receptors near the KWA, there would be no impact.

Biological Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IV. Biological Resources. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☒	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☒	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion

a, b, c, d. Less-than-significant impact. The KWA LMP was developed with the primary purpose of adaptively managing habitats, species, and programs to achieve CDFW's mission to protect and enhance wildlife values. Implementation of the LMP would maintain the wildlife area in a natural state and allow only compatible uses to occur.

Four wildlife species designated by the Department as California species of special concern are known to occur in the KWA: the foothill yellow-legged frog (*Rana boylii*), the western pond turtle (*Actinemys marmorata*), the long-eared owl (*Asio otus*), and the American badger (*Taxidea taxus*). Additionally, the prairie falcon (*Falco mexicanus*) is likely to occur in the KWA because suitable habitat is present, and the species has been observed flying near the southern boundary of KWA. The species was recently downlisted from a species of special concern to a watch-list species; however, this species is still considered a species of management interest by the Department. Other special-status species that are likely to occur and have been documented in the vicinity of the KWA are the California red-legged frog (*Rana draytonii*) (federally listed as threatened and a California species of special concern), the golden eagle (*Aquila chrysaetos*) (fully protected), and Townsend's big-eared bat (*Corynorhinus townsendii*) (candidate for state listing as threatened).

Rare plant surveys were conducted between 2002 and 2004 for the 2005 LMP; for the 2016 LMP, additional rare plant surveys were conducted in 2015 and 2016, focusing on the portion of the KWA that had been added to the area since 2008 (CDFW 2005, 2016). No state- or federally listed plant species were documented to occur in the KWA during either set of surveys.

The following eight species that were encountered during one or both sets of rare plant surveys are categorized by the California Rare Plant Rank (CRPR) system as rare, threatened, or endangered in California or elsewhere (CRPR 1B):

- adobe lily (*Fritillaria pluriflora*)
- bent-neck fiddleneck (*Amsinckia lunaris*)
- Colusa layia (*Layia septentrionalis*)
- green jewelflower (*Streptanthus hesperidis*)
- Hall's harmonia (*Harmonia hallii*)
- Kruckeberg's jewelflower (*Streptanthus morrisonii*)
- northern California black walnut (*Juglans hindsii*)
- pink creamsacs (*Castilleja rubicundula* ssp. *rubicundula*)

Keck's checkerbloom (*Sidalcea keckii*), a CRPR 1B species that is now federally listed as endangered, was identified during the surveys that were conducted prior to 2005; however, genetic analysis conducted in 2016 indicated that the plants originally identified as *S. keckii* more likely belong to a different, more widely distributed species or a hybrid (see Appendix F of the LMP).

One species, Heller's bush mallow (*Malacothamnus helleri*), is on the review list (CRPR 3).

Fifteen species encountered during the rare plant surveys are classified as having limited distribution (CRPR 4):

- bare monkeyflower (*Mimulus nudatus*)
- Cleveland's milk vetch (*Astragalus clevelandii*)
- Cleveland's ragwort (*Packera clevelandii*)
- green monardella (*Monardella viridis*)
- Hoover's lomatium (*Lomatium hooveri*)
- Jepson's navarretia (*Navarretia jepsonii*)
- marsh zigadenus (*Toxicoscordion fontanum*)
- modest rockcress (*Arabis modesta*)
- Purdy's fritillary (*Fritillaria purdyi*)
- Purdy's onion (*Allium fimbriatum* var. *purdyi*)
- serpentine bird's-beak (*Cordylanthus tenuis* ssp. *brunneus*)
- serpentine collomia (*Collomia diversifolia*)
- serpentine sunflower (*Helianthus exilis*)
- swamp larkspur (*Delphinium uliginosum*)
- sylvan microseris (*Microseris sylvatica*)

The plant species that are CRPR 1B or CRPR 3 are eligible for state listing under the California Endangered Species Act. Impacts on these species or their habitats must be analyzed during CEQA review because they meet the definition of rare or endangered under the State CEQA Guidelines, Sections 15125 (c) and 15380 (CNPS 2016). CRPR 4 species are plants with limited distribution whose vulnerability to extinction appears low at this time. These species probably do not meet the eligibility requirements for state listing, but the California Native Plant Society recommends that CRPR 4 plants be considered in the CEQA review process because many of them are of local significance. The following analysis therefore applies to all of the plant and special-status wildlife species named above.

Although the purpose of the LMP is to protect and enhance wildlife values in the KWA, some LMP tasks could temporarily disturb natural habitats and species, including the special-status species described above and sensitive natural communities such as streams, ponds, and wetlands. Tasks that may result in limited ground disturbance (i.e., typically 1 acre or less) or in short-term increases in dust, noise, vibrations, human activity, and erosion would include small-scale restoration or enhancement of stock ponds and creeks, development of water sources for wildlife and domestic livestock, weed control, installation of fences and

signs, performance of scientific research tasks, road and parking area maintenance, and implementation of modified grazing management practices.

For these tasks, the LMP requires appropriate measures to avoid or minimize adverse effects on biological resources. These measures include directing the public away from sensitive habitats, implementing erosion and sedimentation control measures, preventing the spread of weeds, and avoiding direct impacts on biological resources (e.g., permanent loss or alteration of habitat, mortality, or injury). Implementation of these measures alongside other LMP tasks would ensure that any adverse effects on special-status species or sensitive natural communities, including wetlands, are less than significant.

Furthermore, numerous federal, California, and local government agencies potentially have regulatory authority over LMP tasks that could adversely affect special-status species and sensitive natural communities. The LMP requires appropriate agency coordination and compliance with the terms and conditions of any permits or other authorizations issued by these agencies to protect biological resources (see Goal 2 of the Administration and Maintenance Element), further ensuring that any adverse effects on special-status species or sensitive natural communities would be less than significant.

Finally, despite the potential for temporary, small-scale impacts on special-status species and sensitive natural communities because of some LMP tasks, the primary purpose of the LMP is to protect and enhance wildlife values in the KWA. CDFW would manage, enhance, or restore biological resources in the KWA consistent with the LMP, with the long-term goal of improving habitat conditions and enhancing special-status plant and animal populations in the wildlife area.

Because the LMP incorporates specific minimization and avoidance measures as required LMP tasks, the temporary and small-scale impacts on special-status species or sensitive natural communities that could result from LMP implementation would be less than significant, and, overall, implementation of the LMP is expected to have a net beneficial effect on biological resources over the long term.

In addition, before implementing any projects that are consistent with the LMP, CDFW would subject them to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine if additional CEQA documentation is necessary. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

e and f. No impact. The KWA LMP is consistent with the Napa County General Plan (2008), Yolo County's 2030 Countywide General Plan (2009), and County ordinances (see Section X, "Land Use and Planning," for details on zoning and land use). The LMP also is consistent with the Central Valley Regional Water Quality Control Board's (RWQCB's) Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) (2011), which identifies and seeks to protect beneficial uses of Lake Berryessa (downstream of the KWA), including benefits to fish and wildlife (see Section IX, "Hydrology and Water Quality," for further discussion of the Basin Plan). There are no other applicable regional, local, or

state plans addressing biological resources, nor do any adopted habitat conservation plans or natural community conservation plans apply to the wildlife area. There would be no impact.

Cultural Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
V. Cultural Resources. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☐	☒	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐
d) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

Discussion

a, b, c, and d. Less than significant. Under implementation of the KWA LMP, the KWA will remain largely undeveloped and in a natural or seminatural state. The area will be managed for conservation of natural resources and compatible public uses. The proposed LMP would not require any substantial construction or excavation, and so is not expected to adversely affect any historical, archaeological, geological, or paleontological resources, or to disturb any human remains.

On occasion, management could result in ground or vegetation disturbance or could draw attention to cultural resources; examples of such tasks are invasive plant control efforts, fence and sign installation, mowing, trail maintenance, and, potentially, installation of small devices for scientific research. Known cultural resources may be present in the work areas of such activities, or work could reveal yet-undiscovered resources. Buried cultural resources may be from the prehistoric or historical period. Prehistoric indicators could include obsidian or chert flakes and flaked stone tools, groundstone implements (grinding slabs, mortars, and pestles), and locally darkened midden soils containing artifacts, fragments of bone, or fire-affected stones. Historical site indicators may include fragments of glass, ceramic and metal objects, milled or split lumber, and structure and feature remains such as building foundations, privy pits, wells, and dumps.

Siting public-use infrastructure (such as signs) near a visible cultural resource, revealing cultural resources through vegetation removal or ground disturbance, or otherwise disturbing cultural resources could irreversibly damage or degrade the resource or draw undesired attention to it. Sturdy historical features, such

as foundations and corrals, as well as prehistoric bedrock mortars, are less likely to suffer as a result of added public attention or nearby vegetation removal than more ephemeral features, such as lithic scatters. In all cases, if the effect could change the significance of possible historical resources, unique archaeological resources, human remains, or paleontological or geologic resources, this impact could be potentially significant.

However, the proposed KWA LMP contains goals and tasks to prevent degradation of cultural resources. CDFW would review records of known cultural resources and conduct surveys if no recent records exist for an area that might be affected by a management activity. Activities such as installation of infrastructure and maintenance of public access routes would be sited away from cultural resources whenever possible. Any known or newly discovered resources that cannot be avoided and that might be affected by an activity would be evaluated and documented by a qualified professional archaeologist; if necessary, a treatment plan would be developed to protect the resource. Treatment may include consultation with tribal representatives, as appropriate. The LMP also contains tasks that require CDFW or its contractors to stop work if cultural resources or human remains are discovered during an activity, and to initiate appropriate evaluation, documentation, and treatment of the find. Because these measures incorporated into the LMP would ensure that adverse effects on cultural resources do not occur, this impact would be less than significant.

In addition, before implementing any projects that are consistent with the LMP, CDFW would subject them to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine if additional CEQA documentation is necessary. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

Geology and Soils

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VI. Geology and Soils. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to California Geological Survey Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

Discussion

a, c, d, e. No impact. Adoption and implementation of the KWA LMP would not require the construction of buildings or the installation of wastewater disposal systems. Therefore, LMP implementation would not change the current exposure of people to geologic hazards or expansive soils, or involve the use of wastewater disposal systems in unsuitable soils. There would be no impact.

b. Less-than-significant impact. The KWA LMP calls for implementation of some management tasks that would involve ground disturbance, which could lead to soil erosion or loss of topsoil. These tasks include

small-scale restoration of stock ponds and creeks, development of water sources for wildlife, vegetation management and weed control, installation of fences and signs, installation of devices for scientific research, road and parking area maintenance, and implementation of modified grazing management practices. Although these activities have potential to temporarily cause erosion, over the long term they would achieve a net decrease in soil loss, by supporting and protecting healthy native plant and animal communities and habitats. Additionally, the LMP requires that measures be implemented to minimize adverse erosion effects during management activities (see also Section IX, "Hydrology and Water Quality"). Furthermore, as described in the LMP, all management activities would conform to regulatory requirements regarding soil erosion (in particular, see tasks under Goal 2 of the Administration and Maintenance Element and Goal 6 of the Management Coordination Element). Therefore, implementation of the LMP would have a less-than-significant short-term effect as a result of erosion and loss of topsoil, and a net beneficial effect over the long term.

In addition, before implementing any projects that are consistent with the LMP, CDFW would subject them to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine if additional CEQA documentation is necessary. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

Greenhouse Gas Emissions

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VII. Greenhouse Gas Emissions. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

Discussion

a. Less-than-significant impact. For two reasons, the KWA LMP would not generate greenhouse gas (GHG) emissions, either directly or indirectly, that would have a significant impact on the environment. First, the activities required to implement the LMP mostly would continue the current KWA operations and level of public use, and so would not result in a measurable net increase in GHG emissions emanating from the KWA or in off-site emissions related to its management and use. In fact, as described under "b" below, GHG emissions would decrease during implementation of the LMP.

Second, the management activities that would generate the greatest emissions (routine restoration and minor construction) would do so at levels well below proposed significance thresholds. In 2011, BAAQMD proposed a significance threshold of 1,100 metric tons (1,213 tons) of CO_2e (carbon dioxide equivalents) per year for construction activities, based on consistency with California legislation to reduce statewide GHG emissions (BAAQMD 2011). YSAQMD has not adopted a significance threshold for GHG emissions, but has recommended application of the Sacramento Metropolitan Air Quality Management District standard of 1,100 metric tons (1,213 tons) of CO_2e per year (SMAQMD 2016). Both of these thresholds were developed based on substantial evidence. The CO_2e emissions of LMP-related routine restoration and minor construction activities (Table 1) are estimated to be well below these significance thresholds, even if these activities were spread throughout the year instead of during one hypothetical 7-day-long activity, as represented in Table 1. (At most, only one to several weeks per year of these higher-emission activities are expected to occur during implementation of the LMP.) Other potential management actions would produce much lower levels of emissions.

Furthermore, consistent with Sections 15064(h)(3) and 15130(d) of the State CEQA Guidelines, as long as the LMP complies with the requirements of a previously adopted plan or mitigation program for reducing

greenhouse gas emissions, the greenhouse gases emitted during implementation of the LMP would not constitute a cumulatively considerable, incremental contribution to a cumulative effect on the environment. In 2011, Yolo County adopted such a plan: *Yolo County Climate Action Plan: A Strategy for Smart Growth Implementation, Greenhouse Gas Reduction, and Adaptation to Global Climate Change* (Yolo County 2011). In 2012, Napa County completed a draft plan, *Napa County Climate Action Plan*, which has not been adopted and is currently under revision (Napa County 2012). BAAQMD's *Bay Area 2010 Clean Air Plan* also addresses reducing GHG emissions (BAAQMD 2010). The KWA LMP would be consistent with all of these plans, as described under "b" below.

For the reasons given above, the generation of GHGs by activities implementing the KWA LMP would have a less-than-significant impact on the environment.

In addition, before implementing any projects that are consistent with the LMP, CDFW would subject them to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine if additional CEQA documentation is necessary. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

b. No impact. In 2006, Assembly Bill (AB) 32 established a goal for reduced GHG emissions by 2020, and in 2015, Executive Order B-30-15 established additional related goals. AB 32 also directed the California Air Resources Board (ARB) to develop a plan (known as the AB 32 Scoping Plan) for California to achieve that goal. ARB adopted the Scoping Plan in 2008 (ARB 2008). It describes the actions that the state government will undertake to reduce GHG emissions, and recommends that municipalities also take actions to reduce GHG emissions. Many municipalities have since developed a GHG emissions inventory and reduction plan (also known as a climate action plan) consistent with the Scoping Plan. In 2011, Yolo County adopted such a plan: *Yolo County Climate Action Plan: A Strategy for Smart Growth Implementation, Greenhouse Gas Reduction, and Adaptation to Global Climate Change* (Yolo County 2011). In 2012, Napa County completed a draft plan, *Napa County Climate Action Plan* (Napa County 2012), which has not been adopted and is currently under revision.

Although AB 32 does not provide an explicit role for air districts, the Scoping Plan identifies air districts as ARB partners in implementing California's GHG program, particularly with regard to reporting, developing, and enforcing rules and encouraging reductions in GHG emissions by municipalities. Consequently, YSAQMD has been integrating the reduction of GHG emissions into its programs and functions, and BAAQMD has addressed GHG emissions in its *Bay Area 2010 Clean Air Plan* (BAAQMD 2010).

The KWA LMP is consistent with the adopted Yolo County plan, the draft Napa County plan, and the BAAQMD plan. It would continue existing management and use of the KWA. Emissions in the KWA would be reduced incrementally from current levels as a result of national and state actions that reduce the emissions of vehicles and machinery. Also, the LMP incorporates applicable measures from the Napa County, Yolo County, and BAAQMD plans (e.g., the measures listed in Section 4.0, "Management Goals and Environmental Impacts," under Goal 6 of the Management Coordination Element). Furthermore,

implementing the LMP provides opportunities to increase carbon sequestration through restoration of riparian areas, facilitation of oak recruitment, and adjusting grazing practices to increase the potential for carbon storage in soils. Therefore, the KWA LMP would not conflict with applicable plans, policies, or regulations adopted for the purpose of reducing the emissions of GHG. There would be no impact.

Hazards and Hazardous Materials

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VIII. Hazards and Hazardous Materials. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

Discussion

a, c, d, and e. No impact. Adoption and implementation of the KWA LMP would not involve routine transport, use, or disposal of hazardous materials. The LMP's management tasks do not involve generating

hazardous emissions or handling acutely hazardous materials (also, there are no existing or proposed schools within a quarter mile of the KWA). The KWA does not contain any sites that have been listed as hazardous materials sites and incorporated into the State Water Resources Control Board's (SWRCB's) GeoTracker Database (2016), and no hazardous materials sites are otherwise known to be in the KWA. Lastly, the KWA is not located near a public airport or in an airport land use plan area. There would be no hazardous materials impacts related to these criteria.

b. Less-than-significant impact. Some LMP tasks could involve the use of heavy equipment and vehicles, which require small amounts of hazardous materials such as oils, fuels, and other fluids. Also, weed control may employ herbicides that could be toxic to some organisms at certain concentrations. However, implementation of the LMP would not result in an increase in the size or frequency of activities requiring equipment, vehicle use, or potentially toxic chemicals relative to current conditions. Furthermore, the LMP requires the use of spill prevention and control best management practices (BMPs) during equipment use, to avoid or minimize potential adverse effects from spills or leaks. The LMP also specifies that herbicides be applied safely and effectively, in compliance with herbicide label instructions, California and federal law, and CDFW rules that aim to protect the environment. With implementation of these measures, this impact would be less than significant.

In addition, before implementing any projects that are consistent with the LMP, CDFW would subject them to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine if additional CEQA documentation is necessary. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

f. No impact. Two private airstrips are located between 0.8 and 1.7 miles of portions of the KWA: an agricultural airstrip near Lake Berryessa is approximately 1.6 miles from the southern boundary of the wildlife area, and another private airstrip, called Mysterious Valley Airport, is located 0.8 mile from the isolated western parcels of the KWA and 1.7 miles from the main wildlife area. However, very few people reside in or near the KWA. The adoption and implementation of the KWA LMP would not create a safety hazard by adding new residences or otherwise attracting additional people to locations near these airstrips. Also, the project would not adversely affect these airstrips by creating land use conflicts through the construction of new facilities. Rather, LMP implementation would maintain the current rural and natural character of the area. There would be no impact.

g. No impact. Implementation of the LMP would not impair or physically interfere with an adopted emergency response plan or emergency evacuation plan. The KWA region is sparsely populated and mostly undeveloped, so the demand for emergency response is minimal, and is expected to remain so. Furthermore, the LMP does not call for any changes in access that would impede emergency vehicles, nor does it call for construction of facilities that would create demand for additional services. Lastly, the LMP requires that CDFW cooperate and coordinate with California Department of Forestry and Fire Protection (CAL FIRE)

and the Napa County Sheriff's Department, with the goal of improving emergency responses. There would be no impact.

h. No impact. Implementation of the LMP would not expose people or structures to a significant risk of loss, injury, or death involving wildland fires. The KWA is located in a region where wildfires are relatively frequent and of concern to nearby communities. However, even though implementing the LMP's management tasks would occasionally involve construction equipment or vehicles that could contribute to wildfire starts, the size and frequency of such tasks would not represent an increase over current management activities. Additionally, the LMP does not call for the construction of additional structures or facilities that would place more people at risk. Currently, only visitors and CDFW staff use the KWA, and the type and level of use is expected to remain similar during implementation of the proposed LMP. Finally, the adoption and implementation of the LMP's goals and tasks would result in a long-term reduction of wildland fire risk. Pertinent tasks include coordinating fire responses and fuels management with CAL FIRE, applying BMPs to minimize equipment-related fire hazards, reducing the accumulation of fuels through vegetation management (e.g., livestock grazing), and managing natural communities with the goal of maintaining suitable fire regimes. Net project impacts related to wildfire hazards are expected to be beneficial.

Hydrology and Water Quality

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IX. Hydrology and Water Quality. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☒
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☐	☐	☐	☒
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Result in inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

Discussion

a. Less-than-significant impact. Some management tasks described in the LMP have a potential to cause erosion, sedimentation, and associated water quality degradation, and therefore could result in violations of water quality standards. These tasks include small-scale restoration of stock ponds and creeks, development of water sources for wildlife, vegetation management and weed control, installation of fences and signs near watercourses, installation of devices for scientific research, road and parking area maintenance, and implementation of modified grazing management practices. These tasks would be implemented with a long-term goal and expectation of improving water quality; nevertheless, they could temporarily contribute to erosion, sedimentation, and other types of construction-related water pollution by a small amount, primarily through soil disturbance.

The KWA is located in the plan area of the Central Valley RWQCB's Basin Plan (Central Valley RWQCB 2011). The Basin Plan establishes water quality objectives for inland waters, including Lake Berryessa, located just downstream of the KWA. The Basin Plan also identifies water quality concerns for, and beneficial uses of, specific water bodies. Lake Berryessa is identified as providing beneficial uses for recreation, wildlife, agriculture, and municipal needs. Mercury levels are discussed in the Basin Plan as being of concern for people who consume fish caught from the lake.

The KWA LMP is consistent with the objectives of the Basin Plan, and would not adversely affect the beneficial uses of Lake Berryessa or any other inland water body. Under implementation of the KWA LMP, the KWA will remain largely undeveloped and in a natural or seminatural state. The proposed LMP would not require any substantial construction or excavation, so management tasks would not contribute any pollutants that might degrade the beneficial uses of downstream waters. Instead, the area will be managed for conservation of natural resources and compatible public uses. Goals and tasks in the LMP require that measures be implemented to abate erosion and protect aquatic habitats and water quality from impacts that could result from routine operations (e.g., see the tasks under Goal 1 of the Aquatic and Riparian Ecosystems Element, Goal 1 of the Biological Monitoring Element, and Goal 6 of the Management Coordination Element). Grazing would be managed under the KWA grazing plan to protect sensitive riparian and wetland areas from overuse by livestock to the extent feasible (see Goal 2 of the Aquatic and Riparian Ecosystems Element). Spill prevention and control BMPs would be implemented to prevent and contain any leaks or spills of fluids used for equipment and vehicles (Task 5 under Goal 6 of the Management Coordination Element). These measures would reduce potential temporary adverse effects of management activities to less-than-significant levels. Furthermore, the KWA LMP prescribes tasks that will ultimately enhance water quality; for example, the LMP calls for actions to restore watersheds, maintain healthy wildlife and plant populations, control invasive weeds, achieve sustainable fire regimes, direct the public away from sensitive areas, and support biodiversity. Net project results on hydrology and water quality would be beneficial over the long term.

In addition, LMP goals and tasks require that all management actions meet applicable regulatory requirements protecting aquatic habitats and water quality. Requirements include CDFW regulations, applicable sections of

the Clean Water Act, and relevant county policies and ordinances. Actions necessary to comply with these regulatory requirements would further protect water resources. Also, before implementing any projects that are consistent with the LMP, CDFW would subject them to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine if additional CEQA documentation is necessary. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

b, c, d, e, f, g, h, i, and j. No impact. Implementation of the LMP would require no new wells or drilling; therefore, it would cause no decrease in aquifer volumes. The KWA would remain largely undeveloped and managed for conservation of natural resources; thus, there would be no impacts on groundwater recharge, elevations, or volumes. The LMP does not call for the use of storm drain systems, the construction of structures or new sources of surface runoff, the use of a dam, or the redirection of stream courses or drainage patterns. Therefore, adoption and implementation of the LMP would not threaten storm drain capacity, increase 100-year flood hazards, add to surface runoff, create the potential for failure of a levee or dam, or cause substantial erosion or siltation. Restoration and monitoring activities would abate erosion and likely would reduce the risk of mudflows and landslides. Lastly, LMP implementation would not involve the construction of new housing or the exposure of more people to hazards involving floods, impaired water quality, or mudflows. There would be no impact.

Land Use and Planning

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
X. Land Use and Planning. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

Discussion

a, b, and c. No impact. Under implementation of the KWA LMP, the KWA will remain largely undeveloped and in a natural or seminatural state. The area will continue to be managed for conservation of natural resources and compatible public uses. Adoption and implementation of the KWA LMP would not physically divide an established community.

The KWA LMP is consistent with all applicable land use plans, policies, and regulations. Applicable regional plans and rules consist of the *Napa County General Plan* (2008), Yolo County's *2030 Countywide General Plan* (2009), related county ordinances, and the Central Valley RWQCB's Basin Plan (2011).

Under the Napa County General Plan, the KWA region is designated as Agriculture, Watershed & Open Space. The County's zoning map, consistent with the general plan, identifies the KWA region as zoned for Agricultural Watershed. This zone applies to areas where the predominant land use is agriculturally oriented, where watershed areas, reservoirs and floodplain tributaries are located, where development would adversely affect all such uses, and where the protection of agriculture, watersheds, and floodplain tributaries from fire, pollution, and erosion is essential to the public health, safety, and welfare (ordinance code 18.20.010) (Napa County 2015). Continued management of the KWA for the conservation of natural resources and compatible public uses supports the intent of this zone classification.

A small northern portion of the KWA (tens of acres) overlaps Yolo County. Although there are unpaved ranch roads in some of this area, they do not provide through access into the KWA, and there are no other

facilities in this area. Under Yolo County's General Plan, most of the area is designated as Open Space, with a fraction designated Agriculture. The County's zoning map and code (2014) classifies these locations as Public Open Space and Agriculture Extensive. The code describes the purpose of the Public Open Space zone as follows: "to recognize major publicly-owned open space lands, major natural water bodies, agricultural buffer areas, and habitat preserves. The Public Open Space lands are characterized by passive or low management uses." Current and proposed management of the KWA is consistent with this designation. Additionally, KWA management is consistent with Yolo County's Agricultural Extensive zone, which is applied to protect and preserve lands that are "less dependent on high soil quality and available water for irrigation" (Yolo County 2014). The zone allows agricultural activities such as livestock and ranching operations and dryland farming, as well as open space functions connected with foothill and wetland locations, such as grazing and pasture land, and wildlife habitat and recreational areas.

The KWA LMP also is consistent with the Central Valley RWQCB's Basin Plan (2011). As discussed under Section IX, "Hydrology and Water Quality," the Basin Plan (2011) identifies water quality objectives, concerns, and beneficial uses for inland waters, including Lake Berryessa. Lake Berryessa is identified as providing beneficial uses for recreation, wildlife, agriculture, and municipal needs. Implementation of the KWA LMP would not adversely affect, and could enhance, the beneficial uses of Lake Berryessa.

As discussed in Section II, "Air Quality," the KWA is located in the jurisdiction of BAAQMD and YSAQMD, and implementation of the LMP would be consistent with these districts' plans, rules, and regulations regarding emissions and related to land use.

There are no other applicable regional, local, or state plans, nor do any adopted habitat conservation plans or natural community conservation plans apply to the wildlife area.

For the reasons given above, there would be no impact on land use and planning.

Mineral Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XI. Mineral Resources. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

Discussion

a and b. No impact. Adoption and implementation of the KWA LMP would not involve mineral resource extraction. No actions would occur under the plan that that would preclude future mineral extraction, and no policy or management changes are proposed that are pertinent to mineral recovery. Therefore, the proposed project would not conflict with mineral resource protection plans or cause the loss of mineral resources. There would be no impact.

Noise

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XII. Noise. Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion

a, b, and d. Less-than-significant impact. The Napa and Yolo County codes set noise level policies according to the land uses and receptors that could be subject to noise impacts (Yolo County 2014, Napa County 2015). The counties have not established noise level policies for undeveloped agricultural, watershed, or open space areas such as the KWA. And, as described in Section II, "Air Quality," there are few receptors of any kind near the KWA, with the closest private residence more than 700 feet from the boundary of the wildlife area. The region is mostly rural and undeveloped, with scattered and isolated ranch residences, natural area reserve residences, and small settlements located typically more than a mile from the KWA boundary. There are no schools, hospitals, libraries, housing developments, or other sensitive noise receptors nearby. Therefore, there is no potential for a conflict with noise policies or standards.

Although there are no sensitive land uses or receptors located in or near the KWA, visitors to the KWA would occasionally be exposed to temporary noises and ground vibrations resulting from management tasks that require construction equipment or vehicles. For example, road and parking area maintenance, fence installation, scientific research tasks, and vegetation and weed management activities could require the temporary use of loud machinery or vehicles, and could cause ground vibrations. Also, the KWA LMP supports continued use of the wildlife area by hunters, who generate noise by discharging firearms. However, any occasional and transient changes in noise levels or ground vibrations would not represent an increase over current conditions. Management tasks would not increase in size or frequency, nor would hunting increase in a manner that prolongs or worsens related noises. Public uses, including hunting, would be managed so as to avoid crowding and be compatible with the natural character of the wildlife area (e.g., see the Public Use Element goals and tasks). Thus, this impact would be less than significant.

c, e, and f. No impact. Adoption and implementation of the KWA LMP would involve no changes that would result in permanent increases in ambient noise. Also, although the KWA is located within 2 miles of two private airstrips (see Section VIII, "Hazards and Hazardous Materials"), implementation of the LMP would not expose additional workers or residents to excessive noise levels, because it would not involve building housing or facilities, nor would it represent an increase in the size or frequency of management activities in the area. There would be no impact.

Population and Housing

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIII. Population and Housing. Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion

a, b, and c. No impact. Implementation of the KWA LMP would not involve changes in housing. It would not induce growth by providing new housing or infrastructure or by removing barriers to growth. A considerable increase in staff hours would not be necessary to implement the management tasks, and no change in the number of homes in the area would result. Thus, there would be no impact on population and housing.

Public Services

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIV. Public Services. Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

Discussion

a. No impact. Adoption and implementation of the KWA LMP would not change current levels of demand for, or use of, public services. No new housing, roads, or public facilities would be constructed, so there would be no generation of new demand for services. Implementation of LMP tasks would not involve closing Berryessa–Knoxville Road, so law enforcement, ambulance, and fire response times would not be affected. Furthermore, the LMP calls for CDFW to coordinate and cooperate with CAL FIRE and the Napa County Sheriff's Department, with the goal of improving emergency responses. No adverse environmental effects would result from alterations in public services or efforts to maintain service standards; thus, there would be no impact.

Recreation

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XV. Recreation. Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion

a and b. No impact. Implementation of the KWA LMP would cause no change in the level of recreational use of the wildlife area, nor would it result in construction or expansion of recreational facilities. The KWA LMP was developed with the primary purpose of adaptively managing habitats, species, and programs to achieve CDFW's mission to protect and enhance wildlife values, and only compatible public uses would be allowed. Management of existing facilities would not result in an adverse physical effect on the environment, as detailed throughout this document. There would be no impact related to changes in recreational resources.

Transportation/Traffic

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVI. Transportation/Traffic. Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

Discussion

a, b, c, d, e, and f. No impact. Chapter 10 of the Napa County code of ordinances sets forth policies, such as speed limits, that apply to County roads, including Berryessa–Knoxville Road (Napa County 2015). The Napa County ordinances also prescribe appropriate incorporation of bicycle, pedestrian, and public transit facilities into particular land uses and development types. The proposed KWA LMP is consistent with all transportation-related aspects of the Napa County code. (Besides unpaved ranch roads, there are no transportation facilities in the small northern portion of the KWA that overlaps Yolo County.) Furthermore, adoption and implementation of the LMP would not require changes to automobile or air traffic patterns or

volumes, create hazards by constructing new facilities or altering design features, or introduce incompatible uses. There would be no transportation-related impacts.

Tribal Cultural Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVII. Tribal Cultural Resources. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☒	☐
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☒	☐

Discussion

a and b. Less than significant. In compliance with Public Resources Code Section 21080.3.1 and the CDFW Tribal Communication and Consultation Policy, CDFW requested a list of tribes potentially affected by the LMP from the Native American Heritage Commission. Upon receipt of the listed tribes and their contacts, CDFW provided official notification of the LMP to those tribal contacts on May 6, 2015, which resulted in one request for formal consultation on the LMP. An informational meeting occurred on July 17, 2015, with the Yocha Dehe Wintun Nation at the Middletown Rancheria. At the meeting, the range of alternatives to be considered in the plan was described. Additional information regarding the project timeline and recent cultural surveys was requested by the tribe and was provided by CDFW. No potential for significant impacts to affect tribal cultural resources was identified during correspondence or meetings with tribal representatives.

Under implementation of the KWA LMP, the KWA will remain largely undeveloped and in a natural or seminatural state. The area will be managed for conservation of natural resources and compatible public uses. The proposed LMP would not require any substantial construction or excavation, and so is not expected to adversely affect any tribal cultural resources, as defined in in Public Resources Code Section 21074.

On occasion, management could result in ground or vegetation disturbance or could draw attention to cultural resources; examples of such tasks are invasive plant control efforts, fence and sign installation, mowing, trail maintenance, and, potentially, installation of small devices for scientific research. Such activities could reveal yet-undiscovered tribal cultural resources. Buried resources may be from the prehistoric or historical period. Prehistoric indicators could include obsidian or chert flakes and flaked stone tools, groundstone implements (grinding slabs, mortars, and pestles), and locally darkened midden soils containing artifacts, fragments of bone, or fire-affected stones. Historical indicators of potential tribal resource sites may include fragments of objects and structure and feature remains such as building foundations.

Siting public-use infrastructure (such as signs) near a visible cultural resource, revealing cultural resources through vegetation removal or ground disturbance, or otherwise disturbing cultural resources could irreversibly damage or degrade the resource or draw undesired attention to it. If the effect could change the significance of potential tribal cultural resources, this impact could be potentially significant.

However, the proposed KWA LMP contains goals and tasks to prevent degradation of cultural resources, including potential tribal cultural resources. CDFW would review records of known cultural resources and conduct surveys if no recent records exist for an area that might be affected by a management activity. Activities such as installation of infrastructure and maintenance of public access routes would be sited away from cultural resources whenever possible. Any known or newly discovered resources that cannot be avoided and that might be affected by an activity would be evaluated and documented by a qualified professional archaeologist; if necessary, a treatment plan would be developed to protect the resource. Treatment would include consultation with tribal representatives if appropriate. The LMP also contains tasks that require CDFW or its contractors to stop work if cultural resources or human remains are discovered during an activity, and to initiate appropriate evaluation, documentation, and treatment of the find. Because these measures incorporated into the LMP would ensure that adverse effects on tribal cultural resources do not occur, this impact would be less than significant.

In addition, before implementing any projects that are consistent with the LMP, CDFW would subject them to CEQA review according to State CEQA Guidelines Section 15168, in light of the information in this document, to determine if additional CEQA documentation is necessary. The type of additional CEQA documentation completed would be determined based on State CEQA Guidelines Sections 15162–15164.

Utilities and Service Systems

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVIII. Utilities and Service Systems. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Discussion

a, b, c, d, e, f, and g. No impact. Adoption and implementation of the KWA LMP would involve no changes in wastewater generation or treatment, use of storm drain facilities, or solid waste disposal, and would create no demand for additional water supplies or entitlements. Small-scale restoration or development of water sources for wildlife would make use of existing, available water supplies only. Any management tasks that may require the use of water would not increase in size or frequency. There would be no impact.

Mandatory Findings of Significance

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIX. Mandatory Findings of Significance.				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☐	☒	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference, Section 5088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; Sundstrom v. County of Mendocino (1988) 202 Cal. App. 3d 296; Leonoff v. Monterey Board of Supervisors (1990) 222 Cal. App. 3d 1337; Eureka Citizens for Responsible Govt. v. City of Eureka (2007) 147 Cal. App. 4th 357; Protect the Historic Amador Waterways v. Amador Water Agency (2004) 116 Cal. App. 4th at 1109; San Franciscans Upholding the Downtown Plan v. City and County of San Francisco (2002) 102 Cal. App. 4th 656.

Discussion

a. No impact. The LMP was developed to document management actions that will be undertaken with the purpose of protecting natural and cultural resources in the KWA. Some activities that may be conducted under the LMP (e.g., hunting and restoration or enhancement activities) could affect the resources listed in the criterion. However, goals and tasks in the LMP include protection measures for these resources that would eliminate or minimize potential impacts. Ultimately, adoption of the LMP and implementation of the goals and tasks contained therein would have a net benefit in protecting and enhancing the environment, including biological and cultural resources.

b. Less-than-significant impact. Adoption of the proposed LMP and implementation of the goals and tasks contained therein would not require any substantial infrastructure improvements or new construction, and LMP-related activities would be conducted following all applicable regulatory requirements. In addition, implementation of the LMP is anticipated to result in a net benefit to environmental conditions. Therefore, although there is a potential that some temporary and less-than-significant impacts on the environment could occur, none of these impacts would be cumulatively considerable.

c. No impact. The proposed project is adoption and implementation of a land management plan that generally continues the existing uses of the wildlife area, with improvements to operations and protection and enhancement of the environment. Implementation of the LMP would comply with all applicable laws and regulations. As a result, adoption of the proposed LMP and implementation of the goals and tasks contained therein would not have any direct or indirect environmental effects that would cause substantial adverse effects on human beings.

Print Form

Notice of Determination

Appendix D

To:

☒ Office of Planning and Research

U.S. Mail: P.O. Box 3044, Sacramento, CA 95812-3044

Street Address: 1400 Tenth St., Rm 113, Sacramento, CA 95814

☒ County Clerk
County of: Napa
Address: P.O. Box 298
Napa, CA 94559-0298

From:
Public Agency: California Dept. of Fish and Wildlife
Address: 7329 Silverado Trail
Napa, CA 94558
Contact: Conrad Jones
Phone: 707-576-2836

Lead Agency (if different from above):
Address:
Contact:
Phone:

SUBJECT: Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

State Clearinghouse Number (if submitted to State Clearinghouse): 2017042067

Project Title: Knoxville Wildlife Area (KWA) Final Land Management Plan (LMP)

Project Applicant: California department of Fish and Wildlife (CDFW)

Project Location (include county): Napa

Project Description:
CDFW has prepared an LMP for the KWA. The KWA is an approximately 20,900 acre mix of oak woodland, grassland, chaparral and riparian habitats located north of Lake Berryessa in northeastern Napa County. An LMP was prepared in 2005 for the northern portion of the KWA; however, significant land has been added to the KWA since that time. CDFW has updated the LMP to account for these land acquisitions, to reflect curent resource conditions and to respond to changes in CDFW policy. The LMP establishes management goals and tasks that will ensure the long-term conservation of wildlife and their habitats on KWA. It also describes appropriate public uses.

