Review of Conservation Strategy for Butte Regional Conservation Plan by the Independent Science Advisors

Prepared For
Butte County Association of Governments

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Introduction

The Independent Science Advisors (ISA) for the Butte Regional Conservation Plan (BRCP) were asked to review the Draft Conservation Strategy (Chapter 5) of the BRCP document and respond to several questions prepared by the Butte County Association of Governments (BCAG) to ensure the plan is scientifically defensible. The advisors previously provided scientific guidance for the plan early in the planning process in the form of an ISA report (November 2007) to comply with the California Natural Community Planning Act (NCCPA). This second ISA review report represents a follow up to that early advice. It is organized in three sections: general comments on the Draft Conservation Strategy, specific comments, and responses to questions posed by the planning team.

General Comments

In general, the advisors are impressed with the overall quality of the documents we reviewed and with the thought that has gone into devising the conservation strategy. Our comments are intended to assist the planning team in continuing toward a sound conservation plan.

One general concern of the advisors is that it is not always clear if or how our previous recommendations are being applied. In part this is because most of the chapters and supporting documents we were provided as context for this review (e.g., Chapter 3, Baseline Ecological Conditions, and Species Accounts) have not been significantly updated since we first reviewed and commented on them in 2007 (we were only asked to comment on Chapter 5, Conservation Strategy, for the current review). Consequently, there is no documentation of how our recommendations concerning such items as the planning area boundary or list of covered or planning species were treated. In these particular examples, we understand that plan participants did discuss our recommendations and decided (1) not to alter the planning boundary, because they determined this would not affect conservation and management actions or plan effectiveness, and (2) added some covered and planning species, but rejected others as not necessary. At this point, the advisors don't recommend going back to document how each and every recommendation from the 2007 ISA report was handled (i.e., we are not advocating additional "busy work" for the consultants), but we note that this current review may have been more straightforward had we been provided with a brief explanation of how our recommendations were considered during planning. Nevertheless, it does appear that many of our recommendations are reflected in contents of the Draft Conservation Strategy (Chapter 5).

The following general comments are meant to increase the clarity and scientific defensibility of the plan:

Importance of Managed Grazing—The advisors would like to reemphasize the importance of managed grazing as a habitat management tool for maintaining desired vegetation conditions, biological diversity, and some covered species in the plan area. For example, grazing can control woody vegetation and maintain some grassy stream and pond banks for use by pond turtles, giant garter snakes, or other species; maintain desired habitat conditions for grassland species like burrowing owls and tricolored blackbirds; and control invasive plants that otherwise can dominate vernal pool vegetation and adversely affect covered plants. Although use of grazing as

a management tool is mentioned in some sections, the Conservation Strategy seems to focus too strongly on acquiring lands and removing livestock from preserve areas, whereas in many cases obtaining easements that allow for continuing successful grazing practices, or for modifying grazing practices in an adaptive management framework, may be more effective. Where the document makes references to excluding livestock with fencing, we therefore recommend using more flexible language, such as "fencing to control access by livestock." While excluding grazing may be the best current decision, over the long run the option to use grazing should be left open in case monitoring and research determine it to be useful. The plan should also consider landscape configuration as it pertains to livestock management: large, connected, and contiguous grazing areas are important to effective range management, just as they are to reserve design. More specific comments pertaining to range management are provided in the next section.

Assumptions About Land Status—The advisors are concerned that some areas mapped as natural habitat (especially vernal pool areas) and planned for conservation by BRCP have been recently developed or heavily disturbed, or could be converted soon. The vernal pool mapping needs to be checked and updated, as loss is occurring rapidly. Based on GoogleEarth investigations and a recent rangeland assessment prepared by The Nature Conservancy (TNC) one advisor noted that some vernal pool areas planned for acquisition to conserve Butte County meadowfoam have been recently converted, are under development, or are heavily disturbed. TNC has found that Williamson Act (WA) status is an indicator of potential future conversions, as landowners that plan to convert their lands to non-agricultural uses do not renew their WA contracts. Some lands identified as part of the Central Plan Area Corridor (Figure 5-4) are in WA non-renewal status currently and the future plans for these lands should be investigated. A map highlighting some areas that have been or might be converted will be submitted separately to the plan consultants.

Conservation Prioritization—The document would benefit from some reorganization or other changes to clarify priorities for goals, objectives, and conservation actions. While the current organization is clear and logical, it reads almost like a catalog of goals and actions, with little attention to which of these are most important, urgent, or influential in designing the plan and prioritizing conservation actions. For example, species in Section 5.5 could be grouped, re-ordered, or labeled to indicate their relative degree of priority for implementing species-specific conservation goals and actions. Currently, the species are presented in taxonomic order (beginning with birds and ending with plants) and each species has a similar list of conservation goals and objectives, regardless of how sensitive each species is or how important their particular goals and objectives are to plan success. For example, bald eagle (a species recently delisted as Threatened due to dramatic recovery successes and that is unlikely to significantly influence BRCP reserve design or management actions) appears to be just as important in defining plan goals and policies as Butte meadowfoam—a highly endemic and globally threated species that has had, and deserves, significant influence in shaping BRCP.