This is to advise that the California Department of Fish and Wildlife has approved the above
(☒ Lead Agency or ☐ Responsible Agency)

described project on 9/28/2017 and has made the following determinations regarding the above
(date)
described project.

1. The project [☐ will ☒ will not] have a significant effect on the environment.
2. ☐ An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
   ☒ A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☐ were ☐ were not] made a condition of the approval of the project.
4. A mitigation reporting or monitoring plan [☐ was ☐ was not] adopted for this project.
5. A statement of Overriding Considerations [☐ was ☐ was not] adopted for this project.
6. Findings [☐ were ☐ were not] made pursuant to the provisions of CEQA.

This is to certify that the final EIR with comments and responses and record of project approval, or the negative Declaration, is available to the General Public at:
7329 Silverado Trail, Napa CA 94558

Signature (Public Agency): Scott Wilson Title: Regional Manager

Date: September 28, 2017 Date Received for filing at OPR: OCT 10 2017

Governor's Office of Planning & Research

STATE CLEARINGHOUSE

Authority cited: Sections 21083, Public Resources Code.
Reference Section 21000-21174, Public Resources Code.

Revised 2011

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Appendix D. Methods and Results of Biological Surveys

Methods and Results of 2015 Biological Surveys

This appendix summarizes the methods and results of biological resources surveys conducted in 2015 by H. T. Harvey & Associates biologists. Surveys were performed in select portions of the Knoxville Wildlife Area (KWA), emphasizing areas that were acquired and added to the KWA after preparation of the 2005 KWA Land Management Plan (LMP). Surveys were completed to support preparation of an updated LMP and specifically focused on nonnative invasive plants, native grasses, western pond turtle (*Actinemys marmorata*) and its habitat, California red-legged frog (*Rana draytonii*) and its habitat, and foothill yellow-legged frog (*Rana boylii*) and its habitat. Survey methods and results are summarized below. Representative photographs are included as Attachment 1.

Methods

Invasive Plant and Perennial Grass Surveys

H. T. Harvey & Associates biologists prepared a prioritized weed survey list that included species identified as target weeds by the 2005 LMP, nonnative weed species that have been observed in or adjacent to the KWA (i.e., species reported to CalWeedMapper, an online weed mapping tool developed by the California Invasive Plant Council [Cal-IPC]), and other weed species that, in the professional opinion of H. T. Harvey & Associates biologists, could occur in the KWA (Table D-1). These additional species were selected based on several factors, including (1) their disproportionate abundance compared to native species; (2) their ability to transform natural ecological processes and cycles, such as fire frequency, hydrology, and decomposition; (3) their ability to greatly reduce or eliminate native species; and (4) the feasibility of managing potential infestations. Because many grasslands in the KWA are dominated by nonnative annual grasses that are widely naturalized in California (examples include *Avena fatua*, *A. barbata*, *Bromus hordeaceus*, *B. diandrus*, and *Festuca perennis*), these species were not included on the target weed list, even though Cal-IPC considers these species to be weeds.

H. T. Harvey & Associates biologists also prepared a prioritized native grass species survey list that included species observed during fieldwork conducted for the 2005 LMP and species that, based on the professional opinions of the biologists, could occur in the KWA (Table D-2).

Surveys for invasive plants and native grasses were conducted on April 23, 24, 28, and 29, and on May 6 and 13, 2015. These surveys were conducted throughout the southern, more recently acquired portion of the KWA and along part of Berryessa–Knoxville Road in the northern portion. In addition, selected portions of the Zim Zim Creek and Eticuera Creek drainages were assessed for the presence of invasive plants and native grasses.

Before conducting surveys, biologists prepared a geographic information system (GIS) map of the survey area, using existing vegetation maps and several other sources, further described in LMP Appendix E. Using this GIS

map, biologists subjectively selected specific vegetation community *polygons*[1] to survey. Selected polygons were predominately grassland or woodland and were located in areas that were relatively flat (average slopes less than 20%). Because of budget constraints, not every polygon meeting these criteria could be surveyed, so polygons adjacent to roads and streams and relatively large polygons (e.g., 40 acres or larger) were prioritized for surveys, along with polygons located in areas not previously surveyed in support of the 2005 LMP. Larger areas of grasslands and woodlands are more likely to support significant populations of invasive plants because they are more likely to have been previously disturbed (e.g., disced or heavily grazed) or because they are located next to potential vectors of invasive plant dispersal (i.e., roads and streams). Additionally, these larger areas of woodlands and grasslands were selected for surveys because management of these areas (e.g., using grazing, prescribed fire, or herbicides) would be more feasible and efficient than management of smaller areas of grassland and woodland.

For each entire polygon, biologists estimated the percent cover of invasive plant and native grass species, using eight categories (absent, <1%, 1–5%, 5–25%, 25–50%, 50–75%, 75–95%, and >95%) and the accepted standards described in the *California Weed Mapping Handbook* (DiPietro et al. 2002). The biologists either visually assessed the entire polygon (typically on foot), as was the case for portions of Zim Zim Creek and Eticuera Creek, or selected a representative survey point for each polygon when logistical issues or access limitations (e.g., topography) prevented visual assessment of the entire polygon. For large polygons, percent cover was estimated at multiple points and later averaged to represent the average percent cover of each species in the polygon. Given the necessarily coarse resolution of field surveys, it is probable that target species present with very low cover, and diminutive species, such as six-weeks' fescue (*Festuca microstachys*), were occasionally overlooked or that their cover values were underestimated. However, large weed infestations (i.e., infestations likely to warrant treatment) and robust stands of native grasses that could likewise warrant management attention or protection were readily detected using these methods.

[1] *Polygon* refers to an area of land that is mapped as having particular attributes; in this case, particular vegetation communities.

Table D-1. Knoxville Wildlife Area Target Weed Species

Name	Cal-IPC Rating[1]	CDFA Rating[2]	Habitat	Bloom Period	Potential Occurrence (Based on CalWeedMapper)[3]
Barbed goatgrass *Aegilops triuncialis*	High	B	Disturbed areas, cultivated fields, and roadsides, <3,300 feet	May through July	Managed and decreasing in Knoxville and Walter Springs quads, spreading in adjacent quads
Black mustard *Brassica nigra*[4]	Moderate	–	Disturbed areas and fields, <4,900 feet	April through July	Spreading in Knoxville quad, managed but spreading in adjacent quads
Brazilian waterweed *Egeria densa*	High	–	Lakes, springs, ponds, and streams, <7,200 feet	July through August	Present in quads east of Knoxville
Bull thistle *Cirsium vulgare*[4]	Moderate	–	Grasslands, along edges of fresh and brackish marshes, meadows, mesic forest openings, pastures, and disturbed areas, <7,700 feet	June through September	Present in Knoxville quad, spreading in Walter Springs quad
Cheatgrass *Bromus tectorum*	High	–	Open, disturbed areas and grasslands, <11,150 feet	May through June	Managed but spreading in quad west of Knoxville; could present opportunity to manage with grazing
Common teasel *Dipsacus fullonum*	Moderate	–	Roadsides, pastures, fields, and sometimes moist sites, <5,600 feet	June through August	Spreading in Knoxville quad and a few adjacent quads to the west
Crimson fountain grass *Pennisetum setaceum*	Moderate	–	Disturbed areas, <330 feet	July through August	Spreading in two quads adjacent to Knoxville quad; red cultivar is sterile; appears uncommon in northern California, so could be an incipient population to eradicate if observed
Edible fig *Ficus carica*	Moderate	–	Creeks, riverbanks, floodplains, seeps, and disturbed areas, <2,600 feet	March through April	Abundant in Knoxville and surrounding quads
Eurasian watermilfoil *Myriophyllum spicatum*	High	–	Lakes, ponds, canals with slow-moving waters <6,800 feet	July through August	Spreading in quads east of Knoxville
Fennel *Foeniculum vulgare*	High	–	Grasslands, coastal scrub, riparian areas, and wetlands, <5,200 feet	May through September	Spreading in quads east of Knoxville

Name	Cal-IPC Rating[1]	CDFA Rating[2]	Habitat	Bloom Period	Potential Occurrence (Based on CalWeedMapper)[3]
French broom *Genista monspessulana*	High	C	Disturbed areas, <3,000 feet	March through May	Nearest quads are two quads away and need verification, quads farther west are spreading
Giant reed *Arundo donax*	High	–	Wetlands and riparian areas, <4,900 feet	May through June	Eradicated from Walter Springs quad, but in adjacent quads it is managed but spreading
Harding grass *Phalaris aquatica*[4]	Moderate	–	Coastal and foothill grasslands, <5,600 feet	February through March	Spreading in Knoxville and all surrounding quads
Himalayan blackberry *Rubus armeniacus*	High	–	Disturbed areas, roadsides, wetlands, and riparian areas, <5,200 feet	April through August	Abundant in Knoxville and all surrounding quads
Italian thistle *Carduus pycnocephalus*[4]	Limited	C	Disturbed areas, <3,300 feet	February through July	Abundant in Knoxville and all surrounding quads
Klamathweed *Hypericum perforatum*	Moderate	C	Pastures, abandoned fields, and disturbed places, <4,900 feet	May through September	Managed or managed but spreading in quads that are two quads away
Medusa head *Elymus caput-medusae*[4]	High	C	Grasslands and disturbed areas, <6,600 feet	April through July	Spreading in Knoxville and adjacent quads
Pampas grass *Cortaderia selloana*	High	–	Coastal areas and disturbed areas, <1,000 feet	September through March	Present (needs species verification) in Knoxville and some adjacent quads
Perennial pepperweed *Lepidium latifolium*[4]	High	B	Moist or seasonally wet sites throughout California, <8,200 feet	May through July	Spreading in Knoxville and adjacent quads
Poison hemlock *Conium maculatum*	Moderate	–	Meadows, pasturelands, and disturbed areas, <4,900 feet	April through September	Spreading in Knoxville and adjacent quads
Purple false brome *Brachypodium distachyon*	Moderate	–	Disturbed areas and dry slopes, <3,000 feet	April through July	Present (needs species verification) in Walter Springs quad, spreading from the west

Name	Cal-IPC Rating[1]	CDFA Rating[2]	Habitat	Bloom Period	Potential Occurrence (Based on CalWeedMapper)[3]
Purple star-thistle *Centaurea calcitrapa*	Moderate	B	Pastures and disturbed areas, generally <3,300 feet	July through October	Present (needs species verification) in Knoxville quad and two adjacent quads
Ravennagrass *Saccharum ravennae*	Moderate/ Alert	–	Marshes and riparian areas, <1,000 feet	June through July	Present and spreading in Knoxville quad; known from small number of occurrences in Inner North Coast Ranges, Central Valley, and Sonoran Desert (Imperial County)
Scotch broom *Cytisus scoparius*	High	C	Common in disturbed places, <3,300 feet	March through May	Present (needs species verification) in Knoxville and surrounding quads
Spanish broom *Spartium junceum*	High	–	Disturbed areas, <3,000 feet	April through June	Present (needs species verification) in quads west of Knoxville
Stinkwort *Dittrichia graveolens*	Moderate/ Alert	--	Disturbed areas, <2,300 feet	September through November	Managed but spreading in Knoxville and surrounding quads
Tamarisk *Tamarix ramosissima*	High	–	Washes, streambanks, slopes, and roadsides, < 6,500 feet in parts of species' range but typically lower elevations	April through May	Managed but spreading in Walter Springs and two adjacent quads; present in Knoxville quad
Tocalote *Centaurea melitensis*	Moderate	–	Disturbed fields and open woodlands, <7,200 feet	April through August	Spreading in Knoxville quad and surrounding quads, but not in Walter Springs quad
Tree of heaven *Ailanthus altissima*	Moderate	–	Disturbed and seminatural areas, <6,100 feet	May through June	Spreading in Knoxville quad, present in all adjacent quads
Yellow star-thistle *Centaurea solstitialis*[4]	High	C	Open hills, grasslands, open woodlands, fields, roadsides, and rangelands, <4,300 feet	April through September	Managed but spreading in Knoxville and surrounding quads

Name	Cal-IPC Rating[1]	CDFA Rating[2]	Habitat	Bloom Period	Potential Occurrence (Based on CalWeedMapper)[3]

Notes: Cal-IPC = California Invasive Plant Council; CDFA = California Department of Food and Agriculture; LMP = land management plan.

[1] Cal-IPC ratings are defined as follows (Cal-IPC 2015):

High = These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. They have moderate to high rates of dispersal and establishment.

Moderate = These species have substantial and apparent, but not generally severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. They have moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance.

Limited = These species are invasive, but their ecological impacts are minor on a statewide level or there is not enough information to justify a higher score. They have low to moderate rates of invasiveness, but may be locally persistent and problematic.

Alert = These species have the potential for invading new ecosystems, thus an alert designation was established so that land managers may watch for range expansions.

[2] CDFA ratings are defined as follows (CDFA 2015):

B = Eradication, containment, control, or other holding action is at the discretion of each county's Agricultural Commissioner. State endorses holding action and eradication only when found in a nursery.

C = Action to retard spread outside of nurseries is at the discretion of each county's Agricultural Commissioner; reject only when found in a crop seed for planting or at the discretion of the commissioner.

– = Species does not have a CDFA rating.

[3] A *quad* refers to a named U.S. Geological Survey 7.5-minute topographic quadrangle map.

[4] Cover class surveys were completed for these species for the 2005 LMP.

Table D-2. Knoxville Wildlife Area Target Native Grass Species

Name	Habitat	Bloom Period
Beardless wild rye *Elymus triticoides*	Annual grasslands	June–July
Big squirreltail *Elymus multisetus*	Valley grasslands, chaparral, and foothill woodlands	May–July
Blue wild-rye *Elymus glaucus*	Valley grasslands, chaparral, and foothill woodlands	May–July
California brome *Bromus carinatus* var. *carinatus*	Foothill woodlands, chaparral, valley grasslands, red fir forest, and lodgepole pine forest	February–March
California fescue *Festuca californica*	Chaparral	February–April
California melic *Melica californica*	Blue oak woodlands	June–August
Foothill needlegrass *Stipa lepida*	Blue oak woodlands and chaparral	March–May
Idaho fescue *Festuca idahoensis*	Blue oak woodlands	June–July
Pine bluegrass *Poa secunda*	Blue oak woodlands	May–June
Purple needlegrass *Stipa pulchra*	Blue oak woodland	March–May
Small-leaf bent grass *Agrostis microphylla*	Valley grasslands, vernal pools (occasionally on serpentine soils), and wetland-riparian areas	May–July
Small fescue *Festuca microstachys*	Foothill woodlands, chaparral, and valley grasslands	April–June
Torrey's melic *Melica torreyana*	Chaparral	March–June
Woodland brome *Bromus laevipes*	Mixed oak woodlands	May–July

Wildlife Surveys

While completing surveys for perennial grasses and invasive plants along Zim Zim and Eticuera Creeks, H. T. Harvey & Associates biologists also assessed aquatic habitat suitability for the western pond turtle (*Actinemys marmorata*) and foothill yellow-legged frog (*Rana boylii*) along these streams (Photos 1–3). Surveys were conducted at a reconnaissance level either by walking the length of portions of the stream or by surveying the stream at locations where the selected vegetation survey polygons (see description above) intersected the stream. In addition to stream surveys, biologists also assessed habitat suitability for the western pond turtle and California red-legged frog (*Rana draytonii*) at Ponds 53, 56, 62, 67, and 68, as a component of an overall functional assessment completed for these ponds (see LMP Appendix H). Birds and other wildlife incidentally observed during all plant and wildlife surveys were noted and incorporated into the list of species occurring at the KWA (see LMP Appendix G).

Plant Survey Results

Invasive Plants

Fifteen target invasive plant species were observed in the KWA during the 2015 surveys. Yellow star-thistle and Medusa head dominated the nonserpentine grassland and woodland polygons adjacent to Berryessa–Knoxville Road and Eticuera Creek, and sparse infestations of black mustard and Italian thistle also were scattered throughout these polygons. Purple false brome generally was found on dry slopes and composed 5–25% of vegetation cover. Several infestations of barbed goatgrass were observed in nonserpentine grassland and woodland ecosystems in the KWA. Small patches of tocalote were observed along dry slopes, and bull thistle was found in very small numbers (tens of individuals) in nonserpentine grasslands and woodlands west of Berryessa–Knoxville Road.

The surveyed polygons in the Nevada Creek drainage (in the southwestern portion of the KWA) generally supported fewer and sparser target weed infestations compared to polygons adjacent to Berryessa–Knoxville Road (Photo 4), presumably because they are farther from the road and therefore less affected by human activities. Specifically, infestations of yellow star-thistle were noticeably less dense than infestations along the main road.

Zim Zim and Eticuera Creeks supported small infestations of perennial pepperweed and several small infestations of tamarisk that appeared to have been treated in previous years. Tree of heaven was observed in several locations along Eticuera and Zim Zim Creeks. Himalayan blackberry was observed in only one location, along Berryessa–Knoxville Road in the northern portion of the KWA. Eurasian watermilfoil, Harding grass, and purple star-thistle also were observed during the surveys, as detailed below.

Species that were not detected by H. T. Harvey & Associates in 2015 were Arundo, cheatgrass, poison hemlock, pampas grass, Scotch broom, teasel, stinkwort, Brazilian waterweed, edible fig, fennel, French broom, Klamathweed, crimson fountaingrass, Ravennagrass, and Spanish broom.

Observations made during the surveys are summarized below, and the distributions of these species are depicted in LMP Appendix A, Figure 8.

- **Barbed Goatgrass.** Barbed goatgrass was observed in small, scattered patches in nonserpentine grasslands and woodlands near the Wilson Barn, along Toll Canyon Creek, and in the Nevada Creek drainage along the ridge west of Ponds 67 and 68 (Appendix A, Figure 8a). The percent cover of barbed goatgrass near the Wilson Barn is relatively dense (50–75%) compared to the other occurrences of this species in the KWA.

- **Black Mustard.** Black mustard was observed in relatively low densities throughout the KWA, particularly in areas of disturbance in nonserpentine grasslands and woodlands along Berryessa–Knoxville Road and Zim Zim Creek (Appendix A, Figure 8b). When present, it typically composed less than 5% of plant cover on the landscape.

- **Bull Thistle.** Only one occurrence of bull thistle was observed, in nonserpentine grasslands and woodlands along Berryessa–Knoxville Road near the Wilson Barn (Appendix A, Figure 8c).

- **Eurasian Watermilfoil.** Eurasian watermilfoil was observed in Pond 68.

- **Harding Grass.** Harding grass was observed in nonserpentine grasslands and woodlands along Berryessa–Knoxville Road, along Eticuera Creek, and on the slopes east of Ponds 67 and 68 (Appendix A, Figure 8d).

- **Himalayan Blackberry.** Himalayan blackberry was observed in only one location, along Berryessa–Knoxville Road (Appendix A, Figure 8e) near the mouth of Foley Canyon.

- **Italian Thistle.** Italian thistle was observed throughout the KWA; however, it typically was found in low densities. More substantial infestations were observed along Toll Canyon Creek and in the vicinity of Pond 68 (Appendix A, Figure 8f).

- **Medusa Head.** Medusa head was observed throughout nonserpentine grasslands and woodlands and in serpentine ecosystems in the KWA (Appendix A, Figure 8g). Of all the target weed species, it is probably the best established in the KWA. A dense monoculture of Medusa head was observed in one location, along the northwest side of the trail leading to Pond 53 (**Error! Reference source not found.**5).

- **Perennial Pepperweed.** Perennial pepperweed was observed in many locations along Eticuera and Zim Zim Creeks (Appendix A, Figure 8h). Infestations were generally sparse, typically composing less than 5% absolute ground cover.

- **Purple False Brome.** Purple false brome is common in nonserpentine grasslands and woodlands in the KWA and typically occurs as dense infestations among naturalized grasses (Appendix A, Figure 8i).

Infestations were found in the hills along Toll Canyon Creek and in the naturalized grasslands in the Nevada Creek drainage.

- **Purple Star-Thistle.** Purple star-thistle was observed in one location, along Zim Zim Creek (Appendix A, Figure 8j).

- **Tamarisk.** Tamarisk was observed in nonserpentine aquatic and riparian communities along Eticuera and Zim Zim Creeks (Appendix A, Figure 8k). These occurrences had been treated, but localized resprouting continues.

- **Tocalote.** In the KWA, tocalote remains uncommon and sparsely distributed in nonserpentine grasslands and woodlands in Toll Canyon, in the Nevada Creek drainage, and along Zim Zim Creek (Appendix A, Figure 8l).

- **Tree of Heaven.** Tree of heaven was observed in several locations along Berryessa–Knoxville Road, along the reach of Eticuera Creek that parallels the road, and near the confluence of Zim Zim Creek and Eticuera Creek (Appendix A, Figure 8m). It generally occurs as sparse infestations in nonserpentine aquatic and riparian ecosystems.

- **Yellow Star-Thistle.** Yellow star-thistle was observed in nonserpentine grasslands and woodlands throughout the KWA; grasslands adjacent to Berryessa–Knoxville Road are dominated by this species (Appendix A, Figure 8n).

Native Grasses

Eight target native grass species were observed during the 2015 surveys. In general, native grasses were found as very small patches amidst a landscape dominated by nonnative and invasive plants; however, purple needlegrass was present in greater densities in a few locations, particularly on dry slopes where, historically, cattle grazing pressure likely was less intense.

Observations made during the surveys are summarized below, and the distributions of these species are depicted in LMP Appendix A, Figure 9.

- **Beardless Wild Rye.** Small patches of beardless wild rye were scattered throughout the nonserpentine grasslands and woodlands along Eticuera Creek and near an old air strip (Appendix A, Figure 9a); where found, this species typically composed less than 1% of the vegetation cover.

- **Big Squirreltail.** Big squirreltail was observed in only one location, in a nonserpentine grassland/woodland along Zim Zim Creek (Appendix A, Figure 9b).

- **Blue Wild-Rye.** Blue wild-rye was observed in nonserpentine grasslands and woodlands in three locations, along Eticuera Creek, Zim Zim Creek, and Toll Canyon (Appendix A, Figure 9c).

- **California Brome.** California brome was observed in nonserpentine grasslands and woodlands in two locations, along Berryessa–Knoxville Road and along Eticuera Creek (Appendix A, Figure 9d).

- **California Fescue.** A small amount of California fescue was scattered throughout nonserpentine grasslands and woodlands near the old air strip (Appendix A, Figure 9e).

- **California Melic.** Several occurrences of California melic were observed in nonserpentine grasslands and woodlands along Zim Zim Creek, near Pond 68, and near the southern boundary of the KWA in the Toll Canyon grazing area (Appendix A, Figure 9f).

- **Foothill Needlegrass.** A small amount of foothill needlegrass was observed in Toll Canyon, along the trail near Pond 53 (Appendix A, Figure 9g).

- **Purple Needlegrass.** Purple needlegrass was observed in nonserpentine grasslands and woodlands throughout the KWA. Areas that supported substantial cover of purple needlegrass included grasslands along Zim Zim Creek, in the Nevada Creek drainage, and near the Wilson Barn (Appendix A, Figure 9h).

Wildlife Survey Results

Results of the reconnaissance level, special-status wildlife surveys and habitat assessments are presented below. Other species of wildlife that were observed or detected (by tracks or other sign) during these surveys included: bullfrog, alligator lizard (*Elgaria multicarinata multicarinata*), northern Pacific rattlesnake (*Crotalus oreganus oreganus*), western fence lizard (*Sceloporus occidentalis occidentalis*), gopher snake (*Pituophis melanoleucus*), California red-sided gartersnake (*Thamnophis sirtalis infernalis*), raccoon (*Procyon lotor*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), feral pig (*Sus scrofa*), and bobcat (*Lynx rufus*) along with numerous species of birds. All birds, amphibians, and reptiles directly observed during surveys are noted in LMP Appendix G (no mammals were directly observed).

Creek Habitats for Western Pond Turtle

Most portions of Eticuera Creek (Photos 6 and 7) and Zim Zim Creek (Photos 8 and 9) were found to support moderate-quality habitat for the western pond turtle. Ideal habitats for western pond turtles have ponded water, moderate amounts of emergent vegetation that provides cover and supports food production, gradually sloping uplands for nesting, and rocks, logs, and other features that provide cover and basking substrate. In total, four western pond turtles were observed by H. T. Harvey & Associates biologists along Eticuera and Zim Zim Creeks (LMP Appendix A, Figure 6). Western pond turtles were observed using culverts and ledges associated with road crossings along Berryessa–Knoxville Road. These areas supported ponded water to depths of up to

2 feet, little to no emergent vegetation, a moderate amount of cobble and other features that provide cover for turtles, and moderate amounts of algae. Western pond turtles sought cover under rocks, concrete ledges, algal blooms, and culverts associated with the road crossings.

Creek Habitats for Foothill Yellow-Legged Frog

Areas of potentially suitable habitat for the foothill yellow-legged frog were documented along most reaches of Zim Zim Creek, Eticuera Creek, and Toll Canyon Creek. Ideal habitat for this species has clear, flowing water, pools with rocky or gravelly bed substrates, and open, sunny banks in forest, chaparral, or woodland. Eticuera and Toll Canyon Creeks generally support low- to moderate-quality habitat for foothill yellow-legged frog; some areas of the creeks have minimal water flow (this could be attributed to drought), lack appropriate-sized cobble, and have banks shaded by overhanging riparian vegetation. Zim Zim Creek, however, supports moderate- to high-quality potential habitat for foothill yellow-legged frogs, particularly along rocky, sunny stretches that lack overhanging vegetation that shades the creek. In years of adequate rainfall, these locations are expected to provide high-quality stream habitat for foothill yellow-legged frogs.

No individual foothill yellow-legged frogs were observed during the spring 2015 surveys.

Areas of Zim Zim Creek with high levels of erosion have been identified by West Yost engineers as suitable for restoration; however, some of these areas provide high-quality habitat for foothill yellow-legged frogs. Therefore, it is recommended that restoration actions to manage erosion be limited in areas of suitable habitat for this species. Restoration actions that include grading and planting willow cuttings could alter flow conveyance, channel substrate, and vegetation structure in a way that decreases habitat suitability for foothill yellow-legged frogs.

Pond Habitats for Western Pond Turtle and California Red-Legged Frog

H. T. Harvey & Associates biologists surveyed five ponds (Ponds 53, 56, 62, 67, and 68) for the presence of nonnative vegetation, bullfrogs, and potential habitat for western pond turtles and California red-legged frogs. No western pond turtles or California red-legged frogs were observed. Pond locations are shown in LMP Appendix H.

Descriptions of the surveyed ponds are provided below. Additional descriptions of the conditions and restoration potential of Ponds 62 and 68 are provided in the pond evaluation memorandum (LMP Appendix H).

- **Pond 53** was completely dry during the May 13, 2015, survey (Photo 10), likely because of the prolonged drought. Yellow star-thistle and cocklebur (*Xanthium strumarium*) were present in dense patches in the pond. The vegetation along the margins of the pond was dense and consisted primarily of yellow star-thistle, Italian thistle, Medusa head, purple false brome, and common naturalized grasses.

The potential for Pond 53 to provide suitable habitat for the western pond turtle is limited because the pond lacks features that can be used for basking and natural cover (e.g., rocks, logs), and dense nonnative vegetation is present in and around the margins of the pond. Weeds in and around the pond should be treated to improve habitat suitability. The uplands surrounding Pond 53 support blue oak and valley oak woodlands, which could provide suitable upland habitat and leaf litter to support western pond turtles through the winter.

Pond 53 could provide habitat for the California red-legged frog if the pond remained inundated longer into the summer and fall and the surrounding uplands provided adequate burrows and refugia suitable for use in the nonbreeding season. No bullfrogs were detected in Pond 53.

- **Pond 56** supported moderate-quality potential habitat for the western pond turtle and California red-legged frog (Photo 11). The pond supported a small amount of emergent vegetation, decaying vegetation, and algae, and the surrounding uplands were densely overgrown with weeds, including yellow star-thistle and Italian thistle. Some uplands adjacent to the ponds were gradual enough to support nesting by western pond turtles, although the vegetation in these areas was dense. Downed and matted emergent vegetation could provide basking substrate for western pond turtles; however, no other natural basking features were observed. No bullfrogs were detected at this pond.

- **Pond 62**, near the old air strip, supported low- to moderate-quality habitat for the western pond turtle and moderate-quality habitat for the California red-legged frog (Photo 12). The water had been churned up, most likely by feral pigs. Very little emergent vegetation was present in the pond, but the adjacent uplands supported densely growing weeds, including yellow star-thistle. Additionally, no natural basking features (e.g., rocks, logs) were observed in or around the margins of the pond. A ruddy duck (*Oxyura jamaicensis*) was observed swimming and foraging in the water. No bullfrogs were detected at this pond.

- **Pond 67** supported low- to moderate-quality potential habitat for the western pond turtle and California red-legged frog (Photo 13). The pond supported dense emergent vegetation and limited natural basking features other than mats of emergent vegetation. The water in the pond was already low at the time of the survey, but it is expected that in years with more rainfall, the pond will remain inundated longer. The surrounding uplands were dominated by thick, weedy vegetation. No bullfrogs were detected at this pond.

- **Pond 68** supported moderate-quality habitat for the western pond turtle and California red-legged frog but neither species was observed here. Additionally, bullfrogs were detected in this pond, decreasing its habitat suitability for the California red-legged frog by elevating competition and predation risk. A small amount of emergent vegetation was present along the margins of the pond, and a small amount of Eurasian watermilfoil was growing in the pond (Photo 14). Mats of floating emergent vegetation offered basking substrates for western pond turtles, but no other natural basking features were observed. Densely growing weeds, including yellow star-thistle and Italian thistle, as well as common naturalized grasses, surrounded the margins of the pond.

  To increase habitat suitability for western pond turtles and California red-legged frogs, weeds in and around the pond should be treated, and plugs of native emergent vegetation (e.g., tules, cattails) could be planted in

shallow areas (with summer water depths of 1 to 3 feet) along the pond margin to provide cover for turtles and frogs and habitat for native birds. This recommendation assumes that the summer ponding depth throughout most of the pond is greater than 4 feet, which will ensure that planted tall emergent vegetation does not colonize the whole pond. Natural basking features and underwater refugia (e.g., rocks, logs) could be placed in the pond and along its margin.

Finally, eradicating or managing the bullfrog population in Pond 68 could help increase habitat suitability for California red-legged frogs.

In addition to the pond-specific recommendations listed above, the uplands surrounding each pond should be mowed or grazed to decrease vegetation height. This would facilitate overland movement by western pond turtles and burrowing by California red-legged frogs in the dry season.

Attachment 1. Representative Photographs

Photo 1. This portion of Eticuera Creek provides suitable habitat for the western pond turtle. Photo taken on April 23, 2015.

Photo 2. A portion of Eticuera Creek near an old air strip supports moderately suitable potential habitat for the foothill yellow-legged frog, especially during nondrought years. Photo taken on April 23, 2015.

Photo 3. Portions of Toll Creek could support limited habitat for the foothill yellow-legged frog during years of greater precipitation. Photo taken on April 24, 2015.

Photo 4. **Areas farther from Berryessa–Knoxville Road generally supported fewer and sparser infestations of nonnative invasive plants, but naturalized grasses were still widespread. Photo taken on May 6, 2015.**

Photo 5. **A monoculture of Medusa head was found along the trail to Pond 53. Photo taken on May 13, 2015.**

Photo 6. A portion of Eticuera Creek along Berryessa–Knoxville Road provides suitable habitat for western pond turtle. Photo taken on April 24, 2015.

Photo 7. Moderately suitable habitat for western pond turtle was found on Eticuera Creek. Photo taken on April 28, 2015.

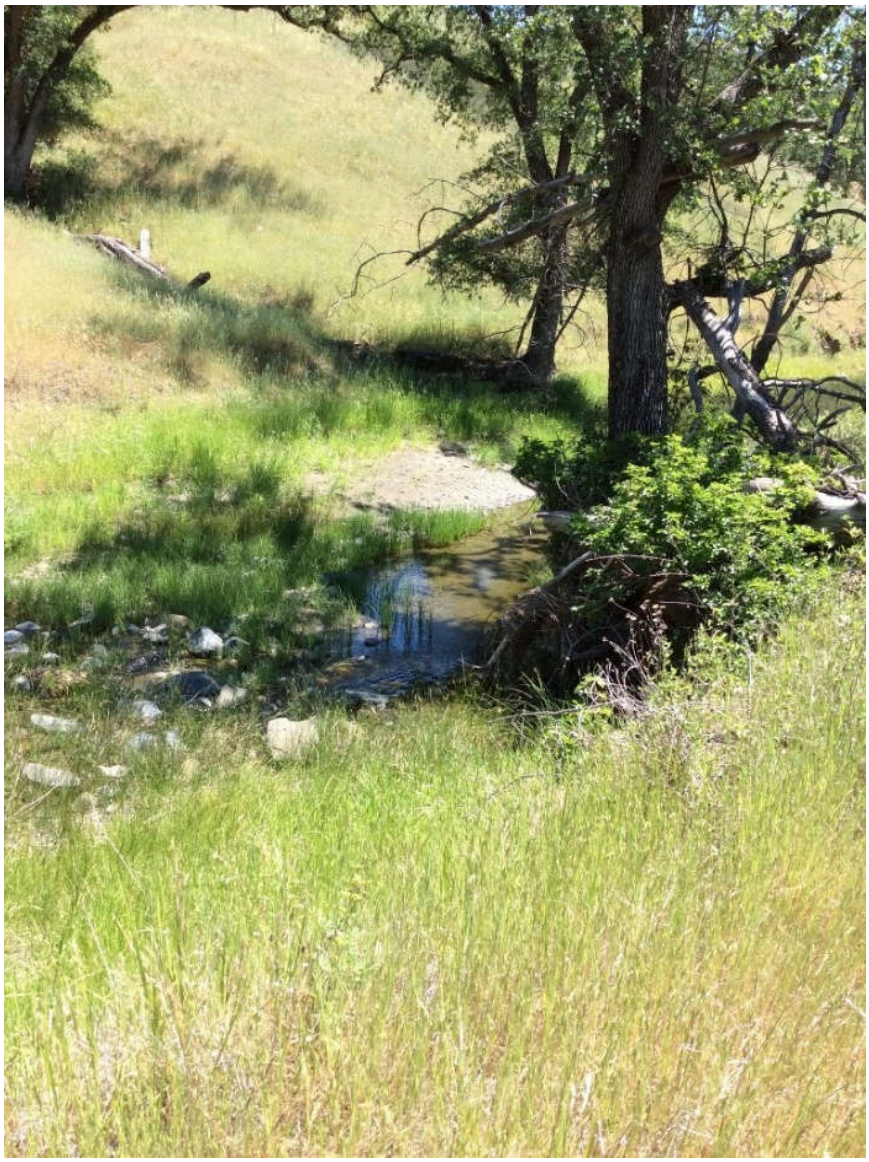

Photo 8. This portion of Zim Zim Creek supports moderately suitable potential habitat for western pond turtle, particularly in years of higher precipitation. Photo taken on April 29, 2015.

Photo 9. This portion of Zim Zim Creek supports moderately suitable habitat for foothill yellow-legged frog. Photo taken on April 29, 2015.

Photo 10. Pond 53 was completely dry during surveys and supported dense infestations of yellow star-thistle and cocklebur. Photo taken on May 13, 2015.

Photo 11. Pond 56 supported small amounts of emergent vegetation and algae. Photo taken on May 13, 2015.

Photo 12. Pond 62 was churned up (possibly by feral pigs) and surrounded by thick vegetation, including yellow star-thistle. Photo taken on April 23, 2015.

Photo 13. Pond 67 supported minimal ponding and dense emergent vegetation. Photo taken on May 6, 2015.

Photo 14. Pond 68 supported moderate amounts of emergent vegetation, natural basking features for western pond turtle, and gradual adjacent uplands. Photo taken on May 6, 2015.

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Appendix E. Mapping Updates

Mapping Updates

Methods

To support development of the updated land management plan (LMP) for the Knoxville Wildlife Area (KWA), a vegetation community map was prepared using several sources and produced by the California Department of Fish and Wildlife's Vegetation Classification and Mapping Program (VegCAMP). A full description of the process used by VegCAMP is provided in this appendix.

In brief, VegCAMP combined data from the 2002 Napa County vegetation map (Thorne et al. 2004), used to describe and depict the locations of vegetation communities in the northern part of the KWA for the 2005 LMP, with a newly created KWA vegetation community map, prepared by VegCAMP in 2014 for the portions of the wildlife area that were acquired by the Department after 2005. Compared to the 2014 KWA map, the 2002 Napa County map was based on older aerial photography (acquired in 1993), and used a now-outdated vegetation classification system, described in the first edition of the *Manual of California Vegetation* (MCV) (Sawyer and Keeler-Wolfe 1995). To create a single vegetation community dataset for the KWA, VegCAMP merged the 2002 and the 2014 vegetation polygons (i.e., the shapes representing mapped vegetation communities), and updated the labels used in the 2002 map to current MCV nomenclature (Sawyer et al. 2009), so that they matched the attribution of the vegetation polygons used for the newer, southern part of the KWA. Most polygons were mapped to the *alliance* or *association*[1] level; however, many polygons could be reliably mapped only at a coarser level of thematic resolution (i.e., the *group* or *macrogroup*[1] level), particularly if the alliance or association label used in 2002 was no longer current or if the thematic accuracy of the 2002 polygons was questionable.

VegCAMP's combined vegetation map was subsequently modified as described below.

- Vegetation polygons for the three isolated parcels west of the main wildlife area were not included in the combined dataset received from VegCAMP. Therefore, vegetation polygons for these three parcels were added from the 2002 dataset.
- The 2002 polygons were compared to a current aerial image (ESRI 2016) to determine whether they should be reattributed to reflect changes in vegetation community composition that had occurred since 1993 (the date of the imagery used to create the 2002 map). Polygons were updated, using current MCV nomenclature, if the communities had changed because of wildfire, plant community processes (succession or retrogression), or other natural factors, or if the poor quality of the 1993 imagery had

[1] These terms refer to classes in the hierarchical system used to characterize vegetation communities. *Alliances* capture regionally applicable similarities among communities in terms of composition and diagnostic species. *Associations* are more locally useful because they describe narrower categories of communities, with multiple diagnostic species that help differentiate communities from one another on a local scale (Sawyer et al. 2009). *Groups* and *macrogroups* are both higher (and thus more generic) in the hierarchy than alliances—Californian chaparral is an example of a macrogroup.

resulted in misattribution of polygons in 2002. Mapping rules used by VegCAMP to create the 2014 map were followed, both to correct attribution on the 2002 polygons and to split single polygons into multiple, correctly attributed polygons.

- To identify vegetation communities that occur on serpentine soils, a mapping attribute was added, using the digital Soil Survey of Napa County (NRCS 2015) (see LMP Section 2.3.2). Even where no serpentine soils were identified by the Natural Resources Conservation Service (NRCS) (2015), the serpentine attribute was applied where MCV groups, alliances, and associations dominated by plants typically associated with serpentine soils (according to Safford et al. 2005) were found.
- For cartographic purposes, a unique three-digit code was added to correspond to each MCV group, alliance, and association occurring in the KWA.
- Lastly, an attribute was added to show how each MCV label corresponds to the four ecosystem types used in this LMP to guide management of the KWA (i.e., riparian and aquatic, grassland and woodland, chaparral, and serpentine soil).

The modified vegetation dataset identifies 62 cover types within the LMP's four ecosystems. The characteristics of each ecosystem, including those of the corresponding MCV groups, alliances, and associations in the KWA, are described in Section 3 of the LMP.

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VEGETATION MAP AND CLASSIFICATION OF KNOXVILLE WILDLIFE AREA, NAPA COUNTY, CALIFORNIA

Department of Fish and Wildlife

Biogeographic Data Branch

Vegetation Classification and Mapping Program

October 2014

ABSTRACT

The California Department of Fish and Wildlife (CDFW) Vegetation Classification and Mapping Program (VegCAMP) created a fine-scale vegetation classification and map of the southern addition to the CDFW Knoxville Wildlife Area , Napa County, California following State Vegetation Survey, Federal Geographic Data Committee (FGDC), and National Vegetation Classification (NVC) standards (Grossman et al 1998).

The vegetation classification was derived from data collected in the field during the periods November 18–20, 2013 and April 28–May 1, 2014. Vegetation polygons were drawn using heads-up "manual" digitizing using the 2011 Napa County 30-cm resolution color infrared (CIR) imagery as the base imagery. Supplemental imagery included National Agricultural Imagery Program (NAIP) true color and CIR 1-meter resolution data from 2009–2012, BING imagery, and current and historical imagery from Google Earth. The minimum mapping unit (MMU) is 1 acre, with the exception of wetland types, which have an MMU of ½ acre. Ponds, riparian types, and the one vernal pool on the WA that were visible on the imagery were mapped regardless of size, and streams were generally mapped if > 10 meters wide (narrower portions may have been mapped to maintain the continuity of the streams). Mapping is to the NVC hierarchy association, alliance, or group level based on the ability of the photointerpreters to distinguish types based on all imagery available and on the field data.

Both the existing (northern) and new addition (southern) portions of the Knoxville WA were mapped in 2002 as part of the Napa County vegetation map (https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=14660). The 2014 map update was undertaken for two reasons: the 2002 map is at a coarse thematic resolution (alliance through macrogroup level), and vegetation in portions of the Wildlife Area has changed since the 2004 Rumsey Fire. We have produced an updated version of the 2002 map layer that uses the same spatial data, but adds a crosswalk to the current classification and the upper levels of the current hierarchy. This map layer is available from VegCAMP.

PROJECT STAFF AND ACKNOWLEDGMENTS

Field staff included Rachelle Boul, Mary Jo Colletti, Joslyn Curtis, Shawn Fresz, Diana Hickson, Todd Keeler-Wolf, Aicha Ougzin, Gina Radieve and Rosie Yacoub.

GIS and database support was provided by Rosie Yacoub and Aicha Ougzin; data entry was completed by Mary Jo Colletti. Classification was performed by Anne Klein and Todd Keeler-Wolf; mapping and attribution were completed by Rachelle Boul and Diana Hickson; the report was written by Rachelle Boul, Diana Hickson and Anne Klein, and was edited by Mary Jo Colletti.

Special thanks to Shawn Fresz and Scott Yoo for ATV and other field support.

CONTENTS

APPENDICES

PURPOSE

The purpose of the classification and vegetation map is to aid in the development of a management plan for CDFW's Knoxville Wildlife Area. The vegetation classification and mapping provide an inventory of habitat types, and a measure of the extent of each type on the property, for use in assessing the biological resources present and determining appropriate management strategies.

METHODS

FIELD SAMPLING METHODS

Relevé samples were collected from 22 vegetation stands and Rapid Assessment (RA) samples were collected from 46 vegetation stands from November 18–20, 2013 and April 28–May 1, 2014 following the Combined Relevé and Rapid Assessment Protocol (Appendix A) and using the form in Appendix B. Relevés were used for herbaceous vegetation and include the absolute cover of all species within a 100 square meter plot. Rapid Assessments were used for vegetation types characterized by tree or shrub cover of at least 10%; they include the absolute cover of 10–20 of the most common or characteristic species in the stand. Whereas the Relevé samples a discrete plot in a vegetation stand, the Rapid Assessment considers the entire stand, i.e. a "plotless" sample. Reconnaissance samples were collected for 122 stands of vegetation. A subset of the Relevé and Rapid Assessment data is collected during a Reconnaissance, as shown in the form in Appendix C.

Appendix D is a list of all plant species recorded during field data collection.

Sample point locations were collected with GPS-enabled data recording devices and are stored in a geodatabase maintained by VegCAMP. Relevé and Rapid Assessment data were entered into VegCAMP's MS Access database, which is available from VegCAMP. The Rapid Assessment and Relevé data include the date of sampling, GPS location, environmental characteristics (microtopography, substrate, soil texture, slope, aspect, ground surface characteristics, disturbance type and intensity), vegetation structure (tree, shrub, and herb covers and heights, total vegetation cover), cover by species, site history, and the Alliance and Association. Additionally, four digital photos were taken in the cardinal directions from each Relevé or Rapid Assessment location and are available from VegCAMP. These data and field photos can serve as a baseline for monitoring future vegetation change. The Reconnaissance

data provide observational notes on stand composition and environmental attributes at specific GPS locations in the landscape, and are sometimes associated with photos. The primary use of Reconnaissance data is to aid in mapping.

VEGETATION CLASSIFICATION METHODS

The classification is based largely on existing vegetation types described in the Manual of California Vegetation (Sawyer et al. 2009), but includes new provisional types which are supported by Buck-Diaz et al. 2012, Evens and Kentner 2006, and this project. The Relevé and RA data collected in 2013 and 2014 (68 surveys total) were used to create the vegetation and map classification for the Knoxville Wildlife Area. These data were analyzed using multivariate cluster analysis, performed by PC-ORD version 6 software. The cluster analysis was based on abundance (cover values) converted to seven different classes using the following modified Braun-Blanquette (1932) cover categories: 1 = <1%, 2 = 1–5%, 3 = >5–15%, 4 = >15–25%, 5 = >25–50%, 6 = >50–75%, 7 = >75%. For the analysis, VegCAMP used the Sorensen distance measure and flexible beta linkage method at -0.25 (McCune and Grace 2002). Floristic data collected in 103 reconnaissance samples were used to refine and validate the final classification for the map.

Naming conventions for vegetation types follow the National Vegetation Classification System (Grossman et al. 1998) and the Manual of California Vegetation, 2nd Edition (Sawyer et al. 2009). An Association is defined by a group of samples that has similar dominant and characteristic species in the overstory, along with other important or indicator species, which are distinctive in a particular environmental setting. A set of similar Associations is grouped hierarchically to the next higher level in the classification, the Alliance. Alliances can be placed into Groups, and then Macrogroups, the next two levels up. For this map, vegetation was mapped to the Association level if possible, but some polygons were mapped only to Alliance.

Appendix E shows the Hierarchical Field and Mapping Key used to classify the vegetation types for this project.

DELINEATION RULES AND MAP ATTRIBUTES

The vegetation map was delineated according to the following rules:

Minimum Mapping Unit (MMU) and minimum width:

- 1 acre for typical vegetation types
- ½ acre for special vegetation types (e.g., localized types)
- No MMU for cattle ponds
- 10 meter width for linear features

Polygon cover class breaks:

- 3 acre MMU for cover class break in the overstory vegetation cover (i.e., when the adjacent vegetation is of the same mapping unit, but the cover class is different)
- 5 acre MMU for cover class break in the understory vegetation cover

Delineation:

- All polygons were drawn at a scale of 1:800 to 1:3500

Imagery:

- Base: Napa County 2011 30 cm True Color and Color Infrared (CIR)
- Supplemental: National Agricultural Imagery Program (NAIP) 2012 (Summer) True color, CIR and NDVI
- Ancillary: Other NAIP years, ESRI Basemap Imagery, Google Earth, Bing

Each mapped polygon has the following attributes:

MapClassCode
The code assigned to the vegetation type of the polygon

MapClass
The vegetation type of the polygon. Note that the lowest level of the hierarchy that could reasonably be photointerpreted was used; in many cases, this was the association.

Heterogeneity
The measure of uniformity of the vegetation type, cover class, and size class within the polygon. A low heterogeneity is desirable.

Low	<5% heterogeneous
Moderate	5–40% heterogeneous
High	>40% heterogeneous

ConifCover
The cover of conifer trees in the polygon, using the cover density values below

HdwdCover
The cover of hardwood trees in the polygon, using the cover density values below

TreeCover
The cover of all trees (conifer and hardwood) in the polygon, using the cover density values below

ShrubCover
The cover of all shrubs in the polygon, using the cover density values below

Cover density (total bird's-eye cover) is photointerpreted separately for conifer, hardwood, total tree and shrub layers of vegetation, and placed into the following cover classes:

none visible
trace–0.9%
1–9.9%
10–19.9%
20–29.9%
30–39.9%
40–49.9%
50–59.9%
60–69.9%
70–79.9%
80–89.9%
90–100%
<null> is used for water features (ponds and streams)

HerbCover
Herbaceous cover . In the absence of field data, herbaceous vegetation cannot be definitively determined, and is modeled by the photointerpreters based on signature, topography, and adjacent field data. The herbaceous values are for absolute cover, not bird's-eye cover. This means if you have 38% shrub and tree cover you do not need to mentally subtract that before estimating herb cover.

0%
<2%
2-9%
10-39%
40-59%
60-100%
can't determine

NonNative_Plants
The presence of non-native plants was determined from field observation and modeling based on ecological setting, since few of the non-natives are interpretable from the imagery. Herbaceous stands with a signature indicating a lot of thatch were called *Centaurea solstitialis* (yellow star-thistle), but may in fact be dominated by *Elymus (=Taeniatherum) caput-medusae* (medusahead).

Not Visible	no visible non-native plants
Low	total non-native cover is <33% of total vegetation cover
Medium	total non-native cover is 33–66% of total vegetation cover

High	total non-native cover is >66% of total vegetation cover

Roads_Trails

Not Visible	there are no visible roads or trails in the polygon, i.e. the polygon is “whole”
Low	roads or trails bisect the polygon, so that from 2/3 to just below the entire polygon is “whole”
Medium	roads or trails bisect the polygon, so that 1/3–2/3 of the polygon is “whole”
High	roads or trails bisecting the polygon, so that <1/3 of the polygon is “whole”

OtherImpact:

Impacts observable in the imagery as follows:

- OHV activity
- Disking/grading
- Development
- Erosion/runoff
- Ungulate Trails
- none

Level_OtherImpact

Subjective determination of the level of any impact recorded in the previous field

- Not Visible
- Low
- Medium
- High

Method of identification:

Method of determining the vegetation type

- Rapid assessment field data
- Relevé field data
- Field reconnaissance
- Photointerpretation
- Other information
- Pre-map reconnaissance
- Adjacent alliance to Rapid Assessment or Relevé

DB_ID

The database ID of the Rapid Assessment, Relevé, or Reconnaissance used to determine the vegetation type (if one were used)

Confidence

The level of confidence of the photointerpreter in correctly identifying the vegetation type and attribute values of the polygon

- Low
- Medium

High

Comments
Text field for additional information

UID

Unique identifier for each polygon

DBH
The diameter at breast height (DBH) of the trees within the polygon, using California Wildlife Habitat Relationships classes as follows:

<1”
1–6”
6–11”
11–24”
>24”
Multi-layered

Note that CWHR follows the forestry practice of the use of quadratic mean diameter, which assigns greater weight to larger trees.

FireEvidence

Yes	dead snags or other evidence of a recent fire are apparent on the imagery, or field data indicate evidence of fire.
No	no evidence is evident, but likely would be evident if the polygon had burned.
Unknown	the vegetation type would not show any photointerpretable indication of recent fire; i.e., herbaceous stands or stands of shrubs that don’t leave dead standing stems and that resprout very quickly.

NVCS_name
Standardized name of the vegetation description used in the National Vegetation Classification System

NVCS_level
The level of the National Vegetation Classification System Hierarchy to which the vegetation type corresponds

NVCS_Macrogroup
The standardized name for the macrogroup within the National Vegetation Classification System

CalVeg_Name
A crosswalk to the Classification and Assessment with Landsat of Visible Ecological Groupings (CalVeg) vegetation system (USDA Forest Service). Note that there may be a one-to-many relationship between CalVeg and NVCS.

CalVeg_Code

The CalVeg code

CWHR_Type
A crosswalk to the California Wildlife Habitat Relationships system. Note that there is usually a one-to-many relationship between CWHR and NVCS.

CWHR_Code
The CWHR code.

Global_Rank
The global rarity rank of the plant community (only for polygons mapped to the Alliance level)

G1	fewer than 6 viable occurrences and/or 2000 acres worldwide
G2	6–20 viable occurrences and/or 2000–10,000 acres worldwide
G3	21–100 viable occurrences and/or 10,000–50,000 acres worldwide
G4	greater than 100 viable occurrences and/or greater than 50,000 acres worldwide
G5	community demonstrably secure due to secure worldwide abundance

State_Rank
The state rarity rank of the plant community (only for polygons mapped to the Alliance level). The state rank will always be less than (more rare) or equal to the global rank.

S1	fewer than 6 viable occurrences and/or 2000 acres statewide
S2	6–20 viable occurrences and/or 2000–10,000 acres statewide
S3	21–100 viable occurrences and/or 10,000–50,000 acres statewide
S4	greater than 100 viable occurrences and/or greater than 50,000 acres statewide
S5	community demonstrably secure due to secure statewide abundance

Rare
Rarity of the vegetation type

Y	alliances and associations with state rank S1–S3
N	not rare

CaCode
California Natural Community Code - unique code assigned to Alliances and Associations

FIELD VERIFICATION

We expect to verify the accuracy of this map within the next year, as time and funding allow.

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Appendix A

CNPS and CDFW Combined

Vegetation Rapid Assessment and Relevé Protocol

California Native Plant Society – California Department of Fish and Wildlife
KNOXVILLE WILDLIFE AREA PROTOCOL FOR COMBINED VEGETATION RAPID ASSESSMENT AND RELEVÉ SAMPLING FIELD FORM
(May 6, 2014)

Introduction

This protocol describes the methodology for both the relevé and rapid assessment vegetation sampling techniques as recorded in the combined relevé and rapid assessment field survey form for the Knoxville Wildlife Area Project. The same environmental data are collected for both techniques. However, the relevé sample is plot-based, with each species in the plot and its cover being recorded. The rapid assessment sample is not based on a plot, but for this project is based on a visually estimated circular area within a representative portion of the entire stand, with up to 20 of the dominant or characteristic species and their cover values recorded. For more background on the relevé and rapid assessment sampling methods, see the relevé and rapid assessment protocols at www.cnps.org.

For this project, we collect relevés in herbaceous vegetation and rapid assessments in woody vegetation.

Defining a Stand:

A stand is the basic physical unit of vegetation in a landscape. It has no set size. Some vegetation stands are very small, such as a portion of a vernal pool, and some may be several square kilometers in size, such as forest types. All samples must be in stands that meet the minimum mapping unit of 1 acre for upland and 0.5 acre for special stands such as small wetlands, riparian and serpentine barrens.

A stand is defined by two main unifying characteristics:

1) It has compositional integrity. Throughout the site, the combination of species is similar. The stand is differentiated from adjacent stands by a discernable boundary that may be abrupt or indistinct.
2) It has structural integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally dominated by the same species that burned on the upper part of the slopes, but not the lower, would be divided into two stands. Likewise, sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

The structural and compositional features of a stand are often combined into a term called homogeneity. For an area of vegetated ground to meet the requirements of a stand, it must be homogeneous (uniform in structure and composition throughout).

Selecting a bounded plot (relevé) or unbounded area (Rapid Assessment) to sample within a stand:

Because many stands are large, it may be difficult to summarize the species composition, cover, and structure of an entire stand. We are also usually trying to capture the most

information as efficiently as possible. Thus, we are typically forced to select a representative portion to sample.

When sampling a stand of vegetation, the main point is to select a sample that, in as many ways as possible, is representative of that stand. This means that you are not randomly selecting a plot; on the contrary, you are actively using your own best judgment to find a representative example of the stand.

Selecting a plot requires that you see enough of the stand you are sampling to feel comfortable in choosing a representative plot location. Take a brief walk through the stand and look for variations in species composition and in stand structure. In many cases in hilly or mountainous terrain look for a vantage point from which you can get a representative view of the whole stand. Variations in vegetation that are repeated throughout the stand should be included in your plot. Once you assess the variation within the stand, attempt to find an area that captures the stand's common species composition and structural condition to sample.

In rapid assessments, you will collect data based on a visually estimated circular area with a minimum radius of 20 meters. If the shape of a stand is constrained, as in a narrow riparian stringer or meadow, the dimensions of the focused assessment area may only approximate the maximum width of the stand (*e.g.,* only 5 or 10 m radius circle).

Selecting plots to avoid spatial autocorrelation:

When possible, do not sample adjacent stands. Do not sample vegetation types of the same type within the same sub-watershed.

Plot Size:

For this project, relevé plot sizes are as follows:

Herbaceous communities: 100 m^2

Special herbaceous communities, such as vernal pools, fens: 10 m^2

Plot Shape:

A relevé has no fixed shape, though plot shape should reflect the character of the stand and is either square or rectangle. Adjust the orientation and dimensions of the plot to incorporate the best approximation of stand homogeneity. If the stand is about the same size as a relevé, the plot boundaries may be similar to that of the entire stand. If we are sampling streamside riparian or other linear communities, our plot dimensions should not go beyond the community's natural ecological boundaries. Thus, a relatively long, narrow plot capturing the vegetation within the stand, but not outside it would be appropriate. Species present along the edges of the plot that are clearly part of the adjacent stand should be excluded from the plot.

Location of GPS Points:

For relevés, one corner will be considered the plot Identifier Point and should be in the SW corner, if possible. This point will be associated with the KNOXxxxx number from a series

of provided numbered stickers. If the GPS point is taken in a different corner, this should be noted in the Site History section.

For Rapid Assessments, the point should be taken at the center of the assessed circular area.

Definitions of fields in the protocol

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Database #: Place a KNOXxxxx sticker in this field for all relevé plots and rapid assessments. Use the sticker number in the GPS Waypoint ID field.

Date: Date of the sampling.

Name of recorder: The full name of the recorder should be provided for the first field form for the day. On successive forms, initials can be recorded.

Other Surveyors: The full names of each person assisting should be provided for the first field form for the day. On successive forms, initials of each person assisting can be recorded.

Allocation UID: Indicate the allocation point UID found on the GPS Unit or paper map, if applicable.

GPS name: The name/number assigned to each GPS unit. This can be the serial number if another number is not assigned.

Bearing°, left axis at ID point of Long / Short side: Fill this in for relevés only. For square or rectangular plots: from the Identifier Point corner, looking towards the plot, record the bearing of the axis to your left. If the plot is a rectangle, indicate whether the left side of the plot is the long or short side of the rectangle by circling "long" or "short" side (no need to circle anything for square plots). If there are no stand constraints, set up the plot with boundaries running in the cardinal directions and place the Identifier Point in the SW corner.

UTM coordinates: Easting (UTME) and northing (UTMN) location coordinates of the Identifier Point using the Universal Transverse Mercator (UTM) grid. Record the information from your GPS unit. These coordinates are always the base point of the survey. Soil samples and photos are taken from this point, and exposure, steepness, topography, etc. are measured here. If the GPS is not within the stand (i.e., the point is projected), these are the UTMs of the base point.

PDOP: Record the PDOP from the GPS unit.

Is GPS within stand? Yes / No Circle"Yes" to denote that the GPS waypoint was taken directly within or at the edge of the stand being assessed for a rapid assessment, or circle "No" if the waypoint was taken at a distance from the stand (such as with a binocular view of the stand). If the point is taken at the edge of the stand, note the direction to the stand.

If No, cite from waypoint to stand: distance (m), bearing°, inclination°: From the base GPS point, measure the distance to the projected point using a range finder. Record the compass bearing from the base point to the projected point; record the inclination if the base and projected points are not at the same elevation.
Record projected UTMs: These are the coordinates of the projected point, or the point being surveyed. They are generated in the field if the GPS units have the ability to calculate projected points. If the GPS unit does not have this capability, make a note to that effect and leave these fields blank.

Camera Name: Write the camera name.

Cardinal photos at ID point: Take four photos in the main cardinal directions (N, E, S, W) clockwise from the north, from the Identifier Point and record the jpeg numbers here. Try to include the horizon in at least some of these photos. If this is a distance survey to a projected point, take the four cardinal photos at the base point and at least one photo of the stand.

2nd Point name: If cardinal-direction photos were taken at another corner of a relevé plot, record the name of the corner here. Name the point KNOXxxxxy, where "y" is the corner letter a, b or c as counted clockwise from the Identifier Point.

Cardinal photos at 2nd Point: Record the jpeg numbers here. Try to include the horizon in at least some of these photos.

Other photos: This may include cardinal photos at additional corners or other relevant photos. Notes regarding photo locations or subjects can go here.

Stand Size: Estimate the size of the entire stand in which the sample is taken. As a measure, one acre is about 4000 square meters (approximately 64 x 64 m), or 208 feet by 208 feet. One acre is similar in size to a football field.

Plot Size: If this is a relevé, circle the size of the plot.

Plot Shape: Record the length and width of the plot in meters.

RA Radius: Enter radius of visually estimated sample area for rapid assessments (should be a 20 meter radius minimum)

Exposure: (Enter actual º and circle general category): While facing in the general downhill direction, read degrees of the compass for the aspect or the direction you are standing, using degrees from north, adjusted for declination. Average the reading over the entire stand, even if you are sampling a relevé plot, since your plot is representative of the stand. If estimating the exposure, write "N/A" for the actual degrees, and circle the general category chosen. "Variable" may be selected if the same, homogenous stand of vegetation occurs across a varied range of slope exposures. Select "all" if stand is on top of a knoll that slopes in all directions or if the same, homogenous stand of vegetation occurs across all ranges of slope.

Steepness: (Enter actual º and circle general category): Read degree slope from your compass. If estimating, write "N/A" for the actual degrees, and circle the general category

chosen. Make sure to average the reading across the entire stand even if you are sampling in a relevé plot.

Topography: First assess the broad (**Macro**) topographic feature or general position of the stand in the surrounding watershed, that is, the stand is at the top, upper (1/3 of slope), middle (1/3 of slope), lower (1/3 of slope), or bottom. **Circle *all* of the positions that apply for macrotopography.**
Then assess the local (**Micro**) topographic features or the lay of the area (*e.g.,* surface is flat or concave). **Circle only *one* of the microtopographic descriptors**.

Geology code: Geological parent material of site. If exact type is unknown, use a more general category (*e.g.,* igneous, metamorphic, sedimentary). *See code list for types*.

Soil Texture code: Record soil texture that is characteristic of the site (*e.g.,* coarse loamy sand, sandy clay loam). *See soil texture key and code list for types.*

Upland or Wetland/Riparian: Indicate if the stand is in upland or a wetland/riparian (wetland and riparian are one category.) Note that a site need not be officially delineated as a wetland to qualify as such in this context (*e.g.,* seasonally wet meadow).

% Surface cover (abiotic substrates): The total should sum to 100%. It is helpful to imagine "mowing off" all of the live vegetation at the base of the plants and removing it – you will be estimating what is left covering the surface. Note that non-vascular cover (lichens, mosses, cryptobiotic crusts) is not estimated in this section.

% Water: Percent surface cover of running or standing water, ignoring the substrate below the water.
% BA Stems: Percent surface cover of the basal area of stems at the ground surface. For most vegetation types, BA is 1-3% cover.
% Litter: Percent surface cover of litter, duff, or wood on the ground.
% Bedrock: Percent surface cover of bedrock.
% Boulders: Percent surface cover of rocks > 60 cm in diameter.
% Stone: Percent surface cover of rocks 25-60 cm in diameter.
% Cobble: Percent surface cover of rocks 7.5 to 25 cm in diameter.
% Gravel: Percent surface cover of rocks 2 mm to 7.5 cm in diameter.
% Fines: Percent surface cover of bare ground and fine sediment (*e.g.,* dirt) < 2 mm in diameter.

% Current year bioturbation: Estimate the percent of the sample or stand exhibiting soil disturbance by any organism that lives underground. Do not include disturbance by ungulates. Note that this is a separate estimation from surface cover.

Past bioturbation present? Circle Yes if there is evidence of bioturbation from previous years.

% Hoof punch: Note the percent of the sample or stand surface that has been punched down by hooves (cattle or native grazers) in wet soil.

Fire Evidence: Circle Yes if there is visible evidence of fire, and note the type of evidence in the "Site history, stand age and comments section," for example, "charred dead stems of

Quercus berberidifolia extending 2 feet above resprouting shrubs." If you are certain of the year of the fire, put this in the Site history section.

Site history, stand age, and comments: Briefly describe the stand age/seral stage, disturbance history, nature and extent of land use, and other site environmental and vegetation factors, such as distribution of species. Examples of disturbance history: fire, landslides, avalanching, drought, flood, animal burrowing, or pest outbreak. Also, try to estimate year or frequency of disturbance. Examples of land use: grazing, timber harvest, or mining. Examples of other site factors: exposed rocks, soil with fine-textured sediments, high litter/duff build-up, multi-storied vegetation structure, or other stand dynamics.

Disturbance code / Intensity (L,M,H): List codes for potential or existing impacts on the stability of the plant community. See code list for impacts and definitions of levels of disturbance. Characterize each impact each as **L** (=Light), **M** (=Moderate), or **H** (=Heavy). Disturbance is evaluated on a stand basis.

II. HABITAT AND VEGETATION DESCRIPTION

California Wildlife-Habitat Relationships (CWHR)

For CWHR, identify the size/height class of the stand using the following tree, shrub, and/or herbaceous categories. These categories are based on functional life forms.

Tree DBH: Circle one of the tree size classes provided when the tree canopy closure exceeds 10 percent of the total cover, or if young tree density indicates imminent tree dominance. Size class is based on the average diameter at breast height (dbh) of each trunk (standard breast height is 4.5ft or 137cm). When marking the main size class, make sure to estimate the mean diameter of all trees over the entire stand, and weight the mean toward the larger tree dbh's. The "**T6 multi-layered**" dbh size class contains a multi-layered tree canopy (with a size class T3 and/or T4 layer growing under a T5 layer and a distinct height separation between the classes) exceeding 60% total cover. Stands in the T6 class need also to contain at least 10% cover of size class 5 (>24" dbh) trees growing over a distinct layer with at least 10% combined cover of trees in size classes 3 or 4 (>11-24" dbh).

Shrub: Circle one of the shrub size classes provided when shrub canopy closure exceeds 10 percent (except in desert types) by recording which class is predominant in the survey. Shrub size class is based on the average amount of crown decadence (dead standing vegetation on live shrubs when looking across the crowns of the shrubs).

Herb: Circle one of the herb height classes when herbaceous cover exceeds 2 percent by recording the predominant class in the survey. Note*: This height class is based on the average plant height at maturity, not necessarily at the time of observation.*

INTERPRETATION OF STAND

Field-assessed vegetation alliance name: Enter the name of alliance following the Manual of California Vegetation, 2nd Edition (Sawyer, Keeler-Wolf and Evens 2009). Please use scientific nomenclature, *e.g., Quercus agrifolia* forest. An alliance is based on the dominant or diagnostic species of the stand, and is usually of the uppermost and/or

dominant height stratum. A dominant species covers the greatest area. A diagnostic species is consistently found in some vegetation types but not others.

The field-assessed alliance name may not exist in the present classification, in which case you can provide a new alliance name in this field. If this is the case, also make sure to state that it is not in the MCV under the explanation for "Confidence in alliance identification."

Field-assessed association name (optional): Enter the name of the species in the alliance and additional dominant/diagnostic species from any strata. In following naming conventions, species in differing strata are separated with a slash, and species in the uppermost stratum are listed first (*e.g., Quercus douglasii/Toxicodendron diversilobum*). Species in the same stratum are separated with a dash (*e.g., Quercus lobata-Quercus douglasii)*.

The field-assessed association name may not exist in the present classification, in which you can provide a new association name in this field.

Adjacent Alliances/direction: Identify other vegetation types that are directly adjacent to the stand being assessed by noting the dominant species (or known type). Also note the distance away in meters from the GPS waypoint and the direction in degrees aspect that the adjacent alliance is found
(*e.g., Amsinckia tessellata* / 50m, 360° N *Eriogonum fasciculatum* /100m, 110°).

Confidence in Identification: (L, M, H) With respect to the "field-assessed alliance name," note whether you have L (=Low), M (=Moderate), or H (=High) confidence in the interpretation of this alliance name.

Explain: Please elaborate if your "Confidence in Identification" is low or moderate. Low confidence can occur from such things as a poor view of the stand, an unusual mix of species that does not meet the criteria of any described alliance, or a low confidence in your ability to identify species that are significant members of the stand.

Phenology: Indicate early (E), peak (P) or late (L) phenology for each of the strata. For herbs, this generally indicates if species are in flower and/or fruit and are therefore identifiable. For shrubs and trees, this attribute generally refers to cover, e.g., a tree that is fully leafed out will be considered peak (P) even if it is not in flower. Phenology is useful for cover estimation and species identification issues, and should be elaborated upon in the next field.

Other identification problems or mapping issues: Discuss any further problems with the identification of the assessment or issues that may be of interest to mappers.

Overall Cover of Vegetation
Provide an estimate of cover for the life-form categories below. Record a specific number for the total aerial cover or "bird's-eye view" looking from above for each category, estimating cover for the living plants only. Litter/duff should not be included in these estimates.

The *porosity* of the vegetation should be taken into consideration when estimating percent foliar cover for all categories below: consider how much of the sky you can see when you

are standing under the canopy of a tree, or how much light passes through the canopy of the shrub layer to help you estimate foliar cover.

% NonVasc cover: The total cover of all lichens, bryophytes (mosses, liverworts, hornworts), and cryptogamic crust on substrate surfaces including downed logs, rocks and soil, but not on standing or inclined trees or vertical rock surfaces.

% Vasc Veg cover: The total cover of all vascular vegetation taking into consideration the porosity, or the holes, in the vegetation, and disregarding overlap[1] of the various tree, shrub, and/or herbaceous layers and species.

% Cover by Layer

% Conifer Tree /Hardwood Tree: The total foliar cover (considering porosity) of all live tree species, disregarding overlap[1] of individual trees. Estimate conifer and hardwood covers separately.
Please note: These cover values should not include the coverage of regenerating tree species (i.e., tree seedlings and saplings).

% Regenerating Tree: The total foliar cover of seedlings and saplings, disregarding overlap[1] of individual recruits. See seedling and sapling definitions below.

% Shrub: The total foliar cover (considering porosity) of all live shrub species disregarding overlap[1] of individual shrubs.

% Herbaceous: The total cover (considering porosity) of all herbaceous species, disregarding overlap[1] of individual herbs.

Height Class by Layer

Modal height for conifer tree /hardwood tree, shrub, and herbaceous categories: Record an average height value per each category by estimating the mean height for each group. Please use the following height intervals to record a height class: 01 = <1/2 m, 02 = 1/2-1 m, 03 = 1-2 m, 04 = 2-5 m, 05 = 5-10 m, 06 = 10-15 m, 07 = 15-20 m, 08 = 20-35 m, 09 = 35-50 m, 10 => 50 m. Note: *For the herbaceous layer height, this height class is based on the average plant height at the time of observation, as opposed to how this is recorded in the CWHR section (at maturity).*

Species List and Coverage

For rapid assessments, list up to 20 species that are dominant or that are characteristically consistent throughout the stand. These species may or may not be abundant, but they should be constant representatives in the survey. When different layers of vegetation occur in the stand, make sure to list species from each stratum. As a general guide, make sure to list at least 1-2 of the most abundant species per stratum.

[1] Porosity reduces the total cover of the canopy. Overlapping strata should not be included in the total cover percent; for instance, if a shrub is growing under a tree, only the cover of the tree will be added into the total; the cover of the shrub will be disregarded, except for the amount by which it fills in the porosity of the tree canopy.

For relevés, list all species present in the plot, using the second species list page if necessary.

For both sample types, provide the stratum:
T = Tree. A woody perennial plant that has a single trunk.
S = Shrub. A perennial, woody plant, that is multi-branched and doesn't die back to the ground every year.
H = Herb. An annual or perennial that dies down to ground level every year.
E = SEedling. A tree species clearly of a very young age that is < 1" dbh or has not reached breast height. Applies only to trees propagating from seed; resprouts are not recorded here even if they meet the size requirements.
A = SApling. 1" - <6" dbh and young in age, OR small trees that are <1" dbh, are clearly of appreciable age, and are kept short by repeated browsing, burning, or other disturbance. Includes trees that are re-sprouting from roots or stumps following fire, logging or other disturbance. These re-sprouts may exhibit a shrubby form, with multiple small trunks, but are species that are generally considered trees. If a majority of the trunks are >6" dbh, then the re-sprouts would be recorded under the "Tree" stratum.
N = Non-vascular. Includes moss, lichen, liverworts, hornworts, cryptogammic crust, and algae.

Be consistent and don't break up a single species into two separate strata. The only time it would be appropriate to do so is when one or more tree species are regenerating, in which case the Seedling and/or Sapling strata should be recorded for that species. These may be noted on the same line, *e.g.:*

Strata	Species	%Cover	C
T/E/A	Quercus douglasii	40/<1/<1	

If you're unsure of the strata for a species, call it what it is called in the MCV or, as a second choice, the Jepson Manual.

Note: *Quercus wislizeni* tree vs. shrub. *Quercus wislizeni* occurs in two genetically distinct subspecies, var. *wislizeni* which is the tree form, and var. *frutescens* which is the shrub form. Both subspecies occur in the Knoxville Wildlife Area. When the tree has been burned or cut, it will resprout from the base and takes on a shrubby form, although it is still genetically the tree variety. For this project, *Quercus wislizeni* in the shrub form will be recorded as follows:

- If there is evidence of fire and there are dead, burned *Q. wislizeni* tree snags present, report the shrubby *Q. wislizeni* as resprouting trees.
- If there is no evidence of the tree form having been present at this site, report *Q. wislizeni* shrubs.

C: If a species collection is made, it should be indicated in the collection column with a "C" (for collected). If the species is later keyed out, cross out the species name or description and write the keyed species name in pen on the data sheet. Do not erase what was written in the field, because this information can be used if specimens get mixed up later. If the specimen is then thrown out, the "C" in the collection column should crossed out. If the specimen is kept but is still not confidently identified, add a "U" to the "C" in the collection column (CU = collected and unconfirmed). In this case the unconfirmed species epithet should be put in parentheses [*e.g., Hordeum (murinum)*]. If the specimen is kept and is confidently identified, add a "C" to the existing "C" in the collection column (CC = Collected and confirmed).

Use Jepson Manual nomenclature. Write out the genus and species of the plant. Do not abbreviate except for dominant species that do not have ambiguous codes. If you aren't sure there aren't duplicate codes, don't use a code. When uncertain of an identification (which you intend to confirm later) use parentheses to indicate what part of the determination needs to be confirmed. For example, you could write out *Brassica* (*nigra*) if you are sure it is a *Brassica* but you need further clarification on the specific epithet.

Provide the % absolute foliar cover for each species listed considering porosity. When estimating, it is often helpful to think of coverage in terms of the following cover intervals at first:

<1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%.

Keeping these classes in mind, then refine your estimate to a specific percentage. All species percent covers may total over 100% because of overlap.

Include the percent cover of snags (standing dead) of trees and shrubs. Use the code "SNAG." Note their species, if known, in the "Species" column (ie. SNAG – Quercus wislizeni).

For rapid assessments, make sure that the major non-native species occurring in the stand also are listed in the space provided in the species list with their strata and % cover. For relevés, all non-native species should be included in the species list.

Also for relevés, record the <1% cover in one of two categories: r = trace (i.e., rare in plot, or solitary individuals) and + = <1% (few individuals at < 1% cover, but common in the plot).

Unusual species: List species that are locally or regionally rare, endangered, or atypical (*e.g.,* range extension or range limit) within the stand. This field will be useful to the Program for obtaining data on regionally or locally significant populations of plants.