Similarly, the list of reserve assembly principles beginning on page 5-16, appears to give equal priority to everything. It would be useful to try to group or prioritize these principles in some way to better indicate how they can be applied to design and assemble an effective reserve system over time. Clearly, some lands are urgent to conserve and manage to prevent habitat conversion and fragmentation for the rarest, most sensitive species and communities (e.g., vernal

pool areas subject to conversion), whereas other lands could be added over time, perhaps using agricultural easements and incentive programs to maintain habitat values (e.g., in oak woodlands and savannahs).

These are just two examples of places where the document could be refined to help readers better understand the relative importance of various issues for guiding and prioritizing conservation actions. Overall, although the document presents a relatively clear, balanced, and comprehensive set of goals, objectives, and actions, we recommend giving more thought to presenting these issues in a manner that better reflects conservation priorities and the phasing of implementation.

Literature Citations—The advisors remain concerned that some information, assumptions, etc., throughout the document are not adequately supported by scientific citations, and in some cases are at odds with the published literature. We realize that as a public document that should be readable by a wide audience, the plan document should not be burdened with too much technical detail and citations; however, some statements and assumptions that could be challenged, or that are contradicted by scientific literature, are presented without support. Examples are scattered within our specific comments, below, such as statements that tri-colored blackbirds prefer tall, ungrazed grasslands for foraging when the literature says they prefer mown or grazed grasses less than 6 inches tall.

We also recommend (and assume) that all species accounts and management recommendations will be comprehensively updated with the latest literature, because there have been significant advances in understanding of some species, communities, and habitat management and monitoring methods since 2007. Likewise, species locality data should be updated on maps (e.g., from the latest CNDDB). Again, some important new citations and data updates are listed in specific comments, below.

Importance of Sacramento River Habitats—We recommend considering additional conservation actions along the Sacramento River, including within the Sacramento River CAZ and portions of other CAZs that boarder the River. We noted that Table 5-2 proposes little or no acquisition acreage in the Sacramento River CAZ despite the importance of habitats along the river to numerous covered species (e.g., Valley elderberry longhorn beetle [VELB], pond turtle, and riparian birds). We also recommend designating an additional wildlife corridor within this CAZ (perhaps also extending north to the North Plan Area Corridor). The area along the river and floodplain should be a focus for conserving, restoring, and buffering natural riparian/floodplain habitats to make larger, more continuous habitat (e.g., by restoring some agricultural areas to natural habitat) for such species as yellow-billed cuckoo, VELB, and numerous other riparian species.

Specific Comments

Tables—Tables presenting acreage acquisition targets (e.g., Table 5-1, 5-2) would be more meaningful if they included percentages of the total as well as acreages. Tables should also be carefully proofed, as we noted scattered typos and some incorrect numbers. For example, in Table 5-7 the Percent Existing Protected Habitat for western yellow-billed cuckoo should be 19.3, not 42.3.

Species Categories—We recommend adding a section early in Chapter 5 (or in earlier chapters) to clearly explain the rationale for selecting Covered Species, Planning Species, and Local Concern Species, and how these species were used in designing the Conservation Strategy. In particular, the terms Planning Species and Local Concern Species arise in various portions of the Chapter before they are defined (Covered and Local Concern Species are defined in Chapter 1, but Planning Species are not). Note also that Table 5-4 includes white-fronted goose and yellow-breasted chat as planning species, but these are not mentioned in text concerning planning species (and yellow-breasted chat is also listed as a covered species).

Bird Comments

- Bird accounts and information in the plan concerning threats, management recommendations, etc., should be updated with information in Shuford and Gardali (2008), Richmond et al. (2010), Tricolored Blackbird Working Group (2009), and other recent publications.
- Black rail. Information and recommendations should be updated to reflect the most recent results of the California Black Rail Project. Note that the majority of habitat in the study area may be associated with wetlands maintained by irrigation practices (e.g., from leaky irrigation lines or canals), rather than natural wetlands (Richmond et al. 2010).
- Tri-colored blackbird. Contrary to statements in the species account and Section 5.5.1, this species prefers short grasslands (less than 6 inches tall) maintained by grazing or mowing rather than ungrazed, tall grasses for foraging habitat (Tricolored Blackbird Working Group 2009).