Appendix B

Rapid Assessment and Relevé Form

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised July 30, 2013)

Relevé or Rapid Assessment (circle one)

For Office Use:	Final database #:	Final vegetation type:	Alliance_____ Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Database #:	Date:	Name(s) of surveyors (circle recorder):
SONO		

Allocation UID: _____ GPS name: _____ Bearing, left axis at ID point_____ (degrees) of Long / Short side

UTME ___ ___ ___ ___ ___ ___ UTMN ___ ___ ___ ___ ___ ___ ___ Zone: 10 NAD83 PDOP_____

GPS within stand? Yes / No
If No, cite from waypoint to stand: distance _____ (meters) bearing _____(degrees) inclination _____(degrees)

Camera Name: Cardinal photos at ID point:
2nd point name: Cardinal photos at 2nd point:
Other photos:

Stand Size (acres): <1, 1-5, >5 | Plot Size (m²): 10 / 100 / 500 / 1000 | Plot Shape ___ x___ m | RA Radius____ m
Exposure, Actual °: _____ NE NW SE SW Flat Variable All | Steepness, Actual °: _____ 0° 1-5° 5-25° > 25

Topography: Macro: top upper mid lower bottom | Micro: convex flat concave undulating
Geology code: _____ Soil Texture code: _____ | Upland or **Wetland/Riparian** (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)
H20: BA Stems: Litter: Bedrock: Boulder: Stone: Cobble: Gravel: Fines: =100%

% Current year bioturbation _____ Past bioturbation present? Yes / No | % Hoof punch _____
Fire evidence: Yes / No (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

Disturbance code / Intensity (L,M,H): _____/____ _____/____ _____/____ _____/____ _____/____ "Other" _____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), **T2** (1-6" dbh), **T3** (6-11" dbh), **T4** (11-24" dbh), **T5** (>24" dbh), **T6** multi-layered (T3 or T4 layer under T5, >60% cover)
Shrub: S1 seedling (<3 yr. old), **S2** young (<1% dead), **S3** mature (1-25% dead), **S4** decadent (>25% dead)
Herbaceous: H1 (<12" plant ht.), **H2** (>12" ht.)

III. INTERPRETATION OF STAND

Field-assessed vegetation alliance name: _____

Field-assessed association name (optional): _____

Adjacent alliances/direction: _____/_____, _____/_____

Confidence in alliance identification: L M H Explain: _____
Phenology (E,P,L): Herb____ Shrub____ Tree____ Other identification or mapping information:

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised July 30, 2013)

Database #: __________ SPECIES SHEET

IV. VEGETATION DESCRIPTION

<u>% NonVasc cover</u>:____ <u>Total % Veg cover</u>:_____ ☐

<u>% Cover</u> - Conifer tree / Hardwood tree: _____/_____ Regenerating Tree: _____ Shrub: _____ Herbaceous: _____ ☐

<u>Height Class</u> - Conifer tree / Hardwood tree: _____/_____ Regenerating Tree: _____ Shrub: _____ Herbaceous: _____ ☐

Height classes: 01=<1/2m 02=1/2-1m 03=1-2m 04=2-5m 05=5-10m 06=10-15m 07=15-20m 08=20-35m 09=35-50m 10=>50m

Stratum categories: T=Tree, S = Shrub, H= Herb, E = SEedling, A = SApling, N= Non-vascular/ **For relevés**: r=trace, + = <1%

Strata	Species	% cover	C	Strata	Species	% cover	C

Unusual species: ____

Appendix C

Reconnaissance Form

RECON FIELD FORM (July 30, 2013)

Date: | **Surveyors (circle recorder):** | **Return?** ☐

Waypoint ID:

Projected? Yes / No / Base / Digitized If yes, enter **Base Waypoint ID**:
Bearing: ______(degrees) Distance: ______(meters) Inclination: ______(degrees)

Base UTMs / projected UTMs (circle one)

UTME ___ ___ ___ ___ ___ ___ ___ UTMN ___ ___ ___ ___ ___ ___ ___ ___ PDOP: +/-

Camera/Photos:

Field alliance name:

Comments:

Strata	Species	% cover		Strata	Species	% cover		Strata	Species	% cover

Date: | **Surveyors (circle recorder):** | **Return?** ☐

Waypoint ID:

Projected? Yes / No / Base / Digitized If yes, enter **Base Waypoint ID**:
Bearing: ______(degrees) Distance: ______(meters) Inclination: ______(degrees)

Base UTMs / projected UTMs (circle one)

UTME ___ ___ ___ ___ ___ ___ ___ UTMN ___ ___ ___ ___ ___ ___ ___ ___ PDOP: +/-

Camera/Photos:

Field alliance name:

Comments:

Strata	Species	% cover		Strata	Species	% cover		Strata	Species	% cover

Date: | **Surveyors (circle recorder):** | **Return?** ☐

Waypoint ID:

Projected? Yes / No / Base / Digitized If yes, enter **Base Waypoint ID**:
Bearing: ______(degrees) Distance: ______(meters) Inclination: ______(degrees)

Base UTMs / projected UTMs (circle one)

UTME ___ ___ ___ ___ ___ ___ ___ UTMN ___ ___ ___ ___ ___ ___ ___ ___ PDOP: +/-

Camera/Photos:

Field alliance name:

Comments:

Strata	Species	% cover		Strata	Species	% cover		Strata	Species	% cover

Appendix D

Plant Species in the Knoxville Wildlife Area

This is a list of all plant species recorded during field data collection. We use the USDA PLANTS database nomenclature.

Species Name	Stratum
Achillea millefolium	Herb
Achyrachaena mollis	Herb
Acmispon brachycarpus	Herb
Acmispon glaber	Shrub
Acmispon sp.	Herb
Acmispon wrangelianus	Herb
Adenostoma fasciculatum	Shrub
Adiantum jordanii	Herb
Adiantum sp.	Herb
Aesculus californica	Tree
Agoseris sp.	Herb
Allium serra	Herb
Amsinckia intermedia	Herb
Amsinckia sp.	Herb
Amsinckia menziesii	Herb
Anagallis arvensis	Herb
Ancistrocarphus filagineus	Herb
Andropogon glomeratus var. *scabriglumis*	Herb
Arctostaphylos sp.	Shrub
Arctostaphylos manzanita	Shrub
Arctostaphylos viscida	Shrub
Artemisia douglasiana	Herb
Aster foliaceus var. *apricus*	Herb
Astragalus gambelianus	Herb
Astragalus sp.	Herb
Athysanus pusillus	Herb
Avena barbata	Herb
Avena fatua	Herb
Avena sp.	Herb
Baccharis salicifolia	Shrub
Brachypodium distachyon	Herb
Brachypodium sp.	Herb
Briza minor	Herb
Brodiaea sp.	Herb
Bromus carinatus	Herb
Bromus carinatus var. *carinatus*	Herb
Bromus diandrus	Herb

Species Name	Stratum
Bromus hordeaceus	Herb
Bromus sp.	Herb
Bromus rubens	Herb
Calandrinia ciliata	Herb
Calandrinia maritima	Herb
Calochortus amabilis	Herb
Calochortus sp.	Herb
Calycanthus occidentalis	Shrub
Calystegia sp.	Herb
Capsella bursa-pastoris	Herb
Carduus pycnocephalus	Herb
Carex densa	Herb
Carex nudata	Herb
Carex praegracilis	Herb
Carex senta	Herb
Carex serratodens	Herb
Castilleja applegatei	Herb
Castilleja attenuata	Herb
Ceanothus cuneatus	Shrub
Ceanothus integerrimus var. *macrothyrsus*	Shrub
Ceanothus jepsonii	Shrub
Ceanothus sp.	Shrub
Ceanothus oliganthus	Shrub
Centaurea melitensis	Herb
Centaurea solstitialis	Herb
Cerastium glomeratum	Herb
Cerastium viscosum	Herb
Cercis occidentalis	Shrub
Cercis occidentalis var. *orbiculata*	Shrub
Cercocarpus betuloides	Shrub
Cercocarpus sp.	Shrub
Cercocarpus montanus	Shrub
Chaenactis glabriuscula	Herb
Chlorogalum sp.	Herb
Chlorogalum pomeridianum	Herb
Chorizanthe membranacea	Herb
Chorizanthe sp.	Herb
Cirsium cymosum	Herb
Cirsium douglasii	Herb
Cirsium vulgare	Herb

Species Name	Stratum
Clarkia gracilis	Herb
Clarkia gracilis ssp. *gracilis*	Herb
Clarkia purpurea	Herb
Clarkia sp.	Herb
Claytonia perfoliata	Herb
Clematis sp.	Shrub
Collinsia parviflora	Herb
Collinsia sparsiflora	Herb
Convolvulus arvensis	Herb
Conyza canadensis	Herb
Croton setigerus	Herb
Crypsis schoenoides	Herb
Cryptantha sp.	Herb
Cynosurus echinatus	Herb
Cynosurus sp.	Herb
Cyperus eragrostis	Herb
Datisca glomerata	Herb
Daucus carota	Herb
Daucus pusillus	Herb
Delphinium hesperium ssp. *hesperium*	Herb
Delphinium hesperium ssp. *pallescens*	Herb
Delphinium variegatum	Herb
Deschampsia caespitosa ssp. *Beringensis*	Herb
Dichelostemma capitatum	Herb
Dichelostemma sp.	Herb
Dichelostemma pulchellum	Herb
Dichelostemma volubile	Herb
Distichlis spicata	Herb
Downingia sp.	Herb
Eleocharis macrostachya	Herb
Elymus caput-medusae	Herb
Elymus elymoides	Herb
Elymus glaucus	Herb
Elymus glaucus ssp. glaucus	Herb
Elymus multisetus	Herb
Elymus triticoides	Herb
Epilobium sp.	Herb
Eriodictyon sp.	Shrub
Eriodictyon californicum	Shrub
Eriogonum sp.	Herb

Species Name	Stratum
Eriogonum nudum	Herb
Eriophyllum lanatum	Herb
Erodium botrys	Herb
Erodium brachycarpum	Herb
Erodium cicutarium	Herb
Eryngium aristulatum var. *aristulatum*	Herb
Eryngium jepsonii	Herb
Eschscholzia caespitosa	Herb
Eschscholzia californica	Herb
Euphorbia serpyllifolia	Herb
Euphorbia spathulata	Herb
Eurybia radulina	Herb
Festuca bromoides	Herb
Festuca idahoensis	Herb
Festuca microstachys	Herb
Festuca myuros	Herb
Festuca perennis	Herb
Filago gallica	Herb
Frangula californica	Shrub
Galium andrewsii	Herb
Galium aparine	Herb
Galium californicum	Herb
Galium sp.	Herb
Galium parisiense	Herb
Galium porrigens	Herb
Garrya congdonii	Shrub
Garrya sp.	Shrub
Gastridium phleoides	Herb
Geranium californicum	Herb
Geranium carolinianum	Herb
Geranium dissectum	Herb
Geranium sp.	Herb
Geranium molle	Herb
Gilia clivorum	Herb
Gilia sp.	Herb
Gilia tricolor	Herb
Gnaphalium sp.	Herb
Grindelia camporum var. *camporum*	Herb
Grindelia sp.	Herb
Harmonia hallii	Herb

Species Name	Stratum
Helenium puberulum	Herb
Hemizonia congesta	Herb
Hemizonia congesta ssp. *Luzulifolia*	Herb
Hesperevax sp.	Herb
Hesperevax sparsiflora	Herb
Hesperevax sparsiflora var. *sparsiflora*	Herb
Hesperocyparis sargentii	Tree
Heteromeles arbutifolia	Shrub
Holodiscus discolor	Shrub
Hordeum brachyantherum	Herb
Hordeum sp.	Herb
Hordeum leporinum	Herb
Hordeum murinum	Herb
Hypochaeris radicata	Herb
Iris macrosiphon	Herb
Isoetes howellii	Herb
Juglans sp.	Tree
Juncus arcticus	Herb
Juncus effusus	Herb
Juncus sp.	Herb
Juncus luciensis	Herb
Juncus mexicanus	Herb
Juncus oxymeris	Herb
Juncus patens	Herb
Juncus phaeocephalus	Herb
Keckiella sp.	Shrub
Koeleria macrantha	Herb
Lactuca sp.	Herb
Lactuca serriola	Herb
Lasthenia californica	Herb
Lasthenia californica ssp. *californica*	Herb
Lathyrus sp.	Herb
Lathyrus vestitus	Herb
Lepechinia calycina	Shrub
Lepechinia sp.	Shrub
Lepidium nitidum	Herb
Leptosiphon bicolor	Herb
Lichen	Non-vascular
Lolium sp.	Herb
Lomatium	Herb

Species Name	Stratum
Lomatium utriculatum	Herb
Lonicera hispidula	Shrub
Lupinus albifrons	Shrub
Lupinus bicolor	Herb
Lupinus sp.	Herb
Lupinus latifolius ssp. *latifolius*	Herb
Lupinus microcarpus var. *densiflorus*	Herb
Lupinus succulentus	Herb
Lythrum hyssopifolia	Herb
Madia exigua	Herb
Madia Molina	Herb
Malacothamnus fremontii	Shrub
Malacothrix sp.	Herb
Marah fabaceus	Shrub
Medicago hispida	Herb
Medicago sp.	Herb
Medicago polymorpha	Herb
Melica bulbosa	Herb
Melica californica	Herb
Melica sp.	Herb
Melica torreyana	Herb
Melilotus albus	Herb
Mentha piperita ssp. *citrata*	Herb
Micropus californicus	Herb
Micropus californicus var. californicus	Herb
Micropus sp.	Herb
Microseris douglasii ssp. *douglasii*	Herb
Microsteris gracilis	Herb
Mimulus aurantiacus	Shrub
Mimulus cardinalis	Herb
Minuartia douglasii	Herb
Monardella sp.	Herb
Monardella viridis	Herb
Moss	Non-vascular
Pellaea andromedifolia	Herb
Pentagramma triangularis	Herb
Pentagramma sp.	Herb
Perideridia kelloggii	Herb
Perideridia sp.	Herb
Phacelia californica	Herb

Species Name	Stratum
Phacelia distans	Herb
Phacelia sp.	Herb
Phalaris aquatica	Herb
Pinus sabiniana	Tree
Plagiobothrys sp.	Herb
Plagiobothrys nothofulvus	Herb
Plagiobothrys stipitatus var. *micranthus*	Herb
Plantago erecta	Herb
Plectritis sp.	Herb
Poa bulbosa	Herb
Poa secunda	Herb
Polypogon monspeliensis	Herb
Populus fremontii	Tree
Psilocarphus tenellus	Herb
Quercus ×moreha	Tree
Quercus agrifolia	Tree
Quercus berberidifolia	Shrub
Quercus douglasii	Tree
Quercus durata	Shrub
Quercus kelloggii	Tree
Quercus lobata	Tree
Quercus wislizeni	Tree
Quercus wislizeni var. frutescens	Shrub
Ranunculus aquatilis	Herb
Ranunculus californicus	Herb
Ranunculus sp.	Herb
Rhamnus ilicifolia	Shrub
Ribes sp.	Shrub
Ribes malvaceum	Shrub
Rigiopappus sp.	Herb
Rosa californica	Shrub
Rubus ursinus	Shrub
Rumex crispus	Herb
Salix breweri	Shrub
Salix exigua	Shrub
Salix laevigata	Tree
Salix lasiolepis	Shrub
Salvia columbariae	Herb
Sambucus sp.	Shrub
Sambucus nigra	Shrub

Species Name	Stratum
Sanicula bipinnata	Herb
Sanicula bipinnatifida	Herb
Sanicula crassicaulis	Herb
Sanicula graveolens	Herb
Scrophularia californica	Herb
Scutellaria sp.	Herb
Senecio vulgaris	Herb
Sisyrinchium bellum	Herb
Sisyrinchium sp.	Herb
Solidago californica	Herb
Sonchus oleraceus	Herb
Stachys ajugoides	Herb
Stachys albens	Herb
Stachys sp.	Herb
Stachys rigida	Herb
Stellaria media	Herb
Stipa sp.	Herb
Stipa pulchra	Herb
Streptanthus glandulosus	Herb
Streptanthus morrisonii	Herb
Symphoricarpos albus	Shrub
Symphoricarpos sp.	Shrub
Symphoricarpos mollis	Shrub
Symphoricarpos rivularis	Shrub
Symphyotrichum chilense	Herb
Thermopsis californica	Herb
Thermopsis californica var. *californica*	Herb
Thermopsis sp.	Herb
Thysanocarpus curvipes	Herb
Thysanocarpus	Herb
Torilis sp.	Herb
Torilis arvensis	Herb
Toxicodendron diversilobum	Shrub
Toxicoscordion fremontii	Herb
Toxicoscordion sp.	Herb
Toxicoscordion venenosum	Herb
Trifolium ciliolatum	Herb
Trifolium hirtum	Herb
Trifolium sp.	Herb
Trifolium microdon	Herb

Species Name	Stratum
Triteleia sp.	Herb
Triteleia laxa	Herb
Typha domingensis	Herb
Typha sp.	Herb
Umbellularia californica	Tree
Veronica sp.	Herb
Vicia americana	Herb
Vicia sp.	Herb
Vicia sativa	Herb
Vicia sativa ssp. sativa	Herb
Vicia tetrasperma	Herb
Vicia villosa	Herb
Vitis californica	Shrub
Vitis sp.	Shrub
Vulpia microstachys	Herb
Xanthium strumarium	Herb
Zigadenus fremontii	Herb

Appendix E

Hierarchical Field and Mapping Key

Knoxville Wildlife Area

Key to Identification of All Stands of Vegetation Sampled or Encountered in the Field

This key is developed for the areas mapped in support of the Knoxville WA. It is intended for use as a guide to identification of field-based and image interpretation-based vegetation assessments.

Due to the diversity of the vegetation communities in the area, this is a complex key. You will need to collect or refer to plant composition data that includes not only those species that are dominant but also those "indicator," or characteristic/diagnostic species, whose presence may cause a stand to key to another vegetation type. If you are using this key for mapping rules please also note that some of the types are typically below the accurate detectability for mapping in this project.

Terms and Concepts Used throughout the Key

Stand: The basic physical unit of plant communities in a landscape. It has no set size. Some vegetation stands are very small, such as certain wetland types, and some may be several square kilometers in size, such as certain forest types. A stand is defined by two main unifying characteristics:

1. It has compositional integrity. Throughout the stand, the combination of species is similar. The stand is differentiated from adjacent stands by a discernible boundary that may be abrupt or occur indistinctly along an ecological gradient.

2. It has structural integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally dominated by the same species that burned on the upper part of the slopes but not the lower would be divided into two stands. Likewise, a sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

The structural and compositional features of a stand are often combined into a term called homogeneity. For an area of vegetated ground to meet the requirements of a stand, it must be homogeneous at the scale being considered. The map has a variable Minimum Mapping Unit (MMU) size. For special types such as wetlands and riparian it is 1/2 acre (vernal pools are occasionally smaller) and for upland vegetation it is 1 acre.

Alliance: Plant communities based on dominant/diagnostic species of uppermost or dominant stratum. Part of the United States National Vegetation Classification (USNVC) hierarchy.

Association: The most botanically detailed plant community designation based on dominant species and multiple co- or subdominant indicator species from any strata. Part of the USNVC hierarchy.

Plant community nomenclature: Species separated by "-" are within the same stratum; species separated by "/" are in different strata. The number that precedes some plant community names is the Mapping Code used for labeling plant community polygons for the associated GIS-based plant community map.

Cover: The primary metric used to quantify the importance/abundance of a particular species or a particular vegetation layer within a stand. It is measured by estimating the aerial extent of the living plants, or the bird's-eye view looking from above, for each category. Cover in this mapping project uses the concept of "porosity" or foliar cover rather than "opacity" or crown cover. Thus, field crews and aerial photo interpreters are trained to estimate the amount of shade produced by the canopy of a plant or a stratum by taking into account the amount of shade

it casts excluding the openings it may have in the interstitial spaces (e.g., between leaves or branches). This is assumed to provide a more realistic estimate of the actual amount of shade cast by the individual or stratum which, in turn, relates to the actual amount of light available to individual species or strata beneath it. However, as a result cover estimates can vary substantially between leaf-on versus leaf-off conditions.

Absolute cover: The actual percentage of the surface area of the survey that is covered by a species or physiognomic group (trees, shrubs, herbaceous), as in "creosote bush covers 10 percent of the survey." Absolute cover of all species or physiognomic groups, when added together, may total greater than 100 percent, because this is not a proportional number and plants can overlap each other. For example, a survey could have 25 percent tree cover, 40 percent shrub cover, and 50 percent herbaceous cover.

Relative cover: The percentage of the surface area of the survey that is covered by one species or physiognomic group (trees, shrubs, herbaceous) as compared or relative to the amount of surface of the survey covered by all species or groups. Thus, 50 percent relative cover means that half of the total proportion of cover of all species or physiognomic groups is composed of the single species or group in question. Relative cover values are a proportional number that, when added together, total 100 percent for each sample or stand. For example, a scrub oak-chamise vegetation survey with 15 percent cover scrub oak and 15 percent cover chamise estimated using absolute cover would translate to 50 percent relative cover of each species.

Dominance: Dominance refers to the preponderance of vegetation cover in a stand of uniform composition and site history. It may refer to cover of an individual species as in "dominated by chamise," or it may refer to dominance by a physiognomic group, as in "dominated by shrubs" - see "dominance by layer," below.

Strongly dominant: 60 percent+ relative cover. A species in the dominant life form stratum has 60 percent or greater relative cover.

Co-dominant: Each species has 30 percent–60 percent relative cover. Co-dominance refers to two or more species in a stand with near equal cover. In general, co-dominance can occur among species that have between 30 and 60 percent relative cover each. To be co-dominant species should be in at least 70 percent of the stands of this type, with at least 30 percent relative cover in each stand. For example in a stand with 20% *Adenostoma fasciculatum*, 25% *Quercus berberidifolia*, and 15% *Ceanothus cuneatus* (total 60% shrub cover), the *Adenostoma* (20/60 = 33% relative cover) and the *Quercus* (25/60 = 42% relative cover) would be co-dominant while *Ceanothus cuneatus* would be sub-dominant with only 25% relative cover.

Consistent/Characteristic/Diagnostic species: Should be present in at least 80 percent of the stands of the type, with no restriction on cover.

Abundant species: Should be present in at least 50 percent of the samples, with an average of at least 50 percent relative cover in all samples.

Dominance by layer: Tree, shrub, and herbaceous layers are considered physiognomically distinct. A vegetation type is considered to belong to a certain physiognomic group if it is dominated by one layer. Layers are prioritized in order of height. The tallest layer, if it meets a criterion in the "characterized" definitions (see below) is said to dominate, and the type is usually named at the alliance level by the characteristic species of the tallest layer. Average covers within the dominant layer reflect the "modal" concept of the characteristics of a particular vegetation type. For example, a higher average cover of woody plants within a stand not recently affected by

disturbance reflects a mode of general availability of water, nutrition, and equitable climate, while lower average cover under similar conditions would reflect lower availability of these things.

Diagnostic species: A species typically found in the dominant stratum of a vegetation type often lending its name to that association or alliance due to its constancy and reliable presence throughout most similar stands.

Sparse: Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is less than 10 percent absolute cover.

Woody plant: Is any species of plant that has noticeably woody stems. It does not include herbaceous species with woody underground portions such as tubers, roots, or rhizomes.

Tree: A one-stemmed woody plant that normally grows to be greater than 5 meters tall. In some cases, trees may be multiple stemmed following ramifying after fire or other disturbance, but the size of mature plants is typically greater than 5 meters. Undisturbed individuals of these species are usually single stemmed.

Tree-characterized vegetation: Trees are evenly distributed throughout the stand and meet one or both of these criteria: (1) trees influence the distribution or population dynamics of other plant species; (2) trees play an important role in ecological processes within the stand.

Forest: In the USNVC, a forest is defined as a tree-dominated stand of vegetation with 60 percent or greater cover of trees. Most forest alliances tend to have average cover of trees > 60%, but individual stands under certain conditions may drop lower than 60 percent.

Woodland: In the USNVC, woodland is defined as a tree-dominated stand of vegetation with between 25 percent and 60 percent cover of trees. The same notion of "modality" that applies to forest types also applies here and to the sparsely wooded category.

Emergent: A plant (or vegetation layer) is considered emergent if it has a low cover and rises above a layer with has most of the cover in the stand. For example, individual *Umbellularia californica* trees may comprise an emergent tree layer of 5 percent over a dense layer of *Ceanothus oliganthus* shrubs; the stand would be considered within the *Ceanothus oliganthus* Shrubland Alliance because the total tree cover is < 10% and the shrub cover is > 10%. Further, medium to tall shrubs are not considered emergent over shorter shrubs, but short trees are considered emergent over tall shrubs.

Shrub: Usually a multi-stemmed woody plant that is between 0.2 meter and 5 meters tall. Definitions are blurred at the low and high ends of the height scales. At the tall end, shrubs may approach trees based on disturbance frequencies (e.g., old-growth resprouting chaparral species such as *Cercocarpus montanus*, *Fremontodendron californica*, *Prunus ilicifolia*, and so forth, may frequently attain "tree size"). At the short end, woody perennial herbs or subshrubs of various species are often difficult to categorize into a consistent life-form.

Sub-shrub: A multi-stemmed plant with noticeably woody stems less than 0.5 meter tall.

Shrub-characterized vegetation: Shrubs (including sub-shrubs) are evenly distributed throughout the stand, providing a consistent (even if sparse) structural component, the stand cannot be characterized as a tree stand, and one or both of the following criteria are met: (1) shrubs influence the distribution or population dynamics of other plant species; (2) shrubs play an important role in ecological processes within the stand.

Herbaceous plant: Any species of plant that has no main woody stem development and includes grasses, forbs, and perennial species that die back each year.

Herb-characterized vegetation: Herbs are evenly distributed throughout the stand, providing a consistent (even if sparse) structural component, and play an important role in ecological processes within the stand, and the stand cannot be characterized as a tree or shrub stand.

Botanical nomenclature: We use the NRCS PLANTS database in vegetation mapping as our standard for botanical names.

All references to percent cover in the key are to absolute cover unless specified in a particular section as relative cover.

Hierarchical Field and Mapping Key to the Vegetation of the Southern Unit of

Knoxville Wildlife Area, Napa Co.

Section I: Woodlands and forests dominated or characterized by needle or scale-leaved conifer trees.

1. Vegetation dominated or characterized by *Callitropsis sargentii.*

Californian evergreen coniferous forest and woodland Group

Callitropsis sargentii dominates in an open to dense tree overstory, sometimes with understory shrubs meeting or exceeding *Callitropsis* in cover. *Salix breweri*, *Frangula* spp., and other riparian or wetland species may be in the understory.

***Callitropsis sargentii* Alliance**

Section II. Woodlands, forests, and riparian shrublands characterized mainly by native and non-native broad-leaved evergreen and deciduous trees, as well as riparian shrub species. Includes *Aesculus, Baccharis, Populus,* tree species of *Quercus and Salix*, *Tamarix,* and *Umbellularia.*

2. Woodland or forest stands characterized by *Aesculus,* a tree species of *Quercus,* or *Umbellularia.* The understory may be shrubby or herbaceous – if the former, shrubs are often of similar stature to re-sprouting trees due to recent fires.

Californian broadleaf forest and woodland Group

2a. *Aesculus californica* dominates in the tree overstory, sometimes with as little as 5% cover. In Knoxville, two sub-MMU stands were supported by reconnaissance surveys – there were no supporting RA data.

***Aesculus californica* Alliance**

2b. *Quercus agrifolia* is the dominant tree or is co-dominant with *Quercus wislizeni* in the tree overstory. Stands occur on lower slopes in ravines, or along riparian terraces and may intergrade with *Q. lobata* or *Q. wislizeni* stands. Understory shrubs may include *Ceanothus oliganthus, Frangula californica,* or *Heteromeles arbutifolia.*

***Quercus agrifolia* Alliance**

Quercus agrifolia/Ceanothus oliganthus Association

Quercus agrifolia/Frangula californica–Heteromeles arbutifolia Association

2c. *Quercus wislizeni* is the dominant species in the overstory or may be co-dominant with *Pinus sabiniana* or *Quercus douglasii*. In Knoxville, when shrubby resprouts of *Q. wislizeni* are no taller than common shrubs such as *Ceanothus oliganthus*, *Frangula californica*, and/or *Heteromeles*, stands still key to this tree alliance.

***Quercus wislizeni tree* Alliance**

Quercus wislizeni/Ceanothus oliganthus Provisional Association

Quercus wislizeni–Pinus sabiniana/annual grass–herb Association

Quercus wislizeni–Pinus sabiniana/Arctostaphylos manzanita Association

Quercus wislizeni–Quercus douglasii–Aesculus californica Association

2d. *Quercus douglasii* is the dominant tree or may be co-dominant with *Pinus sabiniana*. In Knoxville, the understory herbaceous layer is often comprised of a moderate to dense variety of native and non-native forbs and grasses.

***Quercus douglasii* Alliance**
Quercus douglasii/grass Association
Quercus douglasii–Pinus sabiniana Association

2e. *Quercus lobata* is the dominant tree or may be co-dominant with another tree species of *Quercus.* Stands occur in uplands (e.g., valleys, lower slopes) or in riparian settings.

***Quercus lobata* Alliance**
Quercus lobata–Salix lasiolepis Association
Quercus lobata–Quercus wislizeni Association

2f. *Umbellularia californica* is the dominant species in the overstory or may be co-dominant with *Quercus wislizeni.* Stands are found along lower slopes or in draws or ravines. In post-fire stands, *Umbellularia* resprouts are often shrubby with height similar to co-occurring shrubs or resprouting *Aesculus* or *Quercus wislizeni*. Mesic chaparral shrubs such as *Ceanothus oliganthus*, *Frangula*, *Heteromeles*, or *Quercus berberidifolia* can attain similar combined covers to the re-sprouting trees.

***Umbellularia californica* Alliance**
Umbellularia californica–Quercus wislizeni Association

3. Riparian vegetation dominated by *Populus, Salix laevigata* or by a shrub species of *Salix,* including *S. breweri* or *S. lasiolepis*.

Southwestern North American Riparian, Flooded and Swamp Forest Macrogroup

3a. Riparian vegetation dominated by trees.

Southwestern North American riparian evergreen and deciduous woodland Group

3a1. *Salix laevigata* dominates the tree overstory, though *Salix lasiolepis* may meet or exceed it in cover in the understory. If *S. lasiolepis* has >60% relative cover, key to the *S. lasiolepis* Alliance. If *Populus fremontii* is present, it must be sub-dominant with ≤5% absolute cover.

***Salix laevigata* Alliance**

3a2. *Populus fremontii* ≥5% absolute cover in the tree layer. One or two small stands may exist in the area, with or without co-dominant *Salix laevigata*. This type is not substantiated by survey data.

***Populus fremontii* Alliance**

3b. Riparian vegetation dominated by shrubs.

Southwestern North American riparian/wash scrub Group

3b1. *Salix breweri* dominates in the shrub overstory, often intermixing with other shrubs or herbaceous species in seeps and small stream channels on serpentine substrates. Emergent trees of *Callitropsis sargentii* occasionally occur in stands.

***Salix breweri* Alliance**

3b2. *Salix lasiolepis* dominates in the shrub overstory. If riparian tree species are present, they must be sub-dominant (generally < 10% absolute cover), with *S. lasiolepis* having >60% relative cover.

***Salix lasiolepis* Alliance**

Salix lasiolepis Association

Section III. Shrub or grass vegetation dominated or characterized by Mediterranean warm temperate taxa, including shrubs of the genera *Adenostoma* , *Ceanothus cuneatus*, *C. oliganthus*, *Eriodictyon*, *Lupinus*, and *Quercus*; as well as grasses and forbs of the genera *Eriogonum, Eschscholzia, Lasthenia, Melica, Nassella (Stipa);* and non-native herbs and grasses of the genera *Avena, Bromus,* and *Centaurea.* [Note: *Ceanothus integerrimus* keys out in section IV, step 7].

4. Shrublands dominated or characterized by evergreen, sclerophyllous chaparral species. Indicator taxa include *Adenostoma, Ceanothus, Eriodictyon, Heteromeles,* or a shrub species of *Quercus.* [Note: there is not enough evidence to support the existence of the *Heteromeles arbutifolia* Alliance in Knoxville. There were some reconnaissance surveys that showed dominance by *Heteromeles,* but these stands were sub-MMU and/or occurred with more diagnostic species. When *Heteromeles* intermixes with other shrubs (sometimes having the highest cover), key to the alliance of the other, most diagnostic shrub (e.g., *Adenostoma fasciculatum, Quercus berberidifolia,* or *Q. durata*)].

California Chaparral Macrogroup MG043

4a. *Quercus berberidifolia* is the dominant shrub or may be co-dominant with *Adenostoma fasciculatum, Ceanothus oliganthus,* or *Cercocarpus montanus.* Stands tend to occupy more mesic sites, such as north-facing slopes, concavities and toeslopes with well-drained soils.

Californian mesic chaparral Group

4a1. Stands with co-dominant *Quercus berberidifolia* and *Adenostoma fasciculatum* (both species have between 30% and 60% relative cover in the shrub overstory). Often found on upper to middle, north-facing and somewhat sheltered slopes.

***Quercus berberidifolia-Adenostoma fasciculatum* Alliance**

4a2. *Quercus berberidifolia* is the dominant shrub or is co-dominant with *Ceanothus oliganthus* or *Cercocarpus montanus.* Typically found on north-facing or otherwise lower, relatively sheltered slopes. Stands may grade into scrubby woodlands of *Quercus agrifolia, Q. wislizeni*, or *Umbellularia californica* in lower slope positions. *Aesculus californica* may be sub-dominant to *Q. berberidifolia* as an emergent tree.

***Quercus berberidifolia* Alliance**

Quercus berberidifolia/Aesculus californica Provisional Association

Quercus berberidifolia–Ceanothus oliganthus Association

Quercus berberidifolia–Cercocarpus montanus Association

4b. *Arctostaphylos viscida* is dominant, *Ceanothus oliganthus* is dominant, *Quercus durata* is dominant, or each of the three species may be co-dominant with *Adenostoma fasciculatum* in the shrub overstory. In general, stands are more frost-tolerant and found at higher, cooler, and more mesic sites than the Xeric or Mesic Chaparral Groups.

Californian pre-montane chaparral Group

4b1. *Arctostaphylos viscida* ssp. *pulchella* is the sole dominant shrub or is co-dominant with *Adenostoma fasciculatum* on serpentine, exposed, or south-facing slopes. No surveys were collected, but there were anecdotal observations in the northwest portion of the study area.

***Arctostaphylos viscida* Alliance**

4b2. *Ceanothus oliganthus* is the dominant shrub or may be co-dominant with *Adenostoma fasciculatum. Heteromeles arbutifolia* may also have relatively high cover.

***Ceanothus oliganthus* Shrubland Alliance**

Ceanothus oliganthus–Adenostoma fasciculatum Association

4b3. *Quercus durata* is the dominant shrub or may be co-dominant with *Adenostoma fasciculatum* or *Heteromeles arbutifolia.* Stands are often found on dry, rocky, or gravelly serpentine substrates, with serpentine-specialized shrubs such as *Arctostaphylos viscida* ssp. *pulchella* and *Ceanothus jepsonii*. Or they may occur along with broadly-tolerant chaparral shrubs such as *Adenostoma, Frangula californica*, and *Heteromeles*.

***Quercus durata* Alliance**

Quercus durata-Adenostoma fasciculatum Provisional Association

4c. *Adenostoma, Ceanothus cuneatus,* or *Eriodictyon* dominates in the shrub canopy, often on well-drained soils in full sun exposures, including upper slopes, spur-ridges and convexities.

Californian xeric chaparral Group

4c1. *Adenostoma fasciculatum* strongly dominates (usually with ≥60% relative shrub cover) or may be co-dominant with *Heteromeles arbutifolia*. Stands are usually on south-facing or otherwise well-drained, exposed slopes. If *Ceanothus cuneatus, C. oliganthus, Quercus berberidifolia,* or *Q. durata* intermixes as a co-dominant shrub, key to the appropriate *Ceanothus* or *Quercus* alliance instead of the *A. fasciculatum* Alliance.

***Adenostoma fasciculatum* Alliance**

Adenostoma fasciculatum Association

Adenostoma fasciculatum–Heteromeles arbutifolia/Melica torreyana Association

4c2. *Ceanothus cuneatus* is the dominant shrub or may be co-dominant with *Adenostoma fasciculatum.* If *C. integerrimus* is co-dominant, key to the *C. integerrimus* Alliance (see step 7 below). Usually on southerly-facing or otherwise relatively exposed upper slopes.

***Ceanothus cuneatus* Alliance**

Ceanothus cuneatus–Adenostoma fasciculatum Association

4c3. Diffuse shrublands characterized by open to intermittent cover of *Eriodictyon californicum* over native and non-native annual and perennial herbs. If *Lupinus albifrons* intermixes as a co-dominant shrub, key to the *Lupinus* Alliance.

***Eriodictyon californicum* Alliance**

*Eriodictyon californicum/*herbaceous Association

5. Upland shrublands where main shrubs are drought or winter deciduous (e.g., *Lupinus albifrons)* or herblands with perennial herbs/subshrubs with drought-deciduous leaves (e.g., *Eriogonum nudum*). Leaves tend to be lost in late spring, with new ones emerging after fall and winter rains. Stands are often more open than typical stands of chaparral and have a variety of forbs and grasses in the understory. Stands are generally small (<5 acres), and occupy steep or eroded transitional sites between grassland and sclerophyll-dominated shrublands.

California Coastal Scrub Macrogroup

5a1. Open, diffuse shrublands characterized by a sparse to intermittent shrub cover of *Lupinus albifrons*. *Eriodictyon californicum* may be co-dominant. Other, more thick-leaved and evergreen shrubs may be present, but with uneven or patchy distribution.

***Lupinus albifrons* Alliance**

5a2. Sparse herblands with *Eriogonum nudum* present throughout the stand. Vegetation contains a variety of other native herbaceous annuals and/or perennials, but none usually with noticeably higher cover or being more diagnostic than *E. nudum*. Stands are generally rocky or gravelly, on or off serpentine substrate.

***Eriogonum (elongatum, nudum)* Provisional Alliance**

Eriogonum nudum Provisional Association

6. True herblands, where the plants are not woody, even at the base. Stands are characterized by both native and non-native grasses and forbs. Shrubs, if present, not >10% absolute cover and/or not evenly distributed across a stand. Indicator genera include *Avena, Bromus, Centaurea, Eschscholzia*, *Lasthenia*, *Melica, Nassella (Stipa), Plantago* and *Vulpia.*

California Annual and Perennial Grassland Macrogroup

6a. Stands dominated or characterized by mostly annual grasses and forbs. Native herbs are characteristic and evenly distributed across the herbaceous layer, though non-native forbs and grasses may be dominant. Cover and composition vary year to year, but indicators usually present in sufficient amounts to differentiate from non-native stands. Diagnostic taxa include *Eschscholzia* spp., *Lasthenia* spp., *Plantago erecta* and *Vulpia microstachys*.

California annual forb/grass vegetation Group

6a1. *Eschscholzia californica* is seasonally dominant or co-dominant on upland slopes or flats with well-drained sandy to loamy soils. *Amsinckia*, *Avena*, *Bromus*, *Dichelostemma, Erodium cicutarium*, *Lupinus bicolor*, *Uropappus lindleyi* and a variety of other native and non-native taxa may be present.

***Eschscholzia* (*californica*) Alliance**

Eschscholzia californica Association

6a2. *Lasthenia californica*, *Plantago erecta*, and/or *Vulpia microstachys* are characteristically present in herbaceous stands. A variety of native forbs including *Lupinus bicolor, Plagiobothrys* spp., and *Trifolium* spp. may be present.

***Lasthenia californica–Plantago erecta–Vulpia microstachys* Alliance**

6b. Stands characterized by perennial, native grasses that are evenly distributed across a stand. Annual, non-native forbs and grasses may also be present and abundant. Diagnostic genera include *Nassella (Stipa)* and *Melica.*

California perennial grassland Group

6b1. *Melica californica* is characteristically present and evenly distributed in the herbaceous layer, usually with at least 10% relative cover. A variety of native and non-native taxa, such as *Achillea, Amsinckia, Athysanus (Daucus) pusillus, Bromus, Galium, Trifolium, Triteleia,* and *Vicia* may intermix.

***Melica (californica, torreyana)* Provisional Alliance**

Melica californica Provisional Association

6b2. *Nassella (Stipa) pulchra* is characteristically present and evenly distributed in the herbaceous layer, usually with at least 10% relative cover. A variety of native and non-native taxa, such as *Bromus, Centaurea, Delphinium, Erodium, Geranium, Micropus, Sisyrinchium,* and *Sonchus* may intermix.

***Nassella pulchra* Alliance**

6c. Stands strongly dominated by non-natives and lacking evenly distributed, diagnostic native plants (usually <5% relative cover). Annual *Avena*, *Bromus, Brachypodium, Centaurea,* and *Taeniatherum* and other non-native herbaceous taxa are strongly dominant. Because very few surveys were collected in non-native stands for this project, most polygons will be mapped broadly at the Group Level.

Mediterranean California naturalized annual and perennial grassland Group

6c1. *Avena barbata* or *A. fatua* (usually *A. barbata* in Knoxville) is strongly dominant.

***Avena (barbata, fatua)* Semi-natural Stands**

6c2. *Bromus diandrus* or *B. hordeaceus* is strongly dominant in the herbaceous layer, often co-occurring with *Brachypodium distachyon.*

***Bromus (diandrus, hordeaceus)–Brachypodium distachyon* Semi-natural Stands**

6c3. *Centaurea solstitialis* is seasonally characteristic, often intermixing with other non-native herbs, which may exceed *Centaurea* in cover (e.g., *Bromus* and/or *Taeniatherum*).

***Centaurea (solstitialis, melitensis)* Semi-natural Stands**

Section IV. Vegetation not adapted to Mediterranean climates and, therefore, dominated or characterized primarily by native species. Stands are higher in the mountains or more strictly associated with cooler and moist to wet microsites. In Knoxville, shrub stands are dominated by *Ceanothus integerrimus*. Herbaceous stands are dominated or characterized by *Carex*, *Eleocharis*, *Eryngium, Juncus, Leymus, Thermopsis,* or *Typha.*

7. *Ceanothus integerrimus* is the dominant species or may be co-dominant with *C. cuneatus* in the shrub canopy. *C. integerrimus* has winter deciduous leaves (difficult to ascertain during growing season) and is the sole alliance

member of the Western Cordilleran Montane Shrubland and Grassland Macrogroup in the study area. *Adenostoma, Arctostaphylos manzanita, Lepechinia,* and *Quercus wislizeni* may intermix.

Southern Vancouverian montane deciduous scrub Group

***Ceanothus integerrimus* Shrubland Alliance**

8. *Thermopsis californica* and/or *Bromus carinatus* (both are perennial species) are characteristically present and one or both may be dominant. Non-native annual grasses such as *Avena* or *Bromus* are often present and may intermix with a variety of native and introduced grasses and forbs. Currently, this vegetation is recognized at the association level. Further data collection is needed to determine the appropriate alliance name for this type.

Western dry upland perennial grassland Group

Thermopsis californica (Alliance unknown) Provisional Association

9. Stands dominated or characterized by tall to short grasses, graminoids, or forbs and restricted to freshwater seeps, marshes, wet meadows, seasonal ponds or in regularly to episodically flooded bottomlands or depressions. Most stands are small, although some meet MMU requirements and have been mapped. Indicator taxa include *Carex, Eleocharis, Eryngium, Juncus, Leymus,* and *Typha.*

9a. *Typha* spp. (in Knoxville, likely *T. domingensis*) dominates in the tall herb layer.

Arid West freshwater emergent marsh Group

***Typha* (*angustifolia*, *domingensis*, *latifolia*) Alliance**

Typha domingensis Association

9b. *Eleocharis macrostachya* or *Eryngium aristulatum* dominates or characterizes the herbaceous layer.

Californian mixed annual/perennial freshwater vernal pool / swale bottomland Group

9b1. *Eleocharis macrostachya* is the sole dominant or may be co-dominant with *Juncus arcticus.* Stands may occur in wetland ponds or in vernal pools/swales with a variety of plants such as *Lolium*, *Micropus*, *Ranunculus,* and *Typha.*

***Eleocharis macrostachya* Alliance**

Eleocharis macrostachya Association

9b2. Vernal pools dominated by *Eryngium aristulatum*. One stand was sampled in Knoxville when the pool still had standing water. Associated taxa may include other vernal pool taxa such as *Downingia, Isoetes, Juncus luciensis, Lythrum, Plagiobothrys,* and *Psilocarphus.*

***Eryngium aristulatum* Alliance**

9c. Vegetation dominated or characterized by *Carex barbarae, C. senta, C. serratodens, Juncus arcticus, Juncus oxymeris, J. xiphioides,* or *Leymus triticoides.*

Californian warm temperate marsh/seep Group

9c1. *Carex senta* (or possibly *C. barbarae*, though no stands were sampled for this project), the loosely cespitose or rhizomatous sedge, dominates in the herb layer, often near seeps or swales. In the one survey collected at Knoxville, *Carex senta* had moderate cover surrounding a small sulphur spring, intermixing with *Mimulus cardinalis, Helenium puberulum, Stachys ajugoides*, and a variety of other herbs. This vegetation type falls out as an association under the *Carex barbarae* Alliance – both species are ecologically similar and there currently is not enough data to support a separate *C. senta* Alliance.

***Carex barbarae* Alliance**

Carex senta Provisional Association

9c2. *Carex serratodens* is the sole dominant species or, in Knoxville, may be co-dominant with *Cirsium cymosum* or *Stachys* spp. along seeps, near streambanks, or in other wetland settings.

***Carex serratodens* Provisional Alliance**

9c3. *Juncus arcticus,* the dark brownish-green rhizomatous rush, is dominant, characteristic, or co-dominant with *Leymus triticoides* in the herbaceous layer, often along creeks or near seeps and springs.

***Juncus arcticus* (var. *balticus, mexicanus*) Alliance**

9c4. An iris-leaved species of *Juncus* (e.g., *J. oxymeris, J. xiphioides*) dominates near creeks or in other wetland settings.

***Juncus* (*oxymeris*, *xiphioides*) Alliance**

9c5. *Leymus triticoides*, the pale green creeping grass, dominates or characterizes stands. Stands are usually too small to map and often occur adjacent to edges of wetlands or riparian areas. If *Juncus arcticus* is co-dominant and/or grows with more even distribution, key to *J. arcticus*.

Leymus triticoides Alliance

Section V. Sparsely vegetated outcrops and other settings where vegetation is limited by the lithic nature of the substrate. Vegetation often largely absent and not uniformly distributed across a landscape surface, not composed of evenly-spaced trees or shrubs, or not characterized by herbaceous species most of the time. In the study area, stands are characterized by *Streptanthus.*

California Cliff, Scree, and Other Rock Vegetation Macrogroup

In Knoxville, one survey characterized by *Streptanthus morrisonii* with trace cover, was found on a northwest-facing serpentine barren. No other species were observed in the stand, which was adjacent to *Quercus durata* scrub.

Central California Coast Ranges cliff and canyon Group

***Allium falcifolium-Eriogonum* spp.-*Streptanthus* spp. Provisional Alliance**

Knoxville Wildlife Area 2002 Vegetation Map

Crosswalked to the

Knoxville Wildlife Area 2014 Southern Unit Map Classification

California Department of Fish and Wildlife
Biogeographic Data Branch
Vegetation Classification and Mapping Program

October 2014

ABSTRACT

This map of the northern (existing) and southern (new acquisition) portions of the Knoxville Wildlife Area is a subset of the vegetation map and classification produced for Napa County in 2002 (Thorne et al 2004), which used the classification standards as described in the 1995 Manual of California Vegetation (Sawyer and Keeler-Wolf 1995) and followed the National Vegetation Classification Standard (NVCS) of the time. This map includes both the vegetation type as mapped in 2002 and the corresponding vegetation type as defined in an updated and finer-scale classification that was produced in 2014 by the Vegetation Classification and Mapping Program (VegCAMP). The updated classification was used for a fine scale map of the southern portion of the Wildlife Area.

The base imagery used for photointerpretation for this map was the 1993 Digital Orthophoto Quarter Quads for Napa County. The full 2002 Napa County map can be found on BIOS (Vegetation – Napa County and Blue Ridge Berryessa [ds201]) and the associated report can be found here (Thorne et.al 2004). The 2014 vegetation map and associated report for the Knoxville Wildlife Area can be obtained from the California Department of Fish and Wildlife (CDFW) Vegetation Classification and Mapping Program (VegCAMP).

CONTENTS

TABLES

APPENDICES

PURPOSE

The purpose of this map is to aid in the development of a management plan for the CDFW Knoxville Wildlife Area. The vegetation classification and mapping provide an inventory of habitat types and a measure of the extent of each type on the property. This information may be used to assess the biological resources present and determine appropriate management strategies.

METHODS

CLASSIFICATION

Both the 2002 Napa County map and the 2014 Knoxville Wildlife Area map use a vegetation classification that is based on the National Vegetation Classification System (Grossman et al. 1998), however in 2002 the vegetation classification for California was relatively young; it has evolved considerably since then. Thousands of field surveys have been analyzed and thousands of additional acres of vegetation have been mapped in California since 2002, and as a result there have been many changes to the classification hierarchy. New vegetation types were added at all levels of the hierarchy, shifts were made in the hierarchal organization of the national classification, and many simple name changes occurred in species and vegetation types. The vegetation classification used on the 2002 Napa County map is included as Appendix A; the 2014 classification is found in Appendix B.

Another difference between the older and current map is the use of types that do not have formal descriptions. Although those types were used for the 2002 vegetation map, they are currently avoided due to the lack of empirical data supporting them. It is now preferred to map to a higher level in the hierarchy (group or macrogroup) rather than try to "guess" what a true classification analysis would determine. Table 1 shows the correspondence, or "crosswalk," between the 2002 classification and the current classification, including how the types with no formal description (NFD) from 2002 are translated to the current vegetation hierarchy.

Table 1: Crosswalk of the vegetation mapping classification used for the 2002 Napa County and Blue Ridge Berryessa vegetation map (left) and the vegetation mapping classification used for the 2014 Knoxville Wildlife Area vegetation map (right).

Napa County Map Class (MapClass)	National Vegetation Classification System Name (NVCSName)
(*Carex* spp. - *Juncus* spp - Wet Meadow Grasses) NFD Super Alliance	Californian warm temperate marsh/seep Group
Agriculture	Mediterranean California naturalized annual and perennial grassland Group
Black Oak Alliance	*Quercus kelloggii* Alliance
Blue Oak Alliance	*Quercus douglasii* Alliance
Brewer Willow Alliance	*Salix breweri* Alliance
California Annual Grasslands Alliance	California annual forb/grass vegetation Group

Napa County Map Class (MapClass)	National Vegetation Classification System Name (NVCSName)
California Bay - Leather Oak - (*Rhamnus* spp.) Mesic Serpentine NFD Super Alliance	Californian mesic chaparral Group
Chamise - Wedgeleaf *Ceanothus* Alliance	*Ceanothus cuneatus* Alliance
Chamise Alliance	*Adenostoma fasciculatum* Alliance
Foothill Pine / Mesic Non-serpentine Chaparral NFD Association	Californian mesic chaparral Group
Foothill Pine Alliance	*Pinus sabiniana* Alliance
Interior Live Oak - Blue Oak - (Foothill Pine) NFD Association	*Quercus wislizeni* tree Alliance
Interior Live Oak Alliance	*Quercus wislizeni* tree Alliance
Leather Oak - California Bay - *Rhamnus* spp. Mesic Serpentine NFD Alliance	Californian mesic chaparral Group
Leather Oak - White Leaf Manzanita - Chamise Xeric Serpentine NFD Super Alliance	Californian xeric chaparral Group
MacNab Cypress Alliance	*Callitropsis sargentii* Alliance
Mixed Oak Alliance	Californian broadleaf forest and woodland Group
Mixed Willow Super Alliance	Southwestern North American riparian/wash scrub Group
Rock Outcrop	Central California Coast Ranges cliff and canyon California Cliff, Scree, and Other Rock Vegetation Macrogroup
Scrub Interior Live Oak - Scrub Oak - (California Bay - Flowering Ash - Birch Leaf Mountain Mahogany - Toyon - California Buckeye) Mesic East County NFD Super Alliance	Californian mesic chaparral Group
Serpentine Grasslands NFD Super Alliance	Western dry upland perennial grassland Group
Sparse California Juniper-Canyon Live Oak-California Bay-California Buckeye / Steep Rock Outcrop NFD Alliance	Californian broadleaf forest and woodland Group
Upland Annual Grasslands & Forbs Formation	California annual forb/grass vegetation Group
Valley Oak - (California Bay - Coast Live Oak - Walnut - Ash) Riparian Forest NFD Association	*Quercus lobata* Alliance
Valley Oak - Fremont Cottonwood - (Coast Live Oak) Riparian Forest NFD Association	*Quercus lobata* Alliance
Valley Oak Alliance	*Quercus lobata* Alliance
White Leaf Manzanita - Leather Oak - (Chamise - *Ceanothus* spp.) Xeric Serpentine NFD Super Alliance	Californian xeric chaparral Group

DELINEATION RULES AND MAP ATTRIBUTES

Minimum Mapping Unit (MMU)

The MMU for this map is 2.5 acres (1 hectare) while the MMU for the 2014 Knoxville Wildlife Area map is 1 acre (0.5 acres for wetland and special types). This difference is not only apparent when you look at the vegetation maps (smaller and more polygons in the 2014 Wildlife Area map, and larger and fewer polygons in the 2002 Napa County map), but it is also reflected in the classifications. A smaller MMU means a finer-scale map which requires a finer-scale classification. Therefore, the 2014 Knoxville Wildlife Area classification includes several Association-level mapping types, whereas the finest hierarchical level that is mapped in the 2002 Napa County map is Alliance. None of the Association-level types appear on this map however, since they have no corresponding type in the coarser scale 2002 classification.

Each mapped polygon has the following attributes:

NVCSName
Standardized name of the vegetation description used in the National Vegetation Classification System

NVCSLevel
The level of the National Vegetation Classification System Hierarchy to which the vegetation type corresponds.

MapClass
Vegetation type mapped in 2002 for the Napa County vegetation map (according to the 1993 imagery)

MapClassCode
The code assigned to the vegetation type of the polygon

Size
Tree size (diameter at breast height)

1	Seedlings (less than 1”)
2	Saplings (1–6”)
3	Pole (6–11”)
4	Small (11–25”)
5	Medium – Large (Greater than 25”)
6	Multi Layered (medium to large trees over smaller trees in densities >60%)
9	Not applicable

Density
Density of life form being mapped

1	Greater than 60%
2	40-60%,
3	25-40%
4	10-25%
5	2-10%

CalVegName
A crosswalk to the Classification and Assessment with Landsat of Visible Ecological Groupings (CalVeg) vegetation system (USDA Forest Service). Note that there may be a one-to-many relationship between CalVeg and NVCS.

CalVegCode
The CalVeg code.

CWHRType
A crosswalk to the California Wildlife Habitat Relationships system. Note that there is usually a one-to-many relationship between CWHR and NVCS.

CWHRCode
The CWHR code.

GlobalRank
The global rarity rank of the plant community (only for polygons mapped to the Alliance level)

G1	fewer than 6 viable occurrences and/or 2000 acres worldwide
G2	6–20 viable occurrences and/or 2000–10,000 acres worldwide
G3	21–100 viable occurrences and/or 10,000–50,000 acres worldwide
G4	greater than 100 viable occurrences and/or greater than 50,000 acres worldwide
G5	community demonstrably secure due to secure worldwide abundance

StateRank
The state rarity rank of the plant community (only for polygons mapped to the Alliance level). The state rank will always be less than (more rare) or equal to the global rank.

S1	fewer than 6 viable occurrences and/or 2000 acres statewide
S2	6–20 viable occurrences and/or 2000–10,000 acres statewide
S3	21–100 viable occurrences and/or 10,000–50,000 acres statewide
S4	greater than 100 viable occurrences and/or greater than 50,000 acres statewide
S5	community demonstrably secure due to secure statewide abundance

Rare
Rarity of the vegetation type

Y	alliances and associations with state rank S1–S3
N	not rare

CaCode
California Natural Community Codes - unique code assigned to Alliances and Associations.

NVCSAlliance
The standardized name for the Alliance within the National Vegetation Classification System.

NVCSGroup
The standardized name for the Group within the National Vegetation Classification System.

NVCSMG
The standardized name for the Macrogroup within the National Vegetation Classification System.

ACRES
Size of polygon in acres.

HECTARES
Size of polygon in hectares.

UID
Unique identifier for each polygon.

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Appendix A

Vegetation Classification used for the 2002 Napa County Vegetation Map

TNC Hierarchy
Class - Subclass (Level 1)
Group - Formations (Level 2)
Alliance – Associations & Mapping Units (Level 3)

FOREST – WOODLAND

1000 – Evergreen Broadleaf Forests & Woodlands

1100 – Winter-Rain Sclerophyll Forests & Woodlands

Stands mapped to 1100 in post-burn settings generally under 15 years old.

1101 – California Bay – Coast Live Oak – (Madrone - Black Oak Big Leaf Maple) Mapping Unit

Generally occurs as a mix of hardwood species with *Umbellularia californica* dominating the more northerly mesic slopes and *Arbutus menziesii* an important indicator to drier convex upper slopes. *Acer macrophyllum* and *Quercus kelloggii* become more common in the most mesic portions of the stand.

1121 – California Bay Alliance

1122 – Canyon Live Oak Alliance

Uncommon in pure stands, often mixing with other oaks or hardwoods especially *Arbutus menziesii* or *Quercus kelloggii*. Most likely to occur on steep slopes at higher elevations.

1123 – *Eucalyptus* Alliance

Mapped in small stands primarily in and adjacent to the Napa Valley. Linear rows not mapped.

1124– Tanbark Oak Alliance

Uncommon or rare as mappable stands, usually in close proximity to stands of *Pseudotsuga menziesii* or redwood in mesic concave settings. More often a component to type 1101 or conifer types.

1125– Giant Chinquapin Alliance

1200 – Xeromorphic Sclerophyll Woodlands

1201 – Coast Live Oak – Blue Oak – (Foothill Pine) Mapping Unit

A common type where both oak species contains at least 10-15% relative cover. Generally found in open settings, although somewhat more closed when *Pinus sabiniana* becomes a component, generally less than 15% relative cover.

1202 – Interior Live Oak – Blue Oak – (Foothill Pine) Mapping Unit

Common; generally replaces type 1201 east of the Napa watershed. Found on somewhat steeper settings than type 3122. Both oak species contain at least 10-15% relative cover. *Pinus sabiniana* is often a co-dominant but is generally under 15% relative cover.

1221 – Coast Live Oak – (Foothill Pine) Mapping Unit

Common at low elevations especially in the southern portion of the Napa watershed. Common on gentle slopes in open to closed settings in the lowest foothills especially on the east side of the Napa Valley. Also fairly common on steep slopes as an emergent to chaparral species on steep southerly slopes at lower elevations. May contain a minor component of other oak species (especially *Quercus lobata* and/or *Quercus douglasii*, *Arbutus menziesii* or *Umbellularia californica*) generally under 10-15% relative cover.

Pinus sabiniana may occur as a minor conifer component although generally less often than types 1201 or 1202.

1222 – Interior Live Oak – (Foothill Pine) Mapping Unit

Uncommon as a sole component to a hardwood canopy, generally found on steep northerly setting in closed stands in the eastern portion of the county. May contain a minor component of *Quercus douglasii* and/or *Pinus sabiniana*. Often transitions to a mesic chaparral containing scrub interior oak, bay, scrub oak, mountain mahogany and chaparral ash. Mapped only east of Lake Berryessa on north trending slopes.

1223 – Mixed Oak – (Foothill Pine - Ponderosa Pine) Mapping Unit

Very common throughout the county, mapped as several different phases where at least two or more oaks co-dominate. Lowest elevations often contain a mix *of Quercus agrifolia* and *Q. lobata*. *Quercus garryana* may be a component to this phase, especially north of Napa. Higher elevations will always have a significant component of *Quercus kelloggii*, with *Quercus chrysolepis* playing an important role in steeper settings with *Quercus kelloggii*. Other hardwoods often occur in the stand as a minor component with *Acer macrophyllum* occurring in more mesic settings, and *Arbutus menziesii* on more xeric sites. At higher elevations in open woodland settings, *Quercus kelloggii* and *Quercus douglasii* may occasionally mix. Conifers, especially *Pinus ponderosa* or *Pseudotsuga menziesii* may occur as a minor component to higher elevation stands generally below 10% relative cover.

1224 – Birch-Leaf Mountain Mahogany Alliance

2000 – Evergreen Needle-leaf Forests & Woodlands

2100 – Rounded Crown Forests & Woodlands (Pines & Cypress)

2104 – Foothill Pine / Mesic non-serpentine chaparral Mapping Unit

Several stands noted in the eastern portion of the county where *Pinus sabiniana* is emergent to non-serpentine chaparral or scrubby bay.

2105 – Foothill Pine / White Leaf Manzanita – Leather Oak – (Chamise - *Ceanothus* spp.) Xeric Serpentine Mapping Unit

Common on xeric serpentine sites, less severe sites will often contain a higher component of *Adenostoma fasciculatum*. This type often forms subtle transitions to the mesic serpentine chaparral mapping unit. Generally contains less than 2-5% emergent cover of *Pinus sabiniana*.

2106 – Foothill Pine – California Bay / Leather Oak – (*Rhamnus* spp.) Mesic Serpentine Mapping Unit

Common on mesic northerly trending serpentine sites, less severe sites will often contain higher components of bay. This type often forms subtle transitions to the xeric serpentine chaparral mapping unit. Generally contains less than 2-5% emergent cover of *Pinus sabiniana*.

2121 – Foothill Pine Alliance

Uncommon as a dominant, *Pinus sabiniana* usually is a component to serpentine chaparrals or oak woodlands. Mapped where *Pinus sabiniana* contains a relative cover of at least 40–50% in association with oak or in pure stands or with other conifers generally less than 40–50% relative cover.

2122 – Knobcone Pine Alliance

Fairly common, especially in the northwestern portion of the county on upper slopes and ridges especially in the vicinity of Detert Reservoir. Mapped as pure stands or where *Pinus attenuata* is a dominant with at least 40–50% relative cover, either as an emergent to chaparral or rarely as a co-dominant with other conifers. Stands vary in structure and size, but crowns are usually closed and quite small.

2123 – Ponderosa Pine Alliance

Rarely mapped in pure stands, usually found as a co-dominant with *Pseudotsuga menziesii* and occasionally with *Pinus attenuata*. Generally found on gentle slopes east of the Napa Valley in small stands near the town of Angwin.

2124 – MacNab Cypress Alliance

Locally common in the northeastern portion of the county on serpentine rocky soils, often forming extensive stands. Serpentine chaparral species sometimes forms a significant understory but not always.

2125 – Sargent Cypress Alliance

Extensive stands mapped on the Cedar Roughs on west facing slopes above Chiles Valley. Stands vary in size, structure and density but are usually dense and stunted. Several stands noted also in riparian settings.

2126 – Sugar Pine Alliance or Sugar Pine / Canyon Oak Mapping Unit

Probably only a component to higher elevation conifer stands in the extreme northern portion of the county above 4000 feet. Not mapped to date.

2200 – Conical-Crown Forests (Firs, Spruces, Douglas Firs, Cedars & Hemlocks)

2201 – Coast Redwood – Douglas-fir – California Bay Mapping Unit

Fairly common but generally limited to slopes west of the Napa Valley in riparian settings and north trending coves and drainages. Uncommon east of the Napa valley restricted primarily to riparian habitats.

2222 – Douglas-fir Alliance

Very common in the western portion of the county, local east of the Napa watershed. Mapped where *Pseudotsuga menziesii* contains at least 10–20% relative cover as an emergent to hardwoods, or in nearly pure stands with a small component of *Lithocarpus densiflorus* or bay.

2224 – Douglas-fir – Ponderosa Pine Alliance

Mapped in several areas where both *Pseudotsuga menziesii* or *Pinus ponderosa* contain at least 10–20% relative cover. Not as common as pure stands of *Pseudotsuga menziesii*, this type was noted in vicinity of Angwin and Detert Reservoir.

2230 – Coast Redwood Alliance

Mapped exclusively west of the Napa Valley, in drainages and very mesic north trending concavities. Stands are uncommon and somewhat less extensive than type 2201. *Alnus rhombifolia* is often a component near drainages, *Lithocarpus densiflorus* and *Umbellularia californica* are generally components to non-riparian stands. Mapped where *Pseudotsuga menziesii* is generally under 20% relative cover of conifers.

3000 – Deciduous Forests & Woodlands

3100 – Cold Season Deciduous Forests & Woodlands

3101 – Valley Oak – (California Bay – Coast Live Oak - Walnut - Ash) Riparian Mapping Unit

Noted in major riparian corridors, especially in the Napa Valley and other major watersheds throughout the county. May transition to alder types as the drainage becomes more confined.

3102 - Valley Oak - Fremont Cottonwood - (Coast Live Oak) Riparian Mapping Unit

Mapped in the Napa river drainage generally south of the town of Napa.

3121 – Black Oak Alliance

Mapped in higher elevations, especially in the Atlas Peak region, on gentle to moderate slopes trending in most directions except south. *Quercus kelloggii* is generally mapped as a component to the mixed oak mapping unit.

3122 – Blue Oak Alliance

Mapped occasionally on slopes just east of the Napa Valley, and extensively east of Chiles Valley to the Yolo County line. Stands vary from nearly closed to very open where *Quercus douglasii* make up at least 80-90% relative cover. Most common associate is *Quercus wislizeni*, but other oaks may play a minor component, especially at higher elevations or in west county stands.

3123 – Valley Oak Alliance

Fairly common, especially in the southern portion of the county, on gently to nearly level slopes in open settings. Generally mapped where valley oak is the dominant species. Mixes most often with *Quercus agrifolia*.

3124 – Oregon White Oak Alliance

Uncommon as mappable stands, generally a component to more mesic mixed oak stands. Several nearly pure stands were mapped on gentle slopes west of the Napa Valley and north of the town of Napa.

3125 – California Buckeye Alliance

3200 -Temporarily Flooded Cold Season Deciduous Forests & Woodlands

3201 – White Alder – (Mixed Willow – California Bay – Big Leaf Maple) Riparian Mapping Unit

Most stands mapped as extremely narrow polygons in steep perennial streamsides, often in association with *Umbellularia californica* or *Salix* spp. Lower elevations may contain a small component of *Quercus lobata*.

3202 – (Brewer Willow) Poorly Developed Serpentine Riparian Mapping Unit

Very limited and mapped only in riparian settings where soils or geology depict serpentine areas.

3221 – Mixed Willow Super Alliance

Most stands are below the minimum mapping size, however several drainages have been mapped generally in the vicinity of small lakes and reservoirs.

3222 – Pacific Willow Alliance

3223 – Red Willow Alliance

3224 – Black Willow Alliance

3225 – Arroyo Willow Alliance

3226 – White Alder Alliance

3227 – Black Cottonwood Alliance

SHRUBLAND - DWARF SHRUBLAND

4000 – Evergreen Shrubland

Mapped in disturbed settings and post fire stands generally less than 15 years old.

4300 – Sclerophyllous Shrubland

4301 – Scrub Interior Live Oak – Scrub Oak – (California Bay – Flowering Ash – Birch Leaf Mountain Mahogany – Toyon - California Buckeye) Mesic East County Mapping Unit

Mapped in dense stands especially in the Blue Ridge, often associated with type 1222.

4302 – Mixed Manzanita – (Interior Live Oak – California Bay – Chamise) West County Mapping Unit

Mapped in a variety of settings usually on slopes not quite as steep or xeric as pure *Adenostoma fasciculatum*. Mesic stands contain more bay, xeric stands generally contain a minor component of *Adenostoma fasciculatum* or *Ceanothus* spp.

4303 – Leather Oak – White Leaf Manzanita – Chamise Xeric Serpentine Mapping Unit

Frequently mapped on xeric serpentine soils where *Pinus sabiniana* is generally below 2-5%. More severe settings contain less *Adenostoma fasciculatum*, however *Adenostoma fasciculatum* may become a substantial component of up to 75% relative cover in less severe settings.

4304 – Leather Oak – California Bay – *Rhamnus* spp. Mesic Serpentine Mapping Unit

Noted on serpentine soils trending concave and northerly. May contain a small component of cypress or brewer willow.

4321 – Chamise Alliance

Mapped frequently throughout the county on xeric slopes where *Adenostoma fasciculatum* makes up at least 70–80% relative cover, generally in a closed chaparral setting.

4322 – Chamise – Wedgeleaf *Ceanothus* Alliance

4323 – Interior Live Oak Scrub Alliance

4324 – Wedge Leaf *Ceanothus* Alliance

4325 – White Leaf Manzanita Alliance

4326 – Scrub Oak Alliance

4327– Leather Oak Alliance

4400 – Temporarily Flooded Shrubland

4425 – Mulefat Alliance

4500 – Microphyllous Shrubland

4501 – Coyote Brush – California Sagebrush (Lupine spp.) Mapping Unit

Mapped sparingly only in the extreme southern portion of the county, generally mapped to type 4000 in post disturbance settings elsewhere.

4521– Broom Alliance

4522 – Coyote Brush Alliance

4523 – *Holodiscus* Alliance

4531 – Tamarisk spp. Alliance

5000 – Deciduous Shrubland

5100 – Cold Season Deciduous Shrubland

5121 – Deerbrush Alliance

5122 – Mexican Elderberry Alliance

5200 – Intermittently Flooded to Saturated Deciduous Shrubland

5221 – Narrowleaf Willow Alliance

5222 – Brewer Willow Alliance

HERBACEOUS

6000 – Perennial Herbaceous (Graminoid – Forbs)

6100 – Bunch Forming Grasses

6121 – Creeping Ryegrass Alliance

6122 – Purple Needlegrass Alliance

6123 – One Sided Bluegrass Alliance

6200 – Continuously Forming Sod Grasses

6300 – Temporarily to Seasonally Flooded Grasslands & Forbs

6321 – Giant Reed Alliance

6400 – Semi permanently – Permanently flooded Grasslands & Forbs

6401 (Alkali Bulrush – Bulrush) Brackish Marsh Mapping Unit

Mapped only in areas adjacent to tidal flats south of the town of Napa.

6402 (Bulrush – Cattail) Fresh Water Marsh Mapping Unit

Most mappable stands are found along edges of small ponds and reservoirs.

6403 (*Carex* spp. – *Juncus* spp- Wet Meadow Grasses) Mapping Unit

Mapped in swales and low lying areas in most of the major valleys throughout the county.

6420 – Bulrush Alliance

6421 – Bulrush – Cattail Alliance

6422 – Cattail Alliance

6500 – Tidally flooded Grasslands & Forbs

6501 – Saltgrass – Pickleweed Mapping Unit

Extensive areas mapped in tidal regions generally below Cuttings Warf.

6521 – Saltgrass Alliance

6522 – Pickleweed Alliance

6600 – Hydromorphic Rooted Vegetation

7000 – Annual Herbaceous (Graminoid – Forbs)

7100 – Upland Annual Grasslands & Forbs

Generally mapped in stands that are somewhat more disturbed and contain a higher non-native forb component than type 7120. Also mapped in ruderal settings south of Napa.

7101 - Native Grassland Restoration Sites

Noted in association with mining activities near the Knoxville site.

7102 - Native Flower Fields

7120 – California Annual Grasslands Alliance

Mapped in settings where trees make up less than 5–10% emergent cover in fairly natural settings that have not been recently cleared.

7130 - Native Serpentine Grasslands

Mapped using serpentine soils and geology in settings where trees generally make up less than 5–10% emergent cover.

7200 – Seasonally Flooded Grasslands & Forbs (Vernal Pools)

NON VEGETATED

9000 – Sparsely vegetated or non-vegetated

9001 – Rock Outcrop

Mapped where herbaceous or woody vegetation generally is under 5–10% absolute cover.

9002 – Riverine, Lacustrine, and Tidal Mudflats

9100 = Urban or Built-up

9200 = Agriculture

9300 = Vacant

9400 = Water

Appendix B

Vegetation Classification for the 2014 Knoxville Wildlife Area vegetation map

Temperate Forest Subclass

- **California Forest and Woodland Macrogroup MG009**
  - Californian broadleaf forest and woodland Group
    - *Aesculus californica* Alliance
    - *Quercus agrifolia* Alliance
    - *Quercus agrifolia* / *Ceanothus oliganthus* Association
    - *Quercus agrifolia* / *Frangula californica – Heteromeles arbutifolia* Association
    - *Quercus douglasii* Alliance
      - *Quercus douglasii* / grass Association
      - *Quercus douglasii – Pinus sabiniana* Association
    - *Quercus lobata* Alliance
      - *Quercus lobata – Quercus wislizeni* Association
      - *Quercus lobata – Salix lasiolepis* Association
    - *Quercus wislizeni* tree Alliance
      - *Quercus wislizeni* / *Ceanothus oliganthus* Provisional Association
      - *Quercus wislizeni – Pinus sabiniana* / annual grass – herb Association
      - *Quercus wislizeni – Pinus sabiniana* / Arctostaphylos manzanita Association
      - *Quercus wislizeni – Quercus douglasii – Aesculus californica* Association
      - *Quercus wislizeni – Quercus douglasii – Pinus sabiniana* / (grass) Association
    - *Umbellularia californica* Alliance
      - *Umbellularia californica – Quercus wislizeni* Association
  - Californian evergreen coniferous forest and woodland Group
    - *Callitropsis sargentii* Alliance
- **Southwestern North American Riparian, Flooded and Swamp Forest Macrogroup MG036**
  - Southwestern North American riparian evergreen and deciduous woodland Group
    - *Salix laevigata* Alliance
  - Southwestern North American riparian/wash scrub Group
    - *Salix breweri* Alliance
    - *Salix lasiolepis* Alliance
      - *Salix lasiolepis* Association

Mediterranean Scrub and Grassland Subclass

- **California Chaparral Macrogroup MG043**
  - Californian xeric chaparral Group
    - *Adenostoma fasciculatum* Alliance
      - *Adenostoma fasciculatum – Heteromeles arbutifolia* / *Melica torreyana* Association
    - *Ceanothus cuneatus* Alliance
      - *Ceanothus cuneatus – Adenostoma fasciculatum* Association
    - *Eriodictyon californicum* Alliance
      - *Eriodictyon californicum* / herbaceous Association
  - Californian mesic chaparral Group
    - *Quercus berberidifolia* Alliance

Quercus berberidifolia / *Aesculus californica* Provisional Association
Quercus berberidifolia – *Ceanothus oliganthus* Association
Quercus berberidifolia – *Cercocarpus montanus* Association
Quercus berberidifolia – *Adenostoma fasciculatum* Alliance
Californian pre-montane chaparral Group
Ceanothus oliganthus Alliance
Ceanothus oliganthus – *Adenostoma fasciculatum* Association
Quercus durata Alliance
Quercus durata - *Adenostoma fasciculatum* Provisional Association
California Coastal Scrub Macrogroup MG044
Central and south coastal California seral scrub Group
Eriogonum (*elongatum*, *nudum*) Provisional Alliance
Eriogonum nudum Provisional Association
Lupinus albifrons Alliance
California Annual and Perennial Grassland Macrogroup MG045
California annual forb/grass vegetation Group
Eschscholzia (californica) Alliance
Eschscholzia californica Association
Lasthenia californica – *Plantago erecta* – *Vulpia microstachys* Alliance
California perennial grassland Group
Melica (*californica*, *torreyana*) Provisional Alliance
Melica californica Provisional Association
Nassella pulchra Alliance
Mediterranean California naturalized annual and perennial grassland Group
Avena (*barbata*, *fatua*) Semi-natural Stands
Bromus (*diandrus*, *hordeaceus*) – *Brachypodium distachyon* Semi-natural Stands
Centaurea (*solstitialis*, *melitensis*) Semi-natural Stands

Temperate and Boreal Shrubland and Grassland Subclass
Western North American Temperate Grassland and Meadow Macrogroup MG048
Western dry upland perennial grassland Group
Thermopsis californica (Alliance unknown) Provisional Association
Western Cordilleran Montane Shrubland and Grassland Macrogroup MG049
Southern Vancouverian montane deciduous scrub Group
Ceanothus integerrimus Alliance
Western North American Freshwater Marsh Macrogroup MG073
Arid West freshwater emergent marsh Group
Typha (*angustifolia*, *domingensis*, *latifolia*) Alliance
Typha domingensis Association
Western North America Vernal Pool Macrogroup MG074
Californian mixed annual/perennial freshwater vernal pool / swale bottomland Group
Eleocharis macrostachya Alliance
Eleocharis macrostachya Association
Eryngium aristulatum Alliance
Western North America Wet Meadow and Low Shrub Carr MG075
Californian warm temperate marsh/seep Group
Carex barbarae Alliance
Carex senta Provisional Association
Carex serratodens Provisional Alliance

Juncus arcticus (var. *balticus*, *mexicanus*) Alliance
Leymus triticoides Alliance
Juncus (*oxymeris*, *xiphioides*) Alliance

Mediterranean, Temperate, and Boreal Nonvascular and Sparse Vegetation Subclass

California Cliff, Scree, and Other Rock Vegetation Macrogroup MG110

Central California Coast Ranges cliff and canyon Group

Allium falcifolium - *Eriogonum* spp. - *Streptanthus* spp. Provisional Semi-natural Stands

Appendix F. Rare Plant Survey Report

Report: Rare Plant Survey of the Southern Knoxville Wildlife Area for the California Department of Fish and Wildlife

Daniel Potter and Ninh Khuu, Department of Plant Sciences, University of California, Davis

A. Summary

Rare plant surveys were conducted in 2015 and 2016 in the southern Knoxville Wildlife Area, targeting land added to the Area since 2008. Twelve field trips were made each year, focusing primarily on areas west of the Knoxville-Berryessa Road, especially the western (upper) ends of the Zim Zim and Nevada Creek drainages, where serpentinite-derived soils are common. Rare plants are defined here as those included in the California Native Plant Society's Inventory of Rare Plants. A total of 19 rare plant taxa were encountered, of which one has a CNPS rank of 1B.1, seven have a rank of 1B.2, three have a rank of 4.2, and eight have a rank of 4.3. Estimated population sizes, GPS points, habitat descriptions, photographs, and voucher specimens were taken to document the occurrences. In addition, collections were made of non-rare plant taxa not previously recorded for the Knoxville Wildlife Area and an updated plant list was produced. Analyses of molecular evidence were used to investigate the identity of individuals potentially assignable to the federally endangered species *Sidalcea keckii*. Nucleotide sequence data from the nuclear ribosomal ITS region support the conclusion that plants found in the Knoxville Wildlife Area that are morphologically similar to *S. keckii* are, in fact, more closely related to, and may be conspecific with, the more widely distributed species *S. diploscypha*.