Reptile and Amphibian Comments

- *Hyla regilla* is now *Pseudacris regilla*. Although herpetological names are in continual flux, this one has reached wide acceptance.
- Section 5.4.1.1.2. There should be more than 1 pond protected for Western pond turtle in the Basin and North Orchard CAZs and more than 0 for the Southern Orchard CAZ. Despite absence of CNDDB records, these regions host many populations of Western pond turtle. There are also pond turtles in the Sacramento River CAZ. Turtles are larger and grow faster in lowlands than in foothill streams and may have greater reproductive rates and fecundity, making the Basin, Orchard, and Sacramento River populations important in overall conservation of Western pond turtle. Ponds already protected to some degree include Chico Waste Treatment Ponds (several ponds), Teichert Ponds, and Fair Street Ponds within the Chico city limits.
- Section 5.5.12, giant garter snake. Giant garter snake reports from near Chico are not in rice land, but rather in irrigation ditches near the water treatment plant.
- Section 5.5.14, western pond turtle. Clawed frogs are only important in the southern part of the range, not here.
- Section 5.5.15. Foothill yellow-legged frogs also use ephemeral tributaries to perennial streams during winter. Frogs may travel long distances away from permanent streams up these tributaries.

- Include intermittent stream habitat as important for foothill yellow-legged frog in the Cascades CAZ. Frogs spend considerable time in intermittent streams during the winter. The importance of this habitat is recognized in the Sierra Foothills CAZ but not the Cascades CAZ.
- Appendix A, giant garter snake account: Look out for updated recovery plan due out in late 2011 or early 2012. Threats should include road mortality (as a source of habitat fragmentation and significant source of adult and juvenile mortality).
- Appendix A, western pond turtle account: There should be more records in CNDDB now. T. Engstrom contributed additional locations in January 2011. Time to maturity is highly variable, depending on temperature regime and resources. Age at maturity may be as little as 2-3 years in waste treatment plants on the valley floor in the southern part of the range (Germano 2010) or 14+ years in foothill streams with cold water, due to limited foraging seasons and potentially lower resource availability. This can play an important role in demography of populations and points to the importance of lowland populations. Threats include road mortality. This is particularly important in turtles because adult females, which are most important to population stability, are likely victims during nesting forays. Western pond turtles are in the Sacramento River. They use oxbows, off-channel, and main-channel habitats. We approve of the conservative 500-m upland buffer. There are many unpublished observations of turtles using upland habitats >200 m from water in the CSU Chico BCCER. A 200-m upland buffer is probably insufficient.
- Appendix A, foothill yellow-legged frog: There should have been extensive surveys for foothill yellow-legged frog for FERP relicensing of hydroelectric plants. Consultants or PG&E should have submitted these to CNDDB. If not, then seek reports to FERP and PG&E. Large populations exist in both of CSU Chico's ecological reserves BCCER and BCEP. Include Chytrid fungus as a potential threat mediated by bullfrogs. Bullfrogs can act as carriers, infecting native species without mortality to the bullfrogs.

Fish Comments—The following two references should be considered and cited regarding the importance and use of seasonal tributaries by fishes in the northern Sacramento Valley: Limm and Marchetti (2009) and Walther (2009).

Land Protection Categories—These are not defined prior to the map showing them (unless defined prior to Chapter 5?). The term "open space" appears throughout the document without a definition. Does this include recreational open space or parks that generally do not provide habitat for covered species?

Priorities for Land Assembly—Pages 5-16 and 5-17 provide a list of assembly principles that seem to give priority to everything. Can this be refined to provide more guidance for prioritization by the Implementing Entity (i.e., which principles are most important?) since not everything can be a priority?

Vernal Pool Restoration (Section 5.4.2.2 CM5)—Language should be added to prohibit vernal pool creation on lands with existing vernal pool complexes. Artificially increasing vernal pool density on a site can degrade the hydrologic function of the natural pools and remove habitat for species dependent on the upland surrounding the pools.

Habitat Connectivity—The California Essential Habitat Connectivity Project is incorrectly cited as "Caltrans and DFG 2010" contrary to the "preferred citation" that those agencies (along with the Federal Highways Administration) included on the title page of that report:

> Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration.

We recommend consulting Chapters 5 and 6 of that document for a comprehensive review and recommendations for siting and designing local linkages or wildlife corridors for focal species and mitigating the effects of roads on wildlife movement and ecological processes.

Grazing and Range Management—The importance of appropriate grazing and range management practices to habitat management needs more emphasis, and the accuracy of information about grazing effects could be improved.

- Wherever the document refers to grazing to "increase absolute cover of native plant species" (e.g., page 5-73) it should be preceded by "influence vegetation structure or composition or increase absolute cover…" Grazing can reduce woody species, alter grass heights, reduce biomass of nonnative annuals