B. Introduction

From March 2015 through September 2016, we conducted a rare plant survey of the southern Knoxville Wildlife Area (KWA) in Napa County, California, for the California Department of Fish and Wildlife (CDFW) and The Land Trust of Napa County, concentrating on taxa included in the California Native Plant Society's (CNPS) Inventory of Rare Plants (CNPS, Rare Plant Program 2015-2016). The KWA is located within the Inner North Coast Ranges District (Baldwin et al. 2012), a region of California known to be a center of rare plant diversity and endemism due to the complex topography, chemically unusual soils, and wide range of microclimates. The focal areas for the current study were parcels added to the KWA from 2008 onward, including land both east and west of Knoxville-Berryessa Road, north of Lake Berryessa (see areas highlighted in yellow in Fig. 1). Within that larger target area, we focused most intensively on surveying locations in the western (upper) ends of both the Nevada Creek and Zim Zim Creek drainages. Soil maps indicate that these areas have serpentinite-derived soils, which provide likely places to find many rare plants, and the vast majority of rare taxa identified as likely to occur in the KWA are exclusively or most commonly found on serpentine. A secondary goal for the project was to expand the vascular plant list for the northern KWA prepared by Ruygt (2005).

C. Methods

1. Pre-field work

Prior to the commencement of field work, we compiled a list of rare plants likely to occur in the survey area. The nine quadrats including and surrounding the KWA (Wilson Valley, Glascock Mountain, Rumsey, Jericho Valley, Knoxville, Guinda, Aetna Springs, Walter Springs, and Brooks) were used as locational features to query the California Natural Diversity Database (CNDDB 2015-2016) maintained by the CDFW (Table 1). We also consulted the on-line rare

plant inventory maintained by the California Native Plant Society (CNPS, Rare Plant Program 2015-2016) to confirm rarity status of selected taxa and the Consortium of California Herbaria (http://ucjeps.berkeley.edu/consortium/) to check for previous collections of any taxa of interest from the area. Names and brief descriptions of rare taxa, including color photos, were prepared in order to be provided to all members of field survey teams. Finally, PI Daniel Potter obtained a plant voucher collecting permit from the CDFW.

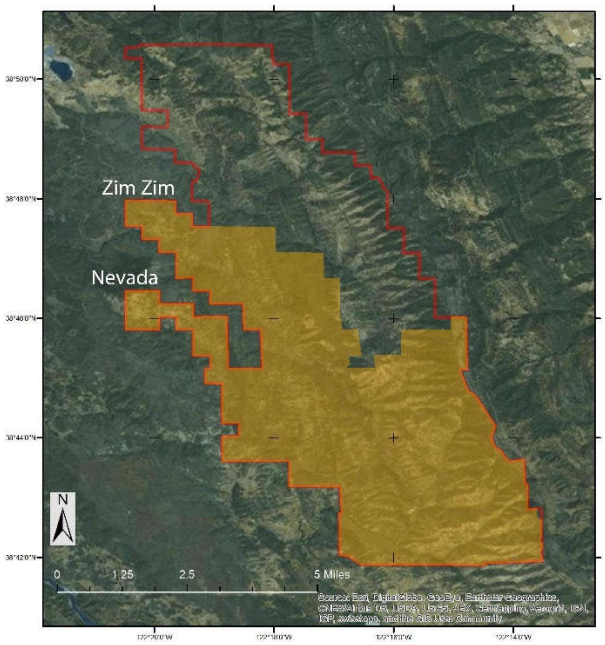

Fig. 1. Plant survey area. Red outline designates boundary of the Knoxville Wildlife Area. Yellow highlighted portion represents the target area for this study. Areas most intensively surveyed are those with serpentinite-derived soils in the northwestern ends of the Upper Zim Zim Creek and Upper Nevada Creek drainages (see also Figs. 5, 6).

2. Field work

A total of 24 field expeditions were undertaken, 12 each in 2015 and 2016 (Table 2). The field teams varied in size from two to six individuals on each trip. As mentioned above, team members were given photographic guides to the rare species we expected to encounter before starting field surveys. Surveys were conducted on foot, departing from parking areas either along Knoxville-Berryessa Road or along roads entering the western side of the KWA in the Zim Zim and Nevada Creek drainages, accessed from Knoxville Devilhead Road.

When rare taxa were encountered, their locations were mapped using a handheld GPS unit (Garmin GPSMap 64s) with WGS84 as the map datum. Mapping was achieved by walking through and around the plant population taking GPS points to cover the population's extent as thoroughly as possible; when populations were very small or very diffuse, only a single point was taken. When multiple populations of a taxon were encountered (either on one or on multiple dates), the points from all populations were combined into a single GPX file. For the two populations of *Fritillaria pluriflora* encountered, track files were recorded instead. Estimates of population sizes were recorded and notes were taken on the habitat. Photos were taken of the plants, including close-ups of key features as well as habitat shots. If more than 10 individuals were present, a voucher specimen was collected. Following acceptance of this report by the CDFW, we will submit reports on each rare plant population encountered to the CNDDB.

Table 1. Rare taxa considered likely to occur in the survey area, based on 9-quadrat query of CNDDB and Ruygt (2005).

Scientific Name	Family	Common Name	Rare Plant Rank	Found in this study?
From 9-quardat query of CNDDB:				
Amorpha californica Nutt. var. *napensis*Jeps.	Fabaceae	Napa False Indigo	1B.2	No
Amsinckia lunaris J.F. Macbr.	Boraginaceae	Bent-Flowered Fiddleneck	1B.2	Yes
Astragalus rattanii A. Gray var. *jepsonianus* Barneby	Fabaceae	Jepson's Milk-Vetch	1B.2	No[1]
Balsamorhiza macrolepis W.M. Sharp	Asteraceae	Big-Scale Balsamroot	1B.2	No
California macrophylla (Hook. & Arn.) J.J. Aldasoro, C. Navarro, P. Vargas, L. Sáez & C. Aedo	Geraniaceae	Round-Leaved Filaree	1B.2	No
Calystegia collina subsp. *oxyphylla*	Convolvulaceae	Mt. Saint Helena Morning-Glory	4.2	No
Castilleja rubicundula (Jeps.) T.I. Chuang & Heckard var. *rubicundula*	Orobanchaceae	Pink Creamsacs	1B.2	Yes
Ceanothus sonomensis J.T. Howell	Rhamnaceae	Sonoma Ceanothus	1B.2	No
Centromadia parryi (Greene) Greene subsp. *parryi*	Asteraceae	Pappose Tarplant	1B.2	No
Cryptantha excavata Brandegee	Boraginaceae	Deep-Scarred Cryptantha	1B.3	No
Eriogonum nervulosum (S. Stokes) Reveal	Polygonaceae	Snow Mountain Buckwheat	1B.2	No
Extriplex joaquinana (A. Nelson) E.H. Zacharias	Chenopodiaceae	San Joaquin Spearscale	1B.2	No
Fritillaria pluriflora Torr. ex Benth.	Liliaceae	Adobe-Lily	1B.2	Yes
Grimmia torenii R.I. Hastings	Grimmiaceae	Toren's Grimmia	1B.3	No[2]
Harmonia hallii (D.D. Keck) B.G. Baldwin	Asteraceae	Hall's Harmonia	1B.2	Yes
Hesperolinon bicarpellatum (H. Sharsm.) H. Sharsm.	Linaceae	Two-Carpellate Western Flax	1B.2	No
Hesperolinon drymarioides (Curran) Small	Linaceae	Drymaria-Like Western Flax	1B.2	No
Hesperolinon sharsmithiae R. O'Donnell	Linaceae	Sharsmith's Western Flax	1B.2	No
Juglans hindsii Jeps. ex R.E. Sm.	Juglandaceae	Northern California Black Walnut	1B.1	Yes
Layia septentrionalis D.D. Keck	Asteraceae	Colusa Layia	1B.2	Yes[3]
Leptosiphon jepsonii (Schemske & Goodwillie) J.M. Porter & L.A. Johnson	Polemoniaceae	Jepson's Leptosiphon	1B.2	No
Lupinus sericatus Kellogg	Fabaceae	Cobb Mountain Lupine	1B.2	No
Navarretia rosulata Brand	Polemoniaceae	Marin County Navarretia	1B.2	No
*Penstemon newberryi*A. Gray var. *sonomensis*(Greene) Jeps.	Plantaginaceae	Sonoma Beardtongue	1B.3	No

Table 1, continued.

Scientific Name	Family	Common Name	Rare Plant Rank	Found in this study?
Plagiobothrys hystriculus (Piper) I.M. Johnst.	Boraginaceae	Bearded Popcorn Flower	1B.1	No[4]
Sidalcea keckii Wiggins	Malvaceae	Keck's Checkerbloom	1B.1	No[5]
Streptanthus brachiatus F.W. Hoffm. subsp. *hoffmanii* R.W. Dolan & LaPré	Brassicaceae	Freed's Jewelflower	1B.2	No
Streptanthus hesperidis Jeps.	Brassicaceae	Green Jewelflower	1B.2	Yes
Streptanthus morrisonii F.W. Hoffm. subsp. *elatus* F.W. Hoffm.	Brassicaceae	Three Peaks Jewelflower	1B.2	No
Streptanthus morrisonii F.W. Hoffm. subsp. *kruckebergii* R.W. Dolan & LaPré	Brassicaceae	Kruckeberg's Jewelflower	1B.2	Yes[6]
Included on Ruygt's (2005) plant list for the KWA:				
Allium fimbriatum S. Watson var. *purdyi* (Eastw.) McNeal	Alliaceae	Purdy's Onion	4.3	No
Arabis modesta Rollins	Brassicaceae	Modest Rockcress	4.3	No

[1]Not encountered in this study, but CNDDB records indicate this taxon may occur in the Upper Zim Zim Creek drainage where we found several other rare taxa.

[2]*Grimmia* is a genus of mosses, which were not surveyed for this study.

[3]Area where found is just south of the KWA boundary.

[4] Not encountered during this project, but there is a CNDDB record from 1998, at 38.76890˚ N 122.26937˚ W, a location within the KWA but outside (just to the northeast) of the focal survey area for this project.

[5]Plants morphologically similar to this taxon, but genetically closer to *S. diploschyha*, are common in serpentine grasslands of the upper Nevada and Zim Zim Creek drainages (see text for details).

[6] Neither edition of The Jepson Manual recognizes varieties within *S. morrisonii*, and the species as a whole was considered but rejected for listing (rank CBR, CNPS, Rare Plant Program 2016).

Table 2. Field trips to KWA for this project.

Date	Areas Visited	Rare Taxa Encountered
2015:		
2/28	South of Zim Zim trailhead, west of Knoxville-Berryessa Road	None
3/7	North of Zim Zim trailhead, west of Knoxville-Berryessa Road	*Fritillaria pluriflora*
3/14	Lower Zim Zim	None
3/22	Lower Zim Zim	None
4/4	Knoxville-Berryessa Road west to upper Zim Zim	None
4/11	Knoxville-Berryessa Road west to upper Zim Zim	*Harmonia hallii*
4/18	Upper Zim Zim	*Sidalcea* sp., *Streptanthus morrisonii*
4/26	Upper Zim Zim	*Harmonia hallii, Sidalcea* sp.
5/2	Upper Nevada	*Astragalus clevelandii, Helianthus exilis, Sidalcea* sp., *Toxicoscordion fontanum,*
5/30	Upper Zim Zim	*Delphinium uliginosum, Helianthus exilis, Toxicoscordion fontanum*
6/13	Upper Nevada	*Astragalus clevelandii*
7/18	Upper Zim Zim / Upper Nevada	*Helianthus exilis*
2016:		
2/21	Upper Zim Zim	None
3/15	Upper Zim Zim / Upper Nevada	*Delphinium uliginosum, Fritillaria purdyi, Lomatium hooveri*
3/19	East of Knoxville-Berryessa Road, south of Zim Zim trailhead	None
4/3	Upper Nevada	*Amsinckia lunaris, Delphinium uligionsum, Layia septentrionalis, Lomatium hooveri, Toxicoscordion fontanum*
4/17	Upper Zim Zim	*Astragalus clevelandii, Collomia diversifolia, Delphinium uligionsum, Harmonia hallii, Mimuls nudatus, Toxicoscordion fontanum,*
4/23	Lower Zim Zim	*Sidalcea* sp.
4/24	Upper Nevada	*Juglans hindsii, Sidalcea* sp.
4/30	Knoxville Berryessa Road to lower Nevada	*Astragalus clevelandii*
5/8	Knoxville Berryessa Road to lower Nevada	*Astragalus clevelandii, Sidalcea* sp.
6/8	Upper Nevada	None
6/18	Upper Zim Zim	*Astragalus clevelandii, Delphinium uliginosum, Helianthus exilis, Navarretia jepsonii, Toxicoscordion fontanum*
6/23	Upper Zim Zim	*Cordylanths tenuis* subsp. *brunneus, Harmonia hallii, Monardella viridis, Navarretia jepsonii, Streptanthus hesperidis, Toxicoscordion fontanum*

While surveying, all non-rare plant taxa encountered were also noted and, if a taxon was not already on Ruygt's (2005) list, a voucher specimen was collected. Taxonomic identifications were checked in the field using The Jepson Manual (Baldwin et al. 2012) and later confirmed by closer examination and comparison with other specimens in the herbarium of the UC Davis Center for Plant Diversity (DAV), where the vouchers are also deposited. As needed, taxa were added to Ruygt's (2005) list, which was also updated to make taxonomy and nomenclature consistent with the current Jepson eFlora (Jepson Flora Project 2016).

3. Genetic analyses

As described below, doubts about the taxonomic identity of plants of the genus *Sidalcea* collected in the KWA, we undertook genetic analyses of those plants with the objective of determining whether they are assignable to the federally listed rare species (CNPS rank 1B.1) *S. keckii*, the more common *S. diploscypha* (Torr. & A. Gray) A. Gray, or an as-yet undescribed taxon. We generated nucleotide sequences for the nuclear ribosomal Internal Transcribed Spacer (ITS) region for five individuals from five separate populations in the KWA and seven herbarium specimens in the DAV herbarium from the inner North Coast Ranges identified, three of which had been identified as *S. diploscypha* and four as *S. keckii* (Table 3).

Table 3. Herbarium specimen samples included in comparative DNA analyses of *Sidalcea* sp. from KWA.

Collector	Number	Identified as	County
Bowcutt	1800	*S. diploscypha*	Sonoma
Dean	8748	*S. diploscypha*	Napa
Major	80	*S. diploscypha*	Mendocino
Crampton	2771	*S. keckii*	Yolo
Preston	582	*S. keckii*	Napa
Solomeshch	s.n.	*S. keckii*	Yolo
Thomsen	1796	*S. keckii*	Yolo

DNA was extracted from dried leaves using the Exgene Plant SV Kit (GeneAll Biotechnology Co., Ltd., South Korea). Procedures for PCR amplification and sequencing of the ITS region followed Potter et al. (2002). Four published sequences for *S. diploscypha* and three for *S. keckii* were downloaded from GenBank. All sequences were aligned with ClustalX (Larkin et al. 2007); sequence comparisons and phylogenetic analyses were implemented in PAUP* (Swofford 2002).

C. Results

1. Pre-field work

The nine quadrats including and surrounding the KWA (Wilson Valley, Glascock Mountain, Rumsey, Jericho Valley, Knoxville, Guinda, Aetna Springs, Walter Springs, and Brooks) were used as locational features to query the CNDDB using RareFind (CNDDB 2015-2016). Thirty taxa were retrieved from this search (Table 1), including three rank 1B.1, 23 rank 1B.2, three rank 1B.3, and one rank 4.2. In addition, two taxa with rank 4.3 were listed by Ruygt (2005). None of these taxa is listed as rare or endangered by the state of California, and only one, *Sidalcea keckii*, is listed as federally endangered.

2. Rare plant taxa encountered.
We encountered eight of the 30 taxa retrieved in the CNDDB search, but, as discussed below, the status of two of those 30 is in doubt. We also encountered 11 additional taxa, with rank 4.2 or 4.3 (Table 4).

Populations were defined as groups of individuals clearly separated from other groups of individuals of the same species. In cases where populations could not be defined unambiguously, species are described as diffusely distributed. Population sizes are conservative estimates based on rough counts of numbers of plants observed in the field. Images of individuals and populations of most of the rare taxa encountered in this study are shown in Figs. 2-4; locations of the populations are shown in Figs. 5 and 6. GPS points for the populations, and the estimated size of each population, are included in GPX or TRK files for each taxon, provided as supplementary data for this report.

Other than *Juglans hindsii*, which occurs in riparian areas next to Eticuera Creek along the Knoxville-Berryessa Road (Fig. 6C), all of the rare plant taxa we encountered were found in serpentine areas in the upper drainages of Nevada and Zim Zim Creeks and the ridge east of upper Zim Zim Creek. These serpentine areas were also the primary focus of our surveys, but we did explore areas farther to the east on several occasions (Table 2). Although no rare taxa (other than *J. hindsii*) were encountered in any of these other areas, we did observe, and collect voucher specimens of, taxa not previously included on the plant list for the KWA on these trips.

Table 4 provides a summary of the populations of rare plant taxa encountered in this study, which are described in more detail below.

CNPS List 1B.1 (rare, threatened, or endangered in California and elsewhere; seriously endangered in California).
***Juglans hindsii*:** One population encountered along Eticuera Creek and the Knoxville-Berryessa Road, consisting of about 5 individuals (Fig. 6C).

Plagiobothrys hystriculus was not encountered during this project, but there is a CNDDB record from 1998 of a population of about 200 individuals occurring at 38.76890° N 122.26937° W, a location within the KWA but outside (just to the northeast) of the focal survey area for this project.

***Sidalcea keckii*:** See discussion of *Sidalcea* sp. under "taxa of questionable status" below.

CNPS List 1B.2 (rare, threatened, or endangered in California and elsewhere; fairly endangered in California).
***Amsinckia lunaris* (Figs. 2A, 2B):** One population, with an estimated size of 500 individuals, was encountered in the upper Nevada Creek drainage in grassland just north of the creek (Fig. 5B).

Table 4. Populations of rare taxa encountered.

Scientific Name	Common Name	Family	Habitat where observed at KWA	Areas where observed at KWA	No. of pops.	Est. total no. of indiv.	Image Figs.	Map Figs.
Rank 1B.1								
Juglans hindsii Jeps. ex R.E. Sm.	Northern California Black Walnut	Juglandaceae	Riparian.	Along Knoxville-Berryessa Road.	1	5	None.	6C
Rank 1B.2								
Amsinckia lunaris J.F. Macbr.	Bent-Flowered Fiddleneck	Boraginaceae	Serpentine grassland.	Upper Nevada Creek.	1	500	2A, 2B	5B
Castilleja rubicundula (Jeps.) T.I. Chuang & Heckard var. *rubicundula*	Pink Creamsacs	Orobanchaceae	Serpentine grassland near creek.	Upper Nevada Creek.	1	10	None.	5A
Fritillaria pluriflora Torr. ex Benth.	Adobe-Lily	Liliaceae	Grassland/ chaparral.	North of Zim Zim trailhead, east and west of Knoxville-Berryessa Rd.	2	1,000	2C, 2D	5A
Harmonia hallii (D.D. Keck) B.G. Baldwin	Hall's Harmonia	Asteraceae	Road and adjacent in serpentine chaparral.	North and east of Zim Zim falls, along road.	3	1,500	2E, 2F	5C
Layia septentrionalis D.D. Keck	Colusa Layia	Asteraceae	Wooded rocky outcrop.	Upper Nevada Creek, just south of KWA.	1	50	2G	5A
Streptanthus hesperidis Jeps.	Green Jewelflower	Brassicaceae	Road and adjacent in serpentine chaparral.	North and east of Zim Zim falls, along road.	1	500	2H, 2I	5B
Streptanthus morrisonii F.W. Hoffm. subsp. *kruckebergii* R.W. Dolan & LaPré [1]	Kruckeberg's Jewelflower	Brassicaceae	Open areas in serpentine chaparral.	Upper Zim Zim Creek.	1	200	4K, 4L	6D

[1] Neither edition of The Jepson Manual recognizes varieties within *S. morrisonii*, and the species as a whole was considered but rejected for listing (rank CBR, CNPS 2016).

Table 4, continued.

Scientific Name	Common Name	Family	Habitat where observed at KWA	Areas where observed at KWA	No. of pops.	Est. total no. of indiv.	Image Figs.	Map Figs.
Rank 4.2								
Delphinium uliginosum Curran	Swamp Larkspur	Ranunculaceae	Wet areas (streambeds, seeps) on serpentine.	Upper Nevada and Zim Zim Creeks.	Diffuse	500	3F	5B
Helianthus exilis A. Gray	Serpentine Sunflower	Asteraceae	Wet areas (streambeds, seeps) on serpentine.	Upper Nevada and Zim Zim Creeks.	3	750	4A-4D	6A
Toxicoscordion fontanum (Eastw.) Zomlefer & Judd	Marsh Zigadenus	Melanthiaceae	Wet areas (streambeds, seeps) on serpentine.	Upper Nevada and Zim Zim Creeks.	4	1,000	4J	6B
Rank 4.3								
Astragalus clevelandii Greene	Cleveland's Milk-Vetch	Fabaceae	Wet areas (streambeds, seeps) on serpentine.	Upper Nevada and Zim Zim Creeks.	6	130	3A, 3B	6C
Collomia diversifolia Greene	Serpentine Collomia	Polemoniaceae	Road and adjacent in serpentine chaparral.	Upper Zim Zim Creek, including ridge to the east.	Diffuse	1000	3C	5D
Cordylanthus tenuis A. Gray subsp. *brunneus* (Jeps.) Muhz	Serpentine Bird's-Beak	Orobanchaceae	Open areas in serpentine chaparral.	Upper Zim Zim Creek.	1	1,000	3D, 3E	6A
Fritillaria purdyi Eastw.	Purdy's Fritillary	Liliaceae	Open areas in serpentine chaparral.	Upper Zim Zim Creek.	1	1,000	3G-3I	5A
Lomatium hooveri (Matthias & Constance) Constance & Ertter	Hoover's Lomatium	Apiaceae	Woodland, grassland, and chaparral on serpentine.	Upper Nevada and Upper Zim Zim Creeks, including ridge to the east.	Diffuse	1,000	4E	6C

Table 4, continued.

Scientific Name	Common Name	Family	Habitat where observed at KWA	Areas where observed at KWA	No. of pops.	Est. total no. of indiv.	Image Figs.	Map Figs.
Rank 4.3, cont.								
Mimulus nudatus Greene	Bare Monkeyflower	Phrymaceae	Wet areas (streambeds, seeps) on serpentine.	Upper Zim Zim Creek.	3	1,100	4F, 4G	5A
Monardella viridis Jeps.	Green Monardella	Lamiaceae	Serpentine chaparral.	Upper Zim Zim Creek.	Diffuse	500	4H	5A
Navarretia jepsonii Jeps.	Jepson's Navarretia	Polemoniaceae	Road and adjacent in serpentine chaparral.	Upper Zim Zim Creek.	Diffuse	6,000	4I	5C
Uncertain status:								
Sidalcea sp.		Malvaceae	Serpentine grassland.	Upper Nevada and Zim Zim Creeks.	Diffuse	1,000+	4M-4O	6D

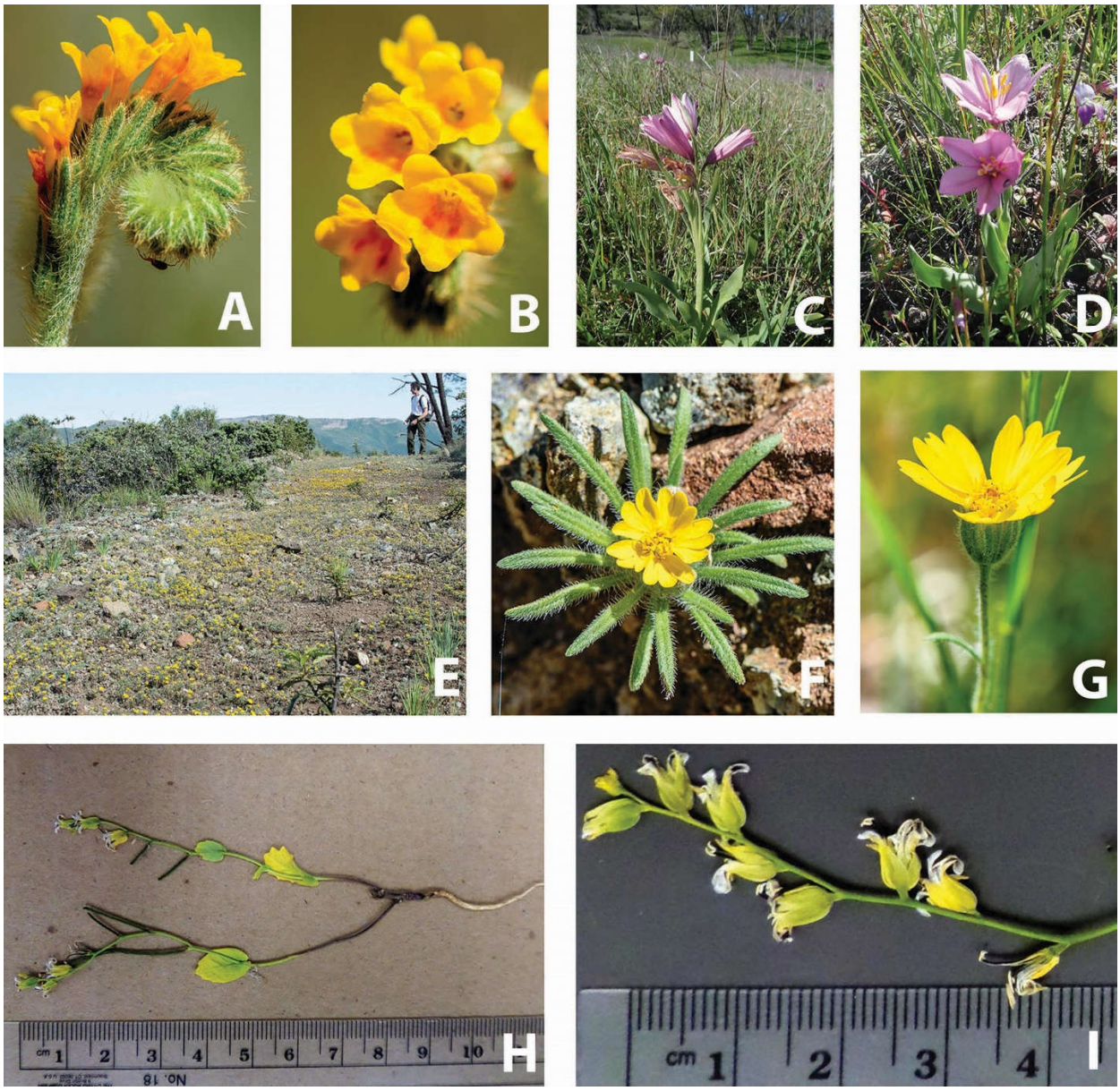

Fig. 2. Taxa with rank 1B.2. A, B. *Amsinckia lunaris*. C, D. *Fritillaria pluriflora*. E, F. *Harmonia hallii*. G. *Layia septentrionalis*. H, I. *Streptanthus hesperidis*.

Astragalus rattanii was not encountered for this study, but CNDDB records indicate that this taxon may occur (a population with an estimated size of 200 individuals) in the Upper Zim Zim drainage where we found several other rare taxa (Figs. 5, 6).

***Castilleja rubicundula* var. *rubicundula*:** One population, with an estimated size of 10 individuals, was encountered in the upper Nevada Creek drainage, immediately adjacent to the creek (Fig. 5A).

***Fritillaria pluriflora* (Figs. 2C, 2D):** Two populations were encountered, north of Zim Zim trailhead, east and west of Knoxville-Berryessa Rd.; both were in serpentine grassland outside the target area for this study, but are reported here nonetheless because they were both partly within the KWA boundary (Fig.5A). The first, immediately adjacent to the road on both sides, consisted of about 500 individuals on the west side and about 10 individuals on the east side, while the second, west of the road on the way up to the ridge east of the Zim Zim Creek drainage, consisted of about 200 individuals.

***Harmonia hallii* (Figs. 2E, 2F):** Three populations were encountered on open, rocky serpentine barrens on roadbeds north and east of Zim Zim Falls (Fig. 5C). The first and largest, consisting of about 1050 individuals, was along the top of the ridge southwest of Knoxville-Berryessa Road, while the second and smallest (about 50 individuals) was to the northwest of the first, along the road descending into the Zim Zim Creek drainage, about halfway down. The third, with about 350 individuals, was a bit further to the west at the bottom of the descent, for a total of about 1,450 individuals.

***Layia septentrionalis* (Fig.2G):** One population of about 50 individuals was encountered in oak woodland at the base of a rocky outcrop in the upper Nevada Creek drainage, just outside the KWA boundary (Fig. 5A); it is reported here since its existence suggests that further exploration may reveal occurrences of this taxon within the KWA.

***Streptanthus hesperidis* (Figs. 2H, 2I):** One population of about 500 individuals was encountered on open rocky serpentine barrens along the road on top of the ridge southwest of Knoxville-Berryessa Road and east of the upper Zim Zim Creek drainage (Fig. 5B).

***Streptanthus morrisonii* subsp. *kruckebergii*:** See discussion of *Streptanthus morrisonii* under "taxa of questionable status" below.

CNPS List 4.2 (uncommon in California; fairly endangered in California).
***Delphinium uliginosum* (Fig 3F):** The species was found diffusely distributed in wet areas of upper Zim Zim and Nevada Creek drainages, with a total of about 500 individuals (Fig. 5B).

***Helianthus exilis* (Fig. 4A-4D):** Three populations were encountered along creeks on serpentine: two in the upper Zim Zim Creek drainage, with about 500 and 200 individuals, respectively, and one in the upper Nevada Creek drainage, with about 50 individuals (Fig. 6A).

***Toxicoscordion fontanum* (Fig. 4J):** Four populations were encountered in marshy areas along creeks on serpentine: three in the upper Zim Zim Creek drainage, with about 300, 500, and 100 individuals, respectively, and one in the upper Nevada Creek drainage, with about u100 individuals (Fig. 6B).

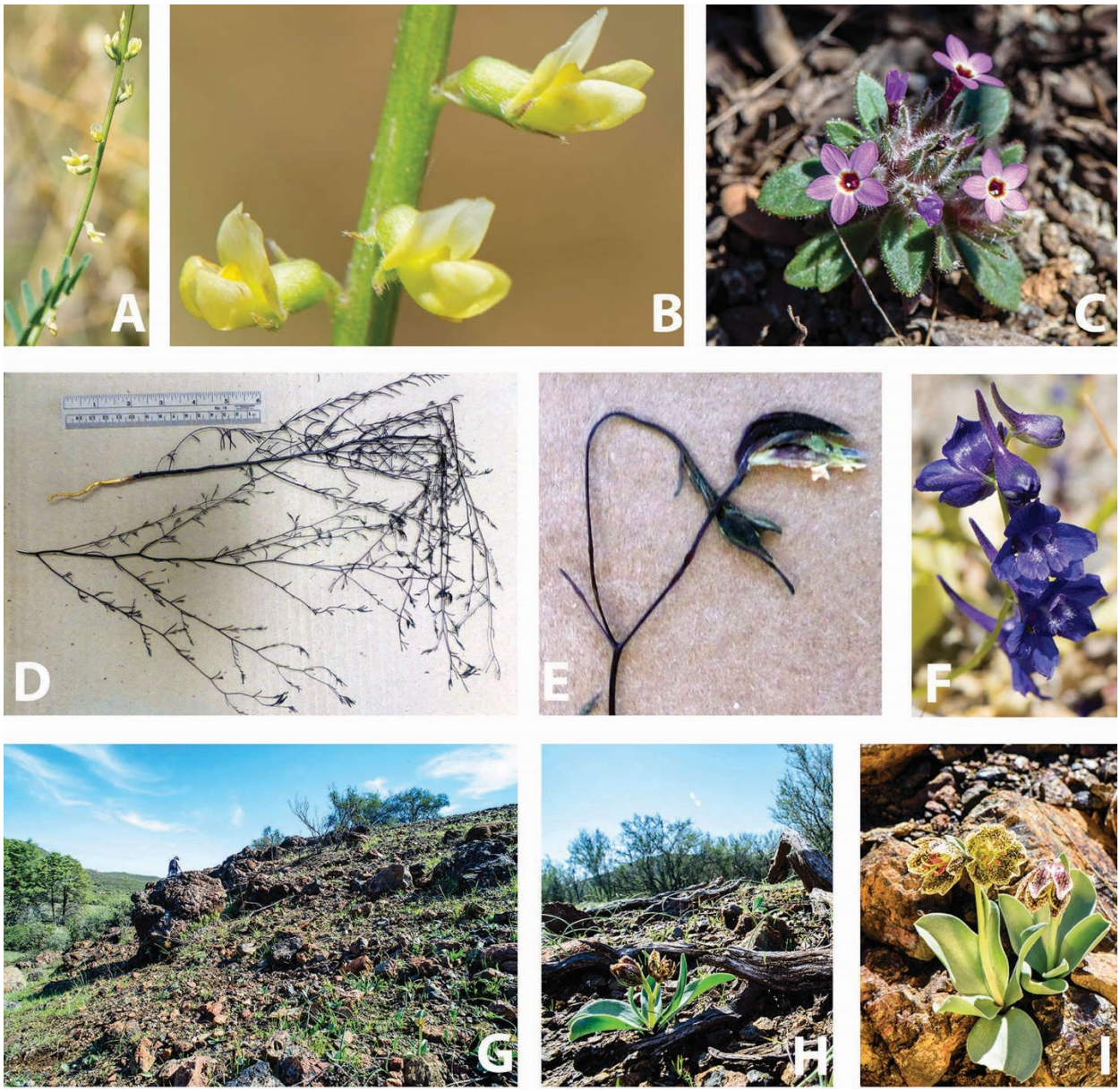

Fig. 3. Taxa with CNPS rank 4. A, B. *Astragalus clevelandii*. C. *Collomia diversifolia*. D, E. *Cordylanthus tenuis* subsp. *brunneus*. F. *Delphinium uliginosum*. G-I. *Fritillaria purdyi*.

CNPS List 4.3 (uncommon in California; not very endangered in California).
***Astragalus clevelandii* (Figs. 3A, 3B):** Six populations were encountered in serpentine grassland adjacent to creeks: two in the upper Zim Zim Creek drainage, with 1 and 50 individuals, respectively; two in the upper Nevada Creek drainage, with 5 and 20 individuals, respectively, and two in the lower Nevada Creek drainage, with 1 (just outside the KWA boundary) and 50 individuals, respectively (Fig. 6C).

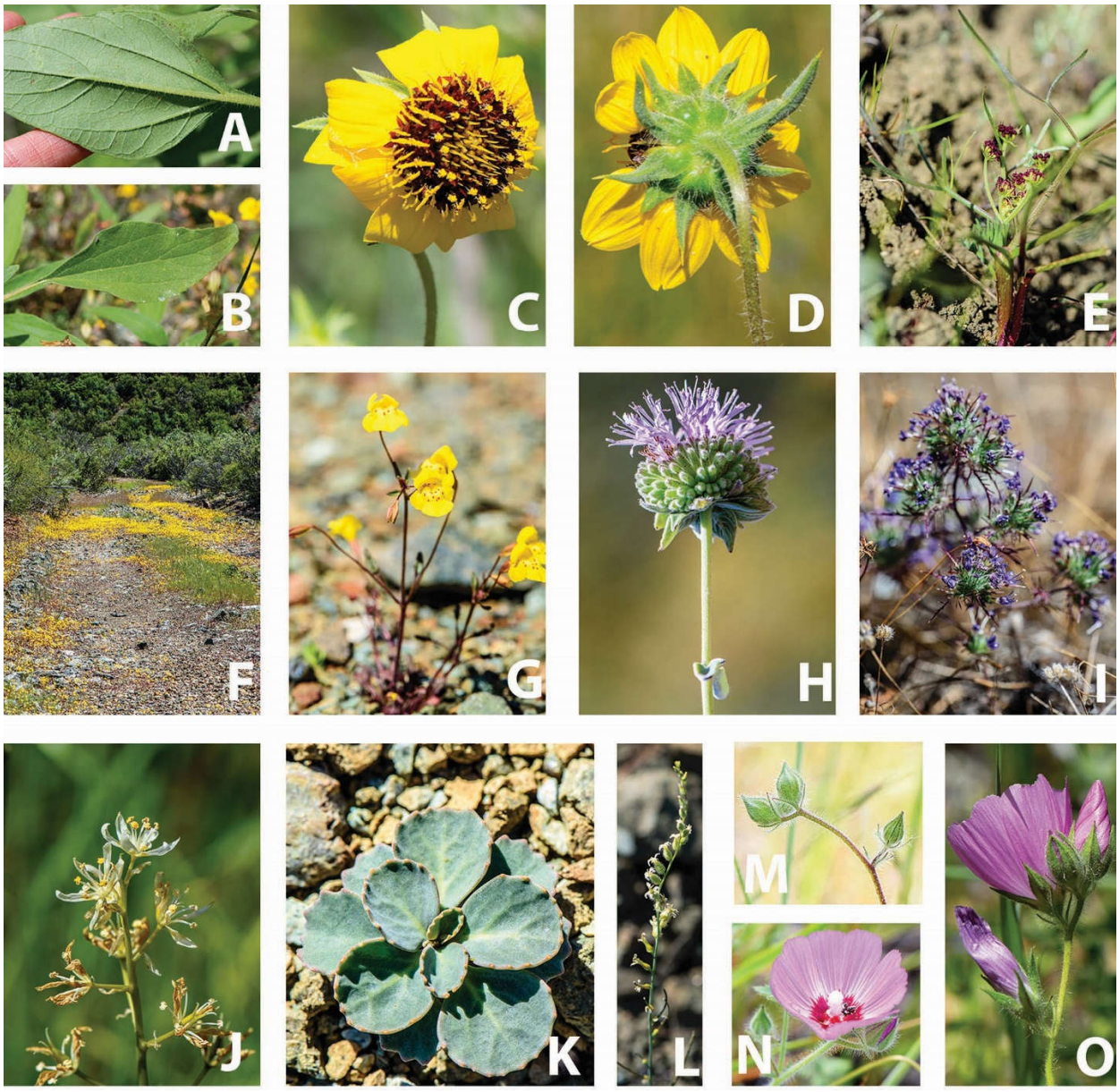

Fig. 4. A-J. Taxa with CNPS rank 4. A-D. *Helianthus exilis*. E. *Lomatium hooveri*. F, G. *Mimulus nudatus*. H. *Monardella viridis*. I. *Navarretia jesponii*. J. *Toxicoscordion fontanum*. K-O. Taxa of uncertain status (see text for explanation). K, L. *Streptanthus morrisonii*. M-O. *Sidalcea* sp.

***Collomia diversifolia* (Fig. 3C):** The species was found diffusely distributed on rocky open, serpentine barrens along roads in the upper Zim Zim drainage and on the ridge to the east, with a total of about 1,000 individuals (Fig. 5D).

***Cordylanthus tenuis* subsp. *brunneus* (Figs. 3D, 3E):** One population with about1,000 individuals was encountered in the very northwest corner of the target area for this study, in open, rocky serpentine chaparral north of upper Zim Zim Creek (Fig. 6A).

***Fritillaria purdyi* (Figs. 3G-3I):** One population with about 1.000 individuals was encountered on open, rocky, serpentine barrens in the upper Zim Zim Creek drainage (Fig. 5A).

***Lomatium hooveri* (Fig. 4E):** The species was diffusely and widely distributed in serpentine grassland, woodland, barrens, and chaparral in the upper Zim Zim and Nevada Creek drainages, with a total of about 1,000 individuals (Fig. 6C).

***Mimulus nudatus* (Figs. 4F, 4G):** Three populations were encountered on open, rocky serpentine seeps in the upper Zim Zim Creek drainage, one on the western boundary of the KWA with about 500 individuals, the other two, with 500 and 100 individuals, respectively, adjacent the road to the east of the first (Fig. 5A).

***Monardella viridis* (Fig. 4H):** The species was diffusely distributed in serpentine chaparral of the upper Zim Zim drainage and slopes to the east, with a total of about 500 individuals (Fig. 5A).

***Navarretia jepsonii* (Fig. 4I):** The species was diffusely distributed on rocky open, serpentine barrens along roads in the upper Zim Zim drainage and on the slope to the east, with a total of about 6,000 individuals (Fig.5C).

Taxa of questionable status.

***Sidalcea* sp.:**

As noted above, *Sidalcea keckii* was the only federally endangered species retrieved in our queries of the CNDDB for the nine quads surrounding and including the KWA (Table 1). The specieswas described by Wiggins (1940) based on type material from Tulare County. In Hill's (1993) treatment of *Sidalcea* for the first edition of The Jepson Manual, *S. keckii* is listed as presumed extinct. The species was, however, rediscovered in 1992 (Baldwin 2000, CNPS, Rare Plant Program 2015-2016) at locations in Fresno, Merced, and Tulare Counties. Molecular data (Andreasen and Baldwin 2001, Andreasen 2005) as well as morphological similarity (Hill 2009) support the conclusion that *S. keckii* is closely related to, but clearly distinct from, the more widespread *S. diploscypha*.

Hill (2009) reported the occurrence of plants morphologically similar to *S. keckii*, which had been previously identified as *S. diploscypha*, from six counties, including Fresno and Merced plus four in the inner North Coast Range region: Colusa, Napa, Solano, and Yolo, although he cautioned that additional, especially molecular, work was needed to confirm their identities, and he also mentioned the possibility of introgression between *S. diploscypha* and *S. keckii*. Hill also annotated many specimens in the UC Davis herbarium from the southern inner North Coast Ranges (Colusa, Napa, Solano, and Yolo Counties), formerly identified as *S. diploscypha*, as *S. keckii*.

[Figure not available for public distribution]

Fig. 5. Locations of rare plant taxa encountered in the Knoxville Wildlife Area during the course of this study. See text and Table 3 for further details, including estimated population sizes.

The CNDDB (2016) reports 16 occurrences for *S. keckii*, in the following counties: Tulare (2), Fresno (2), Merced (1), Colusa (3), Napa (5), Solano (2), and Yolo (1); all are listed as "Presumed Extant" except one in Tulare County, which is marked as "Extirpated." However, the CNPS Inventory of Rare and Endangered Plants (CNPS, Rare Plant Program 2016)includes the following note about *S. keckii* "Rediscovered in 1992 by J. Stebbins and K. Kirkpatrick; known from only three occurrences. Plants from inner north coast ranges may actually be *S.*

diploscypha; needs study." Similarly, in his treatment for the second edition of The Jepson Manual, Hill (2012) reported the distribution as including all seven counties mentioned above, but also noted that plants in the southern inner North Coast Ranges need further study.

[Figure not available for public distribution]

Fig. 6. Locations of rare plant taxa encountered in the Knoxville Wildlife Area during the course of this study. See text and Table 3 for further details, including estimated population sizes.

In areas we surveyed in the KWA, we encountered multiple populations of plants that key to *Sidalcea keckii* based on the morphological characters emphasized by Hill (2012). The taxon is very common in the grasslands of the upper Nevada and Zim Zim Creek drainages (Fig. 6D), and we estimated that at least 1,000 individuals occur across the area. But due to the doubts expressed by Hill (2012) and CNPS (2016), we undertook genetic testing using nuclear ribosomal internal transcribed spacer (ITS) DNA sequences, which are widely used in molecular systematic studies of closely related plant species, including the published studies of *S. diploscypha* and *S. keckii* (Andreasen and Baldwin 2001, Andreasen 2005).

Our sampling included five individuals from five separate populations in the KWA and seven herbarium specimens in the herbarium of the UC Davis Center for Plant Diversity (DAV) from the inner North Coast Ranges all of which had been annotated by Hill, three identified as *S. diploscypha* and four as *S. keckii* (Table 3). The final dataset included the 12 sequences we generated plus four published sequences for *S. diploscypha*, sampled from Lake, Napa, and San Luis Obispo Counties, and three for *S. keckii*, sampled from Fresno and Tulare Counties (Andreasen and Baldwin 2001, Andreasen 2005).

The three previously published ITS sequences for *S. keckii*, exhibited 99% identity to one another and 93-94% identity to published sequences of *S. diploscypha*. The ITS sequences we generated from herbarium specimens from Lake, Mendocino, Napa, and Sonoma Counties identified as *S. diploscypha* exhibited 99-100% identity to published sequences of *S. diploscypha* and 93-94% identity to the published sequences of *S. keckii*. The ITS sequences we generated for the KWA samples and herbarium specimens from Napa and Yolo counties identified as *S. keckii* exhibited 99-100% identity with one another, 94-95% identity with published sequences of *S. keckii*, and 98% identity with published and newly generated sequences of *S. diploscypha*, and phylogenetic analyses also strongly supported a closer evolutionary relationship to the latter (Fig. 7).

We therefore conclude that the plants morphologically similar to *S. keckii* in KWA and elsewhere in the inner north Coast Ranges are not assignable to *S. keckii*, but further work is needed to resolve their taxonomic status. They may represent an undescribed taxon (perhaps a subspecies of *S. diploscypha* or a separate species). Their ITS sequences do not contain the polymorphisms expected of recent hybrids between *S. diploscypha* and *S. keckii*, which would in any case be difficult to explain based on the current distribution of the latter, although a past hybridization event resulting in the origin of *S. diploscypha* and/or the unknown taxon cannot be ruled out at this point. Further study is clearly needed on the morphological and molecular variation in this group in order to resolve these taxonomic questions.

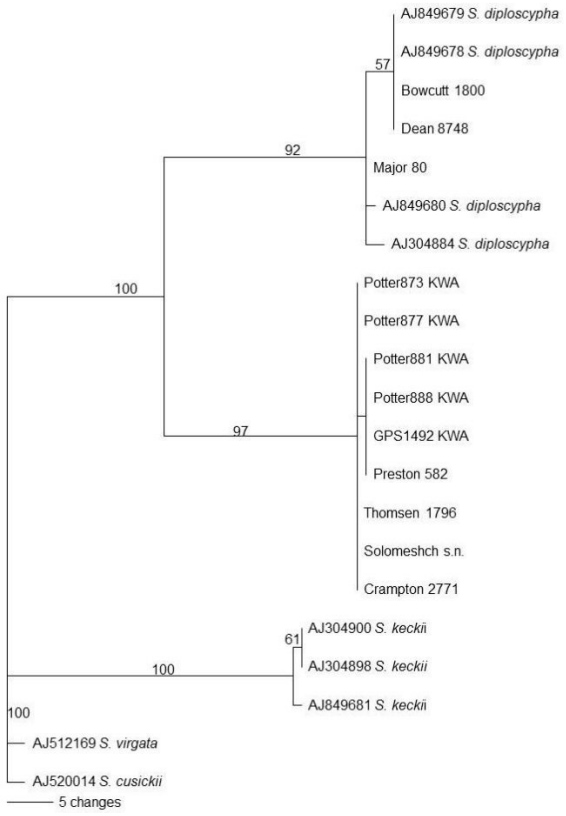

Fig. 7. One of 321 most parsimonious trees (length = 71, consistency index = 0.93, retention index excluding uninformative characters = 0.93) from phylogenetic analyses of nuclear ITS nucleotide sequences of *Sidalcea* sp. individuals collected in the KWA for this study (labels ending in KWA), herbarium specimens from the inner North Coast ranges identified as either *S. diploscypha* or *S. keckii* (see Table 5 for further details), and previously published sequences of both of these species (Andreasen and Baldwin 2001, Andreasen 2005), labeled with their GenBank accession numbers (AJ and six digits). Trees resulted from 1,000 random taxon addition sequence replicates; numbers on branches represent bootstrap support values based on 1,000 replicates. All phylogenetic analyses were implemented in PAUP* (Swofford 2002).

Streptanthus morrisonii:

Our nine-quad query of CNDDB returned two subspecies of *Streptanthus morrisonii*, *S. morrisonii* subsp. *elatus* and *S. morrisonii* subsp. *kruckebergii* (Table 1). Each of these taxa is listed both as a rare plant rank 1B.2 taxon and as a synonym of *S. morrisonii* by CNPS, Rare Plant Program (2015-2016); *S. morrisonii*, in turn, is listed as CBR, i.e., considered but rejected for rare listing. This apparent discrepancy reflects the fact that, although subspecies of *S. morrisonii* have been recognized as distinct by some botanists (e.g., Dolan and LaPré 1989), they are not recognized as separate taxonomic entities in the Flora of North America (Al-Shehbaz. 2010) or the second edition of The Jepson Manual (Al-Shehbaz. 2012), nor were they formally recognized (although they were mentioned) in the first edition of The Jepson Manual (Buck et al. 1993).

We encountered one population of this species (Figs. 4K, 4L), with an estimated size of 200 individuals, in the upper Zim Zim Creek drainage (Fig. 6D). Jake Ruygt had submitted a CNDDB form for this population in 2008, noting 35 plants, and identified them as *S. morrisonii* subsp. *kruckebergii*, which is consistent with treatments that recognize subspecies (e.g., Dolan and LaPré 1989). Based on our reviews of herbarium specimens and relevant literature, we believe that the approach taken in the Jepson Manual to treat all variants as one species without recognizing infraspecific taxa, is most appropriate. We nonetheless intend to submit a report of the KWA population assignable to *S. morrisonii* subsp. *kruckebergii* to the CNDDB, in order to confirm the continued presence of these plants considered rare by some.

3. Plant list updates

In the course of this project, we documented occurrence of 87 taxa in the KWA not listed by Ruygt (2005); for the vast majority of these, we collected voucher specimens (Table 5), which are deposited in the herbarium of the Center for Plant Diversity at the University of California, Davis (DAV). An updated plant list, including the taxa recorded by Ruygt (2005) revised to be taxonomically and nomenclaturally consistent with the current version of the Jepson eFlora (Jepson Flora Project 2016), plus the 87 taxa not previously recorded for the KWA, is provided as an Appendix to this report.

Table 5. Taxa added to the plant list for KWA as a result of this study. Non-native taxa indicated with asterisks (*).

Species	Common Name	Voucher Specimen
LYCOPHYTES		
ISOETACEAE		
Isoetes howellii	Howell's Quilwort	Dean 8079
FERNS		
MARSILEACEAE		
Pilularia americana	American Pillwort	Dean 8077
PTERIDACEAE		
Pentagramma triangularis subsp. *triangularis*	Goldenback Fern	Potter 744
GYMNOSPERMS		
CUPRESSACEAE		
Hesperocyparis sargentii	Sargent Cypress	Potter 794
EUDICOTS		
APIACEAE		
Eryngium sp.		Potter 811, 837, 862, 884
APOCYNACEAE		
*Vinca major**	Greater Periwinkle	None
ASTERACEAE		
Anaphalis margaritacea	Pearly Everlasting	Potter 875
*Centaurea calcitrapa**	Purple Star-thistle	Potter 906
Harmonia hallii	Hall's Harmonia	Potter 778, 779, 894
Helianthus exilis	Serpentine Sunflower	Potter 825, 830
Hemizonella minima	Miniature Tarweed	None
Lasthenia glaberrima	Smooth Goldenfields	Dean 8073
Layia septentrionalis	Colusa Layia	Potter 850
Packera greenei	Flame Ragwort	Potter 788

Table 5, continued.

Species	Common Name	Voucher Specimen
Psilocarphus brevissimus	Short Wooly Marbles	Dean 8080
Psilocarhpus tenellus	Slender Wooly Marbles	Potter 878
Rigiopappus leptocladus	Wire Weed	Dean 8120
BORAGINACEAE		
Amsinckia lunaris	Bent-Neck Fiddleneck	Potter 849
Amsinckia retrorsa	Rigid Fiddleneck	Potter 766
Emmenanthe penduliflora	Whispering Bells	Potter 859
Plagiobothrys stipitatus var. *micranthus*	Stalked Popcornflower	Dean 8071
BRASSICACEAE		
*Cardamine hirsuta**	Hairy Bittercress	Potter 750
*Draba verna**	Spring Draba	Potter 761
Erysimum capitatum	Western Wallflower	Potter 869
Streptanthus morrisonii	Morrisson's Jewelflower	Potter 789, 855
Thysanocarpus radians	Showy Fringe Pod	Potter 840
CAMPANULACEAE		
Downingia cuspidate	Toothed Downingia	Dean 8631
Githopsis specullariodes	Common Bluecup	Potter 853
CARYOPHYLLACEAE		
Minuartia californica	California Sandwort	None
Minuartia douglasii	Douglas' Sandwort	Potter 795
*Petrorhagia dubia**	Hairy Pink	Dean 8102
*Silene gallica**	Windmill Pink	Potter 756
CHENOPODIACEAE		
Chenopodium californicum	California Goosefoot	Potter 781
CONVOLVULACEAE		
Cuscuta howelliana	Boggs Lake Dodder	Potter 812, 831, 885
CRASSULACEAE		
Sedum spathulifolium	Broadleaf Stonecrop	Potter 872
FABACEAE		
Acmispon brachycarpus	Short Podded Lotus	Potter 743
Acmispon parviflorus	Hill Lotus	Dean 8095
*Lathyrus cicera**	Red Peavine	Potter 864
Pickeringia montana var. *montana*	Chaparral Pea	Potter 802
*Trifolium tomentosum**	Woolly Clover	Potter 905
Trifolium variegatum	White-Tipped Clover	Dean 8094
GARRYACEAE		
Garrya elliptica	Coast Silk Tassel	Potter 834

Table 5, continued.

Species	Common Name	Voucher Specimen
JUGLANDACEAE		
Juglans hindsii	Northern California Black Walnut	Potter 863
LAMIACEAE		
Pogogyne serpylloides	Thymeleaf Beardstyle	Dean 8078
LINACEAE		
Hesperolinon californicum	California Dwarf Flax	Potter 804, 890
Hesperolinon clevelandii	Allen Springs Dwarf Flax	Dean 8639
Hesperolinon spergulinum	Slender Western Flax	Potter 787
MORACEAE		
*Maclura pomifera**	Osage Orange	None
OLEACEAE		
*Syringa vulgaris**	Lilac	None
ONAGRACEAE		
Epilobium campestre	Smooth Willow Herb	Dean 8633
Epilobium cleistogamum	Selfing Willow Herb	Dean 8766
Epilobium torreyi	Torrey's Willow Herb	Dean 88767
OROBANCHACEAE		
Castilleja campestris	Vernal Pool Indian Paintbrush	None
Castilleja rubicundula subsp. *lithospermoides*	Cream Sacs	Potter 792
Castilleja rubicundula subsp. *rubicundula*	Pink Creamsacs	None
Cordylanthus tenuis subsp. *brunneus*	Serpentine Bird's-Beak	Potter 897
Orobanche bulbosa	Chaparral Broomrape	None
Orobanche fasciculate	Clustered Broomrape	None
PAPAVERACEAE		
Platystemon californicus	Creamcups	Potter 767
PHRYMACEAE		
Mimulus latidens	Broad-Toothed Monkeyflower	Dean 8637
Mimulus layneae	Layne's Monkeyflower	Potter 790
PLANTAGINACEAE		
*Plantago lanceolata**	English Plantain	
Tonella tenella	Lesser Baby Innocence	Potter 843
POLEMONIACEAE		
Navarretia intertexta subsp. *intertexta*	Interwoven Navarretia	Dean 8770
POLYGALACEAE		
Polygala californica	California Milkwort	Potter 769, 774
POLYGONACEAE		
Chorizanthe membranacea	Pink Spineflower	Potter 808

Table 5, continued.

Species	Common Name	Voucher Specimen
SAXIFRAGACEAE		
Lithophragma parviflorum var. *parviflorum*	Pink Woodland Star	Potter 760
VIOLACEAE		
Viola pedunculata	California Golden Violet	Dean 8101, Potter 838
MONOCOTS		
CYPERACEAE		
Carex densa	Dense Sedge	Dean 8638
Schoenoplectus acutus var. *occidentalis*	Common Tule	Potter 872
JUNCACEAE		
Juncus hemiendytus var. *hemiendytus*	Herman's Dwarf Rush	Dean 8082
Juncus occidentalis	Western Rush	Dean 8771
LILIACEAE		
Calochortus luteus		Potter 861
Calochortus vestae		Potter 806
MELANTHIACEAE		
Toxicoscordion micranthum	Small-Flowered Star Lily	Dean 8087
POACEAE		
*Aira caryophyllea**	Silver Hair Grass	Potter 903
Alopecurus saccatus	Pacific Foxtail	Dean 8072
*Briza minor**	Little Quaking Grass	Potter 904
Deschampsia cespitosa	Tufted Hair Grass	Potter 893
Deschampsia danthonoides	Annual Hair Grass	None
*Elymus ponticus**	Tall Wheat Grass	Potter 879
Koeleria macrantha	June Grass	Potter 800, 902
Melica geyeri	Geyer's Onion Grass	Dean 8111
Phragmites australis	Common Reed	None
*Polypogon monspeliensis**	Rabbitsfoot Grass	Potter 801
THEMIDACEAE		
Dichelostemma congestum	Fork-toothed Ookow	Potter 866
Tritileia hyacinthina	White Brodiaea	Dean 8665

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Appendix. List of vascular plant taxa that occur in the Knoxville Wildlife Area, updated from Ruygt (2005). Non-native taxa indicated with asterisks (*).

Species Name	Common Name
LYCOPHYTES	
ISOETACEAE	
Isoetes howellii	Howell's Quilwort
FERNS	
DRYOPTERIDACEAE	
Dryopteris arguta	California Wood Fern
EQUISETACEAE	
Equisetum laevigatum	Braun's Scouring Rush
MARSILEACEAE	
Pilularia americana	American Pillwort
PTERIDACEAE	
Adiantum jordanii	Maidenhair Fern
Aspidotis californica	California Lace Fern
Aspidotis densa	Indian's Dream
Myriopteris covillei	Coville's Lip Fern
Pellaea andromedifolia	Coffee Fern
Pellaea mucronata	Bird's Foot Fern
Pentagramma triangularis subsp. *triangularis*	Goldenback Fern
GYMNOSPERMS	
CUPRESSACEAE	
Hesperocyparis sargentii	Sargent Cypress
Hesperocyparis macnabiana	Mcnab Cypress
PINACEAE	
Pinus sabiniana	Gray Pine
EUDICOTS	
ANACARDIACEAE	
Rhus aromatica	Skunkbrush
Toxicodendron diversilobum	Poison Oak
ADOXACEAE	
Sambucus nigra subsp. *caerulea*	Blue Elderberry
APIACEAE	
Angelica californica	California Angelica
Angelica tomentosa	Coast Range Angelica
*Daucus carota**	Queen Anne's Lace
*Daucus pusillus**	Rattlesnake Weed

Eryngium sp.	Coyote Thistle
Lomatium californicum	California Lomatium
Lomatium dasycarpum var. *dasycarpum*	Woolly-Fruited Lomatium
Lomatium hooveri	Hoover's Lomatium
Lomatium macrocarpum	Large-Fruited Lomatium
Lomatium marginatum var. *purpureum*	Hartweg's Lomatium
Lomatium utriculatum	Foothill Lomatium
Perideridia kelloggii	Kellogg's Yampah
Sanicula bipinnata	Poison Sanicle
Sanicula bipinnatifida	Purple Sanicle
Sanicula crassicaulis	Pacific Snakeroot
Sanicula tuberosa	Tuberous Sanicle
*Scandix pecten-veneris**	Shepherd's Needles
*Torilis arvensis**	Common Hedge Parsley
*Torilis nodosa**	Knotted Hedge Parsley
APOCYNACEAE	
Apocynum cannabinum	Indian Hemp
Asclepias eriocarpa	Kotolo Milkweed
Asclepias fascicularis	Narrow-Leaved Milkweed
ASTERACEAE	
Achillea millefolium	Common Yarrow
Achyrachaena mollis	Blow-Wives
Agoseris grandiflora	Large-Flowered Agoseris
Agoseris heterophylla	Mountain Dandelion
Anaphalis margaritacea	Pearly Everlasting
Ancistrocarphus filagineus	Woolly Fish-Hooks
*Anthemis cotula**	Mayweed
Artemisia douglasiana	Douglas' Mugwort
Baccharis salicifolia	Mule Fat
Brickellia californica	California Brickellia
Calycadenia pauciflora	Few-Flowered Calycadenia
*Carduus pycnocephalus**	Italian Thistle
*Centaurea calcitrapa**	Purple Starthistle
*Centaurea melitensis**	Malto Starthistle
*Centaurea solstitialis**	Yellow Starthistle
Centromadia fitchii	Spikeweed
Chaenactis glabriuscula var. *heterocarpha*	Slender Chaenactis
*Cichorium intybus**	Chicory
Cirsium cymosum	Peregrine Thistle
Cirsium douglasii var. *breweri*	Indian Thistle

Cirsium douglasii var. *douglasii*	Douglas' Swamp Thistle
Cirsium occidentale var. *venustum*	Red Thistle
*Cirsium vulgare**	Bull Thistle
Erigeron sp.	Rock Daisy
Eriophyllum lanatum var. *achillaeoides*	Woolly Sunflower
Eurybia radulina	Rough Aster
Grindelia camporum var. *camporum*	Great Valley Gumplant
Harmonia hallii	Hall's Harmonia
Helenium bigelovii	Bigelow's Sneezeweed
Helenium puberulum	Common Sneezeweed
Helianthella californica	California Helianthella
Helianthus bolanderi	Bolander's Sunflower
Helianthus exilis	Serpentine Sunflower
Helianthus gracilentus	Slender Sunflower
Hemizonia congesta subsp. *luzulifolia*	Hayfield Tarweed
Hemizonella minima	Miniature Tarweed
Hesperevax sparsiflora	Erect Hesperevax
Holocarpha virgata subsp. *virgata*	Virgate Tarweed
*Hypochaeris glabra**	Smooth Cat's Ear
*Hypochaeris radicata**	Hairy Cat's Ear
*Lactuca serriola**	Prickly Lettuce
Lagophylla minor	Lesser Hareleaf
Lagophylla ramosissima	Common Hareleaf
Lasthenia californica	California Goldfields
Lasthenia glaberrima	Smooth Goldenfields
Layia chrysanthemoides	Smooth Layia
Layia septentrionalis	Colusa Layia
Lessingia ramulosa	Sonoma Lessingia
Logfia californica	California Filago
*Logfia gallica**	Narrow-Leaved Filago
Madia exigua	Small Tarweed
Madia gracilis	Slender Tarweed
Malacothrix floccifera	Woolly Malacothrix
Matricaria discoidea	Pineapple Weed
Micropus californicus var. *californicus*	Slender Cottonweed
Microseris douglasii subsp. *douglasii*	Douglas' Microseris
Microseris sylvatica	Sylvan Microseris
Packera clevelandii	Cleveland's Ragwort
Packera greenei	Flame Ragwort
Pseudognaphalium californicum	California Cudweed

Pseudognaphalium stramineum	Cotton Batting Plant
Psilocarphus brevissimus	Short Wooly Marbles
Psilocarphus tenellus	Slender Woolly Marbles
Rigiopappus leptocladus	Wire Weed
Senecio aronicoides	Rayless Ragwort
*Senecio vulgaris**	Common Groundsel
Solidago velutina subsp. *californica*	California Goldenrod
*Taraxacum officinale**	Common Dandelion
Uropappus lindleyi	Silver Puffs
Wyethia angustifolia	Narrow-Leaved Mule's Ears
Wyethia helenioides	Gray Mule's Ears
Xanthium strumarium	Cocklebur
BORAGINACEAE	
Cynoglossum grande	Grand Hound's Tongue
Amsinckia intermedia	Common Fiddleneck
Amsinckia lunaris	Bent-Neck Fiddleneck
Amsinckia lycopsoides	Bugloss fiddleneck
Amsinckia menziesii	Common Fiddleneck
Amsinckia retrorsa	Rigid Fiddleneck
Cryptantha flaccida	Flaccid Cryptantha
Cryptantha hispidula	Napa Cryptantha
Cryptantha microstachys	Tejon Cryptantha
Emmenanthe penduliflora	Whispering Bells
Eriodictyon californicum	Yerba Santa
Heliotropium curassavicum	Seaside Heliotrope
Nemophila heterophylla	Woodland Nemophila
Nemophila menziesii var. *menziesii*	Baby Blue-Eyes
Nemophila pedunculata	Meadow Nemophila
Pectocarya pusilla	Dwarf Pectocarya
Phacelia imbricata subsp. *imbricata*	Imbricate Phacelia
Plagiobothrys bracteatus	Bracted Popcorn Flower
Plagiobothrys fulvus	Fulvous Popcorn Flower
Plagiobothrys nothofulvus	Rusty Popcorn Flower
Plagiobothrys stipitatus var. *micranthus*	Stalked Popcorn Flower
Plagiobothrys tenellus	Slender Popcorn Flower
BRASSICACEAE	
Arabis modesta	Modest Rock Cress
Athysanus pusillus	Dwarf Athysanus
*Brassica nigra**	Black Mustard
Cardamine californica	California Milkmaids

*Cardamine hirsuta**	Hairy Bittercress
Cardamine oligosperma	Western Bittercress
*Draba verna**	Spring Draba
Erysimum capitatum	Western Wallflower
*Hirschfeldia incana**	Mediterranean Mustard
*Lepidium latifolium**	Perennial Pepperweed
Lepidium strictum	Wayside Peppergrass
*Raphanus sativus**	Wild Radish
*Sisymbrium officinale**	Hedge Mustard
Streptanthus breweri	Brewer's Jewelflower
Streptanthus glandulosus subsp. *glandulosos*	Common Jewelflower
Streptanthus hesperidis	Green Jewelflower
Streptanthus morrisonii	Morrison's Jewelflower
*Thlaspi arvense**	Fan Weed
Thysanocarpus curvipes	Sand Fringe Pod
Thysanocarpus radians	Showy Fringe Pod
CALYCANTHACEAE	
Calycanthus occidentalis	Spice Bush
CAMPANULACEAE	
Downingia cuspidata	Toothed Downingia
Githopsis specularioides	Common Bluecup
CAPRIFOLIACEAE	
Lonicera interrupta	Chaparral Honeysuckle
Symphoricarpos albus var. *laevigatus*	Common Snowberry
CARYOPHYLLACEAE	
*Cerastium glomeratum **	Mouse-Ear Chickweed
Minuartia californica	California Sandwort
Minuartia douglasii	Douglas' Sandwort
*Petrorhagia dubia**	Hairy Pink
*Spergularia rubra **	Purple Sand Spurry
*Silene gallica**	Windmill Pink
*Stellaria media **	Common Chickweed
Stellaria nitens	Shiny Chickweed
CHENOPODIACEAE	
Chenopodium californicum	California Goosefoot
CISTACEAE	
Crocanthemum aldersonii	Common Rush Rose
CONVOLVULACEAE	
Calystegia collina subsp. *collina*	Serpentine Morning-Glory
Calystegia occidentalis subsp. *occidentalis*	Western Morning-Glory

Calystegia subacaulis	Hill Morning-Glory
*Convolvulus arvensis**	Field Bindweed
Cuscuta howelliana	Boggs Lake Dodder
CORNACEAE	
Cornus glabrata	Brown Dogwood
CRASSULACEAE	
Dudleya cymosa	Dudley's Live-Forever
Sedum spathulifolium	Broadleaf Stonecrop
CUCURBITACEAE	
Marah fabacea	California Manroot
Marah watsonii	Taw Manroot
DATISCACEAE	
Datisca glomerata	Durango Root
ERICACEAE	
Arbutus menziesii	Madrone
Arctostaphylos manzanita	Common Manzanita
Arctostaphylos viscida subsp. *pulchella*	Sticky White-Leaf Manzanita
Arctostaphylos viscida subsp. *viscida*	White-Leaf Manzanita
EUPHORBIACEAE	
Euphorbia serpyllifolia subsp. *serpyllifolia*	Thyme-Leaved Spurge
Croton setiger	Turkey Mullein
Euphorbia crenulata	Chinese Caps
Euphorbia spathulata	Reticulate-Seeded Spurge
FABACEAE	
Acmispon americanus var. *americanus*	American Bird's Foot Trefoil
Acmispon brachycarpus	Short-Podded Lotus
Acmispon glaber var. *glaber*	Common Deerweed
Acmispon grandiflorus var. *grandiflorus*	Chaparral Lotus
Acmispon parviflorus	Hill Lotus
Acmispon wrangelianus	Chilean Trefoil
Astragalus clevelandii	Cleveland's Milkvetch
Astragalus gambelianus	Gambel's Dwarf Locoweed
Cercis occidentalis	Western Redbud
Glycyrrhiza lepidota	American Licorice
Hoita macrostachya	Leather Root
Lathyrus vestitus var. *vestitus*	Hillside Pea
*Lathyrus cicera**	Red Peavine
*Lotus corniculatus**	Bird's Foot Trefoil
Lupinus albifrons subsp. *albifrons*	Silver Lupine
Lupinus bicolor	Miniature Lupine

Lupinus formosus var. *formosus*	Summer Lupine
Lupinus latifolius var. *latifolius*	Broad-Leaf Lupine
Lupinus microcarpus subsp. *densiflorus*	White-Whorl Lupine
Lupinus nanus	Douglas's Lupine
Lupinus succulentus	Arroyo Lupine
*Medicago arabica**	Spotted Medic
*Medicago polymorpha**	Bur Clover
*Medicago sativa**	Alfalfa
*Melilotus albus**	White Sweet Clover
*Melilotus indicus**	Yellow Sweet Clover
Pickeringia montana var. *montana*	Mountain Chickpea
*Robinia pseudoacacia**	Black Locust
Thermopsis californica var. *californica*	False Lupine
Trifolium albopurpureum	Common Indian Clover
Trifolium bifidum var. *bifidum*	Notch-Leaved Clover
Trifolium bifidum var. *decipiens*	Notch-Leaved Clover
Trifolium ciliolatum	Tree Clover
Trifolium depauperatum var. *amplectans*	Pale Sack Clover
*Trifolium dubium**	Shamrock
*Trifolium fragiferum**	Strawberry Clover
Trifolium fucatum	Bull Clover
*Trifolium hirtum**	Rose Clover
Trifolium microcephalum	Maiden Clover
Trifolium microdon	Thimble Clover
Trifolium obtusiflorum	Creek Clover
*Trifolium subterraneum**	Sub Clover
*Trifolium tomentosum**	Woolly Clover
Trifolium variegatum	White-Tipped Clover
Trifolioum wildenovii	Tomcat Clover
Vicia americana	American Vetch
Vicia sativa var. *nigra**	Common Vetch
Vicia sativa var. *sativa**	Spring Vetch
Vicia villosa var. *varia**	Woolly-Podded Vetch
FAGACEAE	
Quercus agrifolia var. *agrifolia*	Coast Live Oak
Quercus berberidifolia	Scrub Oak
Quercus berberidifolia x douglasii (?)	
Quercus douglasii	Blue Oak
Quercus durata	Leather Oak
Quercus kelloggii x wislizeni	Oracle Oak

Quercus lobata	Valley Oak
Quercus wislizeni var. *wislizeni*	Interior Live Oak
GARRYACEAE	
Garrya congdonii	Congdon's Silk-Tassel
Garrya elliptica	Coast Silk-Tassel
GENTIANACEAE	
*Centaurium tenuiflorum**	Slender Centaury
Zeltnera trichantha	Alkali Centaury
GERANIACEAE	
*Erodium botrys**	Long-Beaked Filaree
*Erodium brachycarpum**	Obtuse Filaree
*Erodium cicutarium**	Redstem Filaree
*Erodium moschatum**	Whitestem Filaree
*Geranium dissectum**	Cut-Leaf Geranium
*Geranium molle**	Dove's Foot Geranium
GROSSULARIACEAE	
Ribes malvaceum var. *malvaceum*	Chaparral Currant
HYPERICACEAE	
Hypericum concinnum	Gold Wire
JUGLANDACEAE	
Juglans hindsii	Northern California Black Walnut
LAMIACEAE	
*Lamium amplexicaule**	Henbit
Lepechinia calycina	Pitcher Sage
*Marrubium vulgare**	Horehound
Monardella villosa subsp. *franciscana*	San Francisco Coyote Mint
Monardella viridis	Green Coyote Mint
Pogopgyne serpylloides	Thyme Leaf Mesa Mint
Salvia columbariae	Chia
Scutellaria siphocampyloides	Austin's Skullcap
Scutellaria tuberosa	Danie's Skullcap
Stachys albens	Woolly Hedge Nettle
Stachys bergii	Rigid Hedge Nettle
Stachys stricta	Sonoma Hedge Nettle
Trichostema laxum	Turpentine Weed
LAURACEAE	
Umbellularia californica	California Bay
LIMNANTHACEAE	
Limnanthes douglasii var. *nivea*	Douglas's Meadowfoam

LINACEAE	
Hesperolinon californicum	California Dwarf Flax
Hesperolinon clevelandii	Allen Springs Dwarf Flax
Hesperolinon disjuctum	Disjunct Dwarf Flax
Hesperolinon spergulinum	Slender Western Flax
LYTHRACEAE	
*Lythrum hyssopifolia**	Hyssop-Leaved Loosestrife
MALVACEAE	
Fremontodendron c. subsp. *californicum*	Flannel Bush
Malacothamnus fremontii	Bush Mallow
*Malva parviflora**	Cheese-Weed
Sidalcea diploscypha	Fringed Checkermallow
Sidalcea hartwegii	Hartweg's Checkermallow
Sidalcea sp.	
MONTIACEAE	
Calandrinia menziesii	Red Maids
Claytonia exigua subsp. *exigua*	Dwarf Miner's Lettuce
Claytonia parviflora subsp. *parviflora*	Small Miner's Lettuce
Claytonia perfoliata subsp. *perfoliata*	Common Miner's Lettuce
Lewisia rediviva	Bitterroot
Montia fontana	Water Montia
MORACEAE	
*Maclura pomifera**	Osage Orange
MYRSINACEAE	
*Lysimachia arvensis**	Scarlet Pimpernel
*Lysimachia arvensis**	Blue Flowered Scarlet Pimpernel
OLEACEAE	
Fraxinus dipetala	Flowering Ash
Fraxinus latifolia	Oregon Ash
*Syringa vulgaris**	Common Lilac
ONAGRACEAE	
Clarkia concinna	Red Ribbons
Clarkia gracilis	Farewell To Spring
Clarkia purpurea var. *quadrivulnera*	Wine-Cup Clarkia
Clarkia unguiculata	Elegant Clarkia
Epilobium brachycarpum	Panicled Willow-Herb
Epilobium campestre	Smooth Willow-Herb
Epilobium canum	California Fuchsia
Epilobium ciliatum subsp. *cilatum*	Northern Willow-Herb
Epilobium cleistogamum	Selfing Willow-Herb

Epilobium minutum	Minute Willow-Herb
Epilobium torreyi	Torrey's Willow-Herb
OROBANCHACEAE	
*Bellardia trixago**	Bellardia
Castilleja affinis subsp.*affinis*	Coast Paintbrush
Castilleja applegatei subsp. *martinii*	Round-Lobed Indian Paintbrush
Castilleja attenuata	Valley Tassels
Castilleja campestris	Vernal Pool Indian Paintbrush
Castilleja foliolosa	Felt Paintbrush
Castilleja rubicundula subsp. *lithospermoides*	Cream Sacs
Castilleja rubicundula subsp. *rubicundula*	Pink Cream Sacs
Castilleja minor subsp. *spiralis*	Serpentine Indian Paintbrush
Cordylanthus tenuis subsp. *brunneus*	Serpentine Bird's-Beak
Orobanche bulbosa	Chaparral Broomrape
Orobanche fasculata	Clustered Broomrape
Orobanche uniflora	Naked Broomrape
Pedicularis densiflora	Indian Warrior
Triphysaria eriantha var. *eriantha*	Butter-And-Eggs
Triphysaria pusilla	Dwarf Owl-Clover
Triphysaria versicolor var. *faucibarbata*	Smooth Owl-Clover
PAPAVERACEAE	
Ehrendorferia chrysantha	Golden Ears Drops
Eschscholzia californica	California Poppy
Eschscholzia caespitosa	Tufted Poppy
Platystemon californicus	Creamcups
PHYRMACEAE	
Mimulus aurantiacus	Sticky Monkeyflower
Mimulus cardinalis	Scarlet Monkeyflower
Mimulus douglasii	Douglas's Monkeyflower
Mimulus guttatus	Seep-Spring Monkeyflower
Mimulus kelloggii	Kellogg's Monkeyflower
Mimulus layneae	Layne's Monkeyflower
Mimulus latidens	Broad-Toothed Monkeyflower
Mimulus nudatus	Bare Monkeyflower
PLANTAGINACEAE	
Antirrhinum cornutum	Spurred Snapdragon
Antirrhinum vexillocalyculatum var. *vexillocalyculatum*	Wiry Snapdragon
Callitriche marginata	California Water Starwort
Collinsia greenei	Greene's Blue-Eyed Mary

Collinsia heterophylla	Chinese Houses
Collinsia sparsiflora var. *collina*	Few-Flowered Blue-Eyed Mary
Collinsia sparsiflora var. *sparsiflora*	Few-Flowered Blue-Eyed Mary
Keckiella breviflora var. *glabrisepala*	Gaping Keckiella
Keckiella lemmonii	Bush Beardtongue
Penstemon heterophyllus var. *heterophyllus*	Foothill Penstemon
Plantago erecta	Dwarf Plantain
*Plantago lanceolata**	English Plantain
Tonella tenella	Lesser Baby Innocence
POLEMONIACEAE	
Allophyllum gilioides subsp. *giliodes*	Straggling Gilia
Collomia diversifolia	Serpentine Collomia
Gilia achillaefolia subsp. *multicaulis*	California Gilia
Gilia clivorum	Many-Stemmed Gilia
Gilia tricolor	Bird's Eye Gilia
Leptosiphon androsaceus	Showy Linanthus
Leptosiphon bicolor	Baby Stars
Leptosiphon bolanderi	Baker's Linanthus
Leptosiphon parviflorus	Common Linanthus
Leptosiphon pygmaeus subsp. *continentalis*	Pygmy Linanthus
Linanthus dichotomus	Evening Snow
Microsteris gracilis	Slender Phlox
Navarretia intertexta subsp. *intertexta*	Interwoven Navarretia
Navarretia jepsonii	Jepson's Navarretia
Navarretia mellita	Honey-Scented Navarretia
Navarretia pubescens	Downy Navarretia
POLYGALACEAE	
Polygala californica	California Milkwort
POLYGONACEAE	
Chorizanthe membranacea	Pink Spineflower
Eriogonum luteolum var. *luteolum*	Wicker Buckwheat
Eriogonum nudum var. *nudum*	Nudestem Buckwheat
Eriogonum umbellatum var. *furcosum*	Sulphur Buckwheat
Pterostegia drymarioides	Valentine Plant
*Rumex crispus**	Curly Dock
PRIMULACEAE	
Primula hendersonii	Henderson's Shooting Star
RANUNCULACEAE	
Aquilegia eximia	Van Houte's Columbine
Clematis lasiantha	Chaparral Virgin's Bower

Clematis ligusticifolia	Western Virgin's Bower
Delphinium californicum var. *californicum*	California Larkspur
Delphinium hesperium subsp. *pallescens*	Pale Western Larkspur
Delphinium nudicaule	Red Larkspur
Delphinium patens subsp. *patens*	Indian Blue Larkspur
Delphinium uliginosum	Swamp Larkspur
Delphinium variegatum subsp. *variegatum*	Royal Larkspur
Ranunculus aquatilis var. *diffusus*	Water Buttercup
Ranunculus occidentalis var. *occidentalis*	Western Buttercup
Ranunculus hebecarpus	Hairy-Fruited Buttercup
*Ranunculus muricatus**	Prickly Buttercup
RHAMNACEAE	
Ceanothus cuneatus var. *cuneatus*	Buckbrush
Ceanothus jepsonii	Musk Brush
Ceanothus oliganthus var. *sorediatus*	Jim-Brush
Ceanothus oliganthus	Hairy Ceanothus
Frangula californica	California Coffeeberry
Frangula californica subsp. *tomentella*	Serpentine Coffeeberry
Rhamnus ilicifolia	Holly-Leaved Redberry
ROSACEAE	
Adenostoma fasciculatum	Chamise
Cercocarpus betuloides var. *betuloides*	Mountain Mahogany
Drymocallis glandulosa	Sticky Cinquefoil
Heteromeles arbutifolia	Toyon
Horkelia californica subsp. *dissita*	Tall Horkelia
Oemleria cerasiformis	Oso Berry
Prunus subcordata	Sierra Plum
Rosa californica	California Rose
Rubus ursinus	California Blackberry
RUBIACEAE	
Galium andrewsii subsp. *andrewsii*	Phlox-Leaved Bedstraw
Galium aparine	Cleavers
Galium bolanderi	Bolander's Bedstraw
Galium porrigens var. *tenue*	Climbing Bedstraw
*Sherardia arvensis**	Field Madder
SALICACEAE	
Populus fremontii subsp. *fremontii*	Fremont Cottonwood
Salix breweri	Brewer's Willow
Salix exigua	Sandbar Willow
Salix laevigata	Red Willow

Salix lasiolepis	Arroyo Willow
SAPINDACEAE	
Aesculus californica	Buckeye
SAXIFRAGACEAE	
Lithophragma affine	Woodland Star
Lithophragma heterophyllum	Hill Star
Lithophragma parviflorum var. *parviflorum*	Pink Woodland Star
Micranthes californica	California Saxifrage
SCROPHULARIACEAE	
Scrophularia californica subsp. *californica*	California Figwort
SIMAROUBACEAE	
*Ailanthus altissima**	Tree-Of-Heaven
SOLANACEAE	
Nicotiana quadrivalvis	Indian Tobacco
Solanum parishii	Parish's Nightshade
TAMARICACEAE	
*Tamarix parviflora**	Small-Flowered Tamarisk
VALERIANACEAE	
Plectritis ciliosa	Long-Spurred Plectritis
Plectritis congesta	Pink Plectritis
Plectritis macrocera	White Plectritis
VERBENACEAE	
Phyla nodiflora	Garden Lippia
Verbena lasiostachys	Western Verbena
VIOLACEAE	
Viola douglasii	Douglas's Violet
Viola pedunculata	California Golden Violet
VISCACEAE	
Arceuthobium campylopodum	Western Dwarf Mistletoe
Phoradendron bolleanum	Bollean Mistletoe
Phoradendron leucarpum subsp. *tomentosum*	Hairy Mistletoe
VITACEAE	
Vitis californica	California Grape
*Vitis vinifera**	Wine Grape
MONOCOTS	
AGAVACEAE	
Chlorogalum pomeridianum subsp. *pomeridianum*	Wavy-Leafed Soap Plant
ALLIACEAE	
Allium amplectens	Narrow-Leaved Onion
Allium falcifolium	Sickle-Leaved Onion

Allium fimbriatum var. *fimbriatum*	Fringed Onion
Allium fimbriatum var. *purdyi*	Purdy's Onion
Allium serra	Serrated Onion
CYPERACEAE	
Carex barbarae	Santa Barbara Sedge
Carex densa	Dense Carex
Carex serratodens	Serpentine Sedge
Eleocharis macrostachya	Pale Spikerush
Schoenoplectus acutus var. *occidentalis*	Tule
Schoenoplectus pungens var. *longispicatus*	Threesquare
IRIDACEAE	
Iris macrosiphon	Bowl-Tubed Iris
Sisyrinchium bellum	Blue-Eyed Grass
JUNCACEAE	
Juncus bufonius var. *bufonius*	Toad Rush
Juncus hemiendytus var. *hemiendytus*	Herman's Dwarf Rush
Juncus mexicanus	Mexican Rush
Juncus occidentalis	Western Rush
Juncus oxymeris	Pointed Rush
Juncus patens	Spreading Rush
Juncus tenuis	Slender Rush
Juncus xiphioides	Iris-Leaved Rush
LILIACEAE	
Calochortus amabilis	Diogenes' Lantern
Calochortus luteus	Yellow Mariposa Lily
Calochortus superbus	Superb Mariposa Tulip
Calochortus vestae	Coast Range Mariposa Lily
Fritillaria affinis	Checker Lily
Fritillaria pluriflora	Adobe Lily
Fritillaria purdyi	Purdy's Fritillary
MELANTHIACEAE	
Toxicoscordion fremontii	Fremont's Star Lily
Toxicoscordion fontanum	Marsh Zigadenus
Toxicoscordion micranthum	Small Flowered Star Lily
ORCHIDACEAE	
Epipactis gigantea	Stream Orchid
Piperia sp.	Rein-Orchid
POACEAE	
Agrostis microphylla	Small-Leaved Bentgrass
*Aira caryophyllea**	Silver hairgrass

*Alopecurus pratensis**	Meadow Foxtail
Alopecurus saccatus	Pacific Foxtail
*Avena barbata**	Wild Oats
*Avena fatua**	Wild Oats
*Briza maxima**	Rattlesnake Grass
*Briza minor**	Little Rattlesnake Grass
Bromus carinatus var. *carinatus*	California Brome
*Bromus diandrus**	Rip-Gut Brome
*Bromus hordeaceus**	Soft Chess
Bromus laevipes	Woodland Brome
Bromus madritensis subsp. *rubens**	Red Brome
*Cynodon dactylon**	Bermuda Grass
*Cynosurus echinatus**	Dog-Tail Grass
*Dactylis glomerata**	Orchard Grass
Deschampsia cespitosa	Tufted Hair Grass
Deschampsia danthonioides	Annual Hair Grass
*Elymus caput-medusae**	Medusa Head
*Elymus ponticus**	Tall Wheat Grass
Elymus triticoides	Creeping Wild Rye
*Festuca arundinacea**	Meadow Fescue
Festuca californica	California Fescue
Festuca idahoensis	Blue Bunchgrass
Festuca microstachys	Tracy's Foxtail
Festuca microstachys	Nuttall's Fo Tail
*Festuca perennis**	Italian Ryegrass
Glyceria leptostachya	Davy's Manna Grass
Hordeum brachyantherum	Calif. Serpentine Meadow Barley
Hordeum marinum subsp. *gussoneanum**	Mediterranean Barley
Hordeum murinum subsp. *leporinum**	Wall Barley
Koeleria macrantha	June Grass
Melica californica	California Melic
Melica geyeri	Geyer's Onion Grass
Melica torreyana	Torrey's Melic
Stipa lepida	Small-Flowered Needlegrass
Stipa miliacea var. *miliacea**	Smilo Grass
Stipa pulchra	Purple Needlegrass
*Phalaris aquatica**	Harding Grass
Phragmites australis	Common Reed
*Poa bulbosa**	Bulbous Bluegrass
Poa secunda subsp. *secunda*	Pine Bluegrass

*Polypogon maritimus**	Maritime Beard Grass
*Polypogon monspeliensis**	Rabbitsfoot Grass
POTAMOGETONACEAE	
Potamogeton sp.	Pondweed
THEMIDACEAE	
Dichelostemma capitatum	Blue Dicks
Dichelostemma congestum	Fork Toothed Ookow
Dichelostemma volubile	Twining Brodiaea
Brodiaea elegans subsp. *elegans*	Harvest Brodiaea
Triteleia hyacinthina	White Brodiaea
Triteleia laxa	Ithuriel's Spear
Triteleia peduncularis	Long-Rayed Triteleia
TYPHACEAE	
Typha domingensis	Southern Cattail

Appendix G. Fauna of the Knoxville Wildlife Area

Fauna of the Knoxville Wildlife Area

Birds of the Knoxville Wildlife Area

The following table lists bird species that have been documented in the Knoxville Wildlife Area (KWA) or that have the potential to occur there based on the sources cited. This list originally appeared as Appendix F in the 2005 KWA Land Management Plan (LMP) (CDFG 2005). For the current LMP, the list was amended to reflect incidental observations of 58 species by H. T. Harvey & Associates biologists, who performed surveys in the KWA in 2015.

Table G-1. Birds of the Knoxville Wildlife Area

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
Loons						
Common loon (*Gavia immer*)		I				
Grebes						
Pied-billed grebe (*Podilymbus podiceps*)		I				
Horned grebe (*Podiceps auritus*)		I				
Eared grebe (*Podiceps nigricollis*)		I				
Western grebe (*Aechmophorus occidentalis*)		I				
Clark's grebe (*Aechmophorus clarkii*)		I				
Cormorants						
Double-crested cormorant (*Phalacrocorax auritus*)		I				
Herons, bitterns						
Great blue heron (*Ardea herodias*)	X	YR				
Great egret (*Ardea alba*)	X	I				
Cattle egret (*Bubulcus ibis*)		I				
Green heron (*Butorides virescens*)		YR				

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
Vultures						
Turkey vulture (*Cathartes aura*)	X	YR	Possible	X	X	X
Ducks, geese, swans						
Greater white-fronted goose (*Anser albifrons*)		I				
Snow goose (*Chen caerulescens*)		I				
Canada goose (*Branta canadensis*)	X	I			X	X
Tundra swan (*Cygnus columbianus*)		I				
Wood duck (*Aix sponsa*)	X	I				
Gadwall (*Anas strepera*)		I			X	
American wigeon (*Anas americana*)		I				
Mallard (*Anas platyrhynchos*)	X	YR	Confirmed	X	X	X
Cinnamon teal (*Anas cyanoptera*)		I				
Northern shoveler (*Anas clypeata*)		I				
Northern pintail (*Anas acuta*)		I				
Green-winged teal (*Anas crecca*)		I				
Canvasback (*Aythua valisineria*)		I				
Redhead (*Aythya americana*)		I				
Ring-necked duck (*Aythya collaris*)		I				
Lesser scaup (*Aythya affinis*)		I				
Bufflehead (*Bucephala albeola*)	X	I			X	
Common goldeneye (*Bucephala clangula*)		I				
Hooded merganser (*Lophodytes cucullatus*)		I				
Common merganser (*Mergus merganser*)		I				
Red-breasted merganser (*Mergus serrator*)		I				
Ruddy duck (*Oxyura jamaicensis*)		I			X	
Ospreys						
Osprey (*Pandion haliaetus*)		YR				X

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
Hawks, kites, eagles						
White-tailed kite (*Elanus leucurus*)	X	YR		X	X	
Bald eagle (*Haliaeetus leucocephalus*)		YR		X		
Northern harrier (*Circus cyaneus*)	X	YR				
Sharp-shinned hawk (*Accipiter striatus*)	X	YR	Possible			
Cooper's hawk (*Accipiter cooperii*)	X	YR	Confirmed			
Red-shouldered hawk (*Buteo lineatus*)		YR			X	
Red-tailed hawk (*Buteo jamaicensis*)	X	YR	Confirmed	X	X	X
Golden eagle (*Aquila chrysaetos*)	X	YR	Possible			X
Falcons						
American kestrel (*Falco sparverius*)	X	YR	Confirmed		X	
Merlin (*Falco columbarius*)	X	M				
American peregrine falcon (*Falco peregrinus anatum*)		YR				X
Prairie falcon (*Falco mexicanus*)	X	YR		X, breeding		
Pheasants, turkeys						
Ring-necked pheasant (*Phasianus colchicus*)		YR				
Wild turkey (*Meleagris gallopavo*)	X	YR	Confirmed			X
Quail						
Mountain quail (*Oreortyx pictus*)		YR	Confirmed	X		X
California quail (*Callipela californica*)	X	YR	Confirmed	X	X	X
Rails, coots						
American coot (*Fulica americana*)	X	YR		X		
Plovers						
Killdeer (*Charadrius vociferus*)	X	YR	Confirmed			
Avocets						
American avocet (*Recurvirostra americana*)		I				
Shorebirds						
Greater yellowlegs (*Tringa melanoleuca*)		I				

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
Spotted sandpiper (*Actitis macularius*)		SR				
Dunlin (*Calidris alpina*)		I				
Short-billed dowitcher (*Limnodromus griseus*)		I				
Common snipe (*Gallinago gallinago*)		I				
Gulls, terns						
Gulls (Laridae family)		I				
Caspian tern (*Hydroprogne caspia*)		I				
Doves						
Rock pigeon (*Columba livia*)		YR	Confirmed			
Band-tailed pigeon (*Patagioenas fasciata*)	X	YR				X
Mourning dove (*Zenaida macroura*)	X	YR	Confirmed	X	X	X
Cuckoos, roadrunners						
Greater roadrunner (*Geococcyx californianus*)		YR				
Barn owl						
Barn owl (*Tyto alba*)	X	YR	Confirmed	X		
Typical owls						
Western screech owl (*Megascops kennicottii*)	X	YR	Confirmed	X		
Great horned owl (*Bubo virginianus*)	X	YR			X	X
Northern pygmy owl (*Glaucidium gnoma*)		YR		X		X
Burrowing owl (*Athene cunicularia*)		W				
Long-eared owl (*Asio otus*)		YR	Confirmed[5]			X
Short-eared owl (*Asio flammeus*)		W				
Northern saw-whet owl (*Aegolius acadicus*)		YR				
Goatsuckers						
Common poorwill (*Phalaenoptilus nuttallii*)		SR	Possible			X
Lesser nighthawk (*Chordeiles acutipennis*)	X	I				
Swifts						
Vaux's swift (*Chaetura vauxi*)		M, SR?				

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
White-throated swift (*Aeronautes saxatalis*)		YR		X		
Hummingbirds						
Black-chinned hummingbird (*Archilochus alexandri*)		M, SR?				
Anna's hummingbird (*Calypte anna*)	X	YR	Confirmed	X	X	X
Calliope hummingbird (*Selasphorus calliope*)		M				
Rufous hummingbird (*Selasphorus rufus*)		M			X	
Allen's hummingbird (*Selasphorus sasin*)		M, SR?				
Kingfishers						
Belted kingfisher (*Megaceryle alcyon*)	X	YR		X		
Woodpeckers						
Lewis's woodpecker (*Melanerpes lewis*)	X	W, YR?			X	X
Acorn woodpecker (*Melanerpes formicivorous*)	X	YR	Confirmed	X	X	X
Red-breasted sapsucker (*Sphyrapicus ruber*)		W				
Nuttall's woodpecker (*Picoides nuttallii*)	X	YR	Possible	X	X	X
Downy woodpecker (*Picoides pubescens*)		YR	Possible	X		X
Hairy woodpecker (*Picoides villosus*)	X	YR	Confirmed			
Northern (red-shafted) flicker (*Colaptes auratus*)	X	YR	Confirmed	X		X
Pileated woodpecker (*Dryocopus pileatus*)	X	YR	Confirmed		X	X
Tyrant flycatchers						
Olive-sided flycatcher (*Contopus cooperi*)		M, SR				X
Western wood-pewee (*Contopus sordidulus*)	X	SR	Confirmed		X	X
Hammond's flycatcher (*Empidonax hammondii*)		M				X
Dusky flycatcher (*Empidonax oberholseri*)		M				
Pacific-slope flycatcher (*Empidonax difficilis*)	X	SR	Confirmed	X	X	X
Black phoebe (*Sayornis nigricans*)	X	YR	Confirmed	X	X	X
Say's phoebe (*Sayornis saya*)		W, YR?		X		
Ash-throated flycatcher (*Myiarchus cinerascens*)	X	SR	Confirmed	X	X	X
Western kingbird (*Tyrannus verticalis*)	X	SR	Confirmed	X	X	X

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
Shrikes						
Loggerhead shrike (*Lanius ludovicianus*)		M				
Vireos						
Cassin's vireo (*Vireo cassinii*)		SR	Possible		X	
Hutton's vireo (*Vireo huttoni*)		YR	Possible	X		X
Warbling vireo (*Vireo gilvus*)		SR	Confirmed		X	X
Jays, crows						
Steller's jay (*Cyanocitta stelleri*)	X	I			X	
California scrub-jay (*Aphelocoma californica*)	X	YR	Confirmed	X	X	X
Yellow-billed magpie (*Pica nuttalli*)		YR	Probable			
American crow (*Corvus brachyrhynchos*)	X	YR	Possible			
Common raven (*Corvus corax*)	X	YR	Probable	X	X	X
Swallows						
Purple martin (*Progne subis*)		M, SR?				
Tree swallow (*Tachycineta bicolor*)		YR?			X	
Violet-green swallow (*Tachycineta thalassina*)	X	SR	Confirmed	X	X	X
Northern rough-winged swallow (*Stelgidopteryx serripennis*)	X	SR			X	
Cliff swallow (*Petrochelidon pyrrhonota*)	X	SR	Confirmed		X	
Barn swallow (*Hirundo rustica*)		SR	Possible			
Titmice						
Oak titmouse (*Baeolophus inornatus*)	X	YR	Confirmed	X	X	X
Bushtits						
Common bushtit (*Psaltriparus minimus*)	X	YR	Confirmed	X	X	X
Nuthatches						
Red-breasted nuthatch (*Sitta canadensis*)		I				
White-breasted nuthatch (*Sitta carolinensis*)	X	YR	Confirmed	X	X	X
Creepers						
Brown creeper (*Certhia americana*)	X	W, YR?	Possible		X	X

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
Wrens						
Rock wren (*Salpinctes obsoletus*)		YR	Possible			X
Canyon wren (*Catherpes mexicanus*)		YR		X		X
Bewick's wren (*Thryomanes bewickii*)	X	YR	Possible	X	X	X
House wren (*Troglodytes aedon*)	X	SR	Confirmed	X	X	X
Kinglets						
Golden-crowned kinglet (*Regulus satrapa*)	X	W			X	X
Ruby-crowned kinglet (*Regulus calendula*)		W				X
Gnatcatchers						
Blue-gray gnatcatcher (*Polioptila caerulea*)		SR	Confirmed	X		X
Thrushes, bluebirds, solitaries						
Western bluebird (*Sialia mexicana*)	X	YR	Confirmed	X		X
Hermit thrush (*Catharus guttatus*)		W		X		X
American robin (*Turdus migratorius*)	X	YR	Confirmed	X	X	X
Varied thrush (*Ixoreus naevius*)		W				
Wrentits						
Wrentit (*Chamaea fasciata*)	X	YR	Probable	X	X	X
Mockingbirds, thrashers						
Northern mockingbird (*Mimus polyglottos*)		I				
California thrasher (*Toxostoma redivivum*)	X	YR	Confirmed	X		X
Starlings						
European starling (*Sturnus vulgaris*)	X	YR	Confirmed		X	X
Pipits						
American pipit (*Anthus rubescens*)		W				
Waxwings						
Cedar waxwing (*Bombycilla cedrorum*)		W				X
Silky flycatchers						
Phainopepla (*Phainopepla nitens*)		I				X

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
Wood warblers						
Orange-crowned warbler (*Oreothlypis celata*)		SR	Confirmed	X	X	X
Nashville warbler (*Oreothlypis ruficapilla*)		M				X
Yellow warbler (*Setophaga petechia*)		M, SR?				
Yellow-rumped warbler (*Setophaga coronata*)		W			X	X
Black-throated gray warbler (*Setophaga nigrescens*)		M				X
Townsend's warbler (*Setophaga townsendi*)		M				X
Hermit warbler (*Setophaga occidentalis*)		M				X
MacGillivray's warbler (*Geothlypis tolmiei*)		M				X
Wilson's warbler (*Cardellina pusilla*)		SR	Probable		X	X
Yellow-breasted chat (*Icteria virens*)		M, SR?				
Tanagers						
Western tanager (*Piranga ludoviciana*)	X	SR	Possible		X	X
Sparrows, towhees						
Spotted towhee (*Pipilo maculatus*)	X	YR	Confirmed	X	X	X
California towhee (*Melozone crissalis*)	X	YR	Confirmed	X	X	X
Rufous-crowned sparrow (*Aimophila ruficeps*)		YR	Probable	X		X
Chipping sparrow (*Spizella passerina*)		SR				
Lark sparrow (*Chondestes grammacus*)	X	YR	Confirmed	X		
Bell's sparrow (*Artemisiospiza belli*)		YR	Probable	X		X
Savannah sparrow (*Passerculus sandwichensis*)		W				X
Fox sparrow (*Passerella iliaca*)		W		X		X
Song sparrow (*Melospiza melodia*)		YR			X	X
Lincoln's sparrow (*Melospiza lincolnii*)		W				X
White-crowned sparrow (*Zonotrichia leucophrys*)		W		X		X
Golden-crowned sparrow (*Zonotrichia atricapilla*)		W		X		X
Dark-eyed (Oregon) junco (*Junco hyemalis*)	X	W, YR?	Possible	X	X	X

Bird Name	Observed in KWA by CDFW Staff	Probable Seasonal Occurrence in KWA[1]	Designation in Napa County Breeding Bird Atlas[2]	Observed during 2003–2004 Biological Inventory[3]	Observed during 2015 Biological Surveys[4]	Recorded in KWA by eBird[6]
Grosbeaks, buntings						
Black-headed rosbeak *Pheucticus melanoce halus*		SR	Confirmed	X	X	X
Lazuli bunting (*Passerina amoena*)		SR	Possible			X
Meadowlarks, blackbirds, orioles						
Red-winged blackbird (*Agelaius phoeniceus*)	X	YR	Possible	X	X	X
Tricolored blackbird (*Agelaius tricolor*)		I				
Western meadowlark (*Sturnella neglecta*)	X	YR	Confirmed	X	X	X
Brewer's blackbird (*Euphagus cyanocephalus*)		YR	Confirmed		X	X
Brown-headed cowbird (*Molothrus ater*)	X	SR	Probable			X
Bullock's oriole (*Icterus bullockii*)	X	SR	Probable	X	X	X
Finches, goldfinches						
Purple finch (*Haemorhous purpureus*)		YR	Probable			X
House finch (*Haemorhous mexicanus*)	X	YR	Confirmed		X	X
Pine siskin (*Spinus pinus*)		W				
Lesser goldfinch (*Spinus psaltria*)	X	YR	Confirmed	X	X	X
Lawrence's goldfinch (*Spinus lawrencei*)		SR	Confirmed			
American goldfinch (*Spinus tristis*)		W				

[1] Status: YR = year-round resident; SR = spring/summer resident; W = winter resident; M = present during migration; I = incidental (appropriate habitat probably not present in the KWA, but may be present nearby).

[2] Breeding status in blocks containing the KWA (555295, 555290, 560290) from the *Breeding Birds of Napa County* (Berner et al. 2003).

[3] Based on the 2005 Land Management Plan. Birds were observed incidentally in 2003–2004 during targeted surveys for rare plants, weeds, and amphibians.

[4] Birds observed incidentally in spring 2015 during targeted surveys for plants, reptiles, and amphibians.

[5] Breeding confirmed in June 1990 on the South Knoxville Ranch by George Gamble and Bill Grummer.

[6] Observations recorded on eBird checklists (eBird 2016).

Mammals of the Knoxville Wildlife Area

The following table lists mammal species know to occur in or near the KWA. Specifically, the second column of the table lists species documented at the University of California's McLaughlin Reserve, adjacent to the KWA (Enderlin 2002). These observations were presented in Appendix G of the 2005 LMP (CDFG 2005). For the current LMP update, a column was added to the table to indicate observations by CDFW staff. However, since 2005, no new species have been added. Also, although tracks and sign of mammals were observed during the spring 2015 surveys, no mammals were directly observed.

Table G-2. Mammals That Occur in or near the Knoxville Wildlife Area

Mammal Name	Sighted or Collected at McLaughlin Reserve	Observed in KWA by CDFW Staff
Insectivores		
Ornate shrew (*Sorex ornatus*)	X	
Trowbridge shrew (*Sorex trowbridgii*)		
Moles		
California mole (*Scapanus latimanus*)	X	
Bats		
Big brown bat (*Eptesicus fuscus*)	X	
Brazilian free-tailed bat (*Tadarida brasiliensis*)	X	
California myotis (*Myotis californicus*)	X	
Fringed myotis (*Myotis thysanodes*)	X	
Little brown bat (*Myotis lucifugus*)		
Hoary bat (*Lasiurus cinereus*)	X	
Long-eared myotis (*Myotis evotis*)	X	
Long-legged myotis (*Myotis volans*)	X	
Pallid bat (*Antrozous pallidus*)	X	
Silver haired bat (*Lasionycteris noctivagans*)		
Red bat (*Lasiurus blossevillii*)	X	
Spotted bat (*Euderma maculatum*)		
Western mastiff bat (*Eumops perotis*)		
Townsend's big-eared bat (*Corynorhinus townsendii*)	X	
Western pipistrelle (*Pipistrellus hesperus*)	X	
Yuma myotis (*Myotis yumanensis*)	X	
Carnivores		
American badger (*Taxidea taxus*)	X	X
Black bear (*Ursus americanus*)	X	X

Mammal Name	Sighted or Collected at McLaughlin Reserve	Observed in KWA by CDFW Staff
Bobcat (*Lynx rufus*)	X	X
Common striped skunk (*Mephitis mephitis*)	X	X
Coyote (*Canis latrans*)	X	X
Gray fox (*Urocyon cinereoargenteus*)	X	X
Mink (*Mustela vison*)	X	
Mountain lion (*Felis concolor*)	X	X
Raccoon (*Procyon lotor*)	X	X
Red fox (*Vulpes vulpes*)	X	
Ringtail (*Bassariscus astutus*)	X	
River otter (*Lontra canadensis*)	X	
Western spotted skunk (*Spilogale gracilis*)		
Lagomorphs		
Black-tailed jackrabbit (*Lepus californicus*)	X	X
Brush rabbit (*Sylvilagus bachmani*)	X	X
Marsupials		
Opossum (*Didelphis virginiana*)	X	
Rodents		
Botta's pocket gopher (*Thomomys bottae*)	X	
Brush mouse (*Peromyscus boylii*)	X	
California ground squirrel (*Spermophilus beecheyi*)	X	X
California vole (*Microtus californicus*)	X	X
Deer mouse (*Peromyscus maniculatus*)	X	
Dusky-footed woodrat (*Neotoma fuscipes*)	X	X
California kangaroo rat (*Dipodomys californicus*)[1]	X	X
Pacific jumping mouse (*Zapus trinotatus*)	X	
Piñon mouse (*Peromyscus truei*)	X	
Porcupine (*Erethizon dorsatum*)	X	
San Joaquin pocket mouse (*Perognathus inornatus*)		
Sonoma chipmunk (*Tamias sonomae*)	X	
Townsend's chipmunk (*Tamias townsendi*)		
Western gray squirrel (*Sciurus griseus*)	X	X
Western harvest mouse (*Reithrodontomys megalotis*)	X	

Mammal Name	Sighted or Collected at McLaughlin Reserve	Observed in KWA by CDFW Staff
Ungulates		
Mule deer (*Odocoileus hemionus*)	X	X
Pig (*Sus scrofa*)	X	X
Tule elk (*Cervus elaphus nannodes*)	X	

1 Appeared as *D. heermanni* in the 2005 LMP; in this document, the nomenclature has been updated to reflect the currently recognized distinction between *D. californicus* and *D. heermanni*.

Fish, Reptiles, and Amphibians of the Knoxville Wildlife Area

The following table lists fish, reptile, and amphibian species know to occur in or near the KWA. Specifically, the second column of the table lists species documented at the adjacent McLaughlin Reserve, and the third column lists species observed in the KWA during the inventory conducted for the 2005 LMP. Both columns were presented in Appendix H of the 2005 LMP (CDFG 2005). For the current LMP update, columns were added to the table to indicate observations made by H. T. Harvey & Associates biologists during 2015 surveys and observations made by CDFW staff.

Table G-3. Fish, Reptiles, and Amphibians Known to Occur in or near the Knoxville Wildlife Area

Name	Sighted or Collected at McLaughlin Reserve[1]	Observed during 2003–2004 Biological Inventory[1]	Observed during 2015 Biological Surveys	Observed in KWA by CDFW Staff
Fishes				
Bass (*Micropterus* sp.)				X
California roach (*Hesperoleucus symmetricus*)	Collected in Knoxville Creek			X
Sacramento pikeminnow (*Ptychocheilus grandis*)				X
Salamanders				
Arboreal salamander (*Aneides lugubris*)				
California newt (*Taricha torosa*)	X	X		X
California slender salamander (*Batrachoseps* Ensatina (*Ensatina eschscholtzi*)				X
Rough-skinned newt (*Taricha granulosa*)	X			
Toads and frogs				
American bullfrog (*Lithobates catesbeianus*)	X	X	X	X
California red-legged frog (*Rana draytonii*)	X			
Foothill yellow-legged frog (*Rana boylii*)	X	X		X
Pacific tree frog (*Hyla regilla*)	X	X		X
Western toad (*Bufo boreas*)	X			
Lizards				
California whiptail (*Aspidoscelis tigris*)	X			
Coast horned lizard (*Phrynosoma coronatum*)				
Northern alligator lizard (*Gerrhonotus coeruleus*)	X		X	X
Northern sagebrush lizard (*Uta stansburiana*)	X			
Southern alligator lizard (*Gerrhonotus multicarinatus*)	X			
Western fence lizard (*Sceloporus occidentalis*)	X		X	X
Western skink (*Eumeces skiltonianus*)	X			

Name	Sighted or Collected at McLaughlin Reserve[1]	Observed during 2003–2004 Biological Inventory[1]	Observed during 2015 Biological Surveys	Observed in KWA by CDFW Staff
Snakes				
Common kingsnake (*Lampropeltis getulus*)	X			X
California mountain kingsnake (*Lampropeltis zonata*)	X			
California red-sided gartersnake (*Thamnophis sirtalis infernalis*)	X	X	X	X
Coachwhip (*Masticophis flagellum*)				
Western yellowbelly racer (*Coluber constrictor*)	X	X		
Gopher snake (*Pituophis melanoleucus*)	X		X	X
Long-nosed snake (*Rhinocheilus lecontei*)				
Night snake (*Hypsiglena torquata*)				
Northern Pacific rattlesnake (*Crotalus viridis oreganus*)	X	X	X	X
Ringneck (*Diadophis punctatus occidentalis*)	X			X
Rubber boa (*Charina bottae*)				
Sharp-tailed snake (*Contia teuis*)				
Striped racer (*Masticophis lateralis*)	X			
Western aquatic garter snake (*Thamnophis couchi*)	X			X
Western terrestrial garter snake (*Thamnophis elegans*)	X			
Turtles				
Western pond turtle (*Actinemys marmorata*)	X	X	X	X

[1] Source: California Department of Fish and Game 2005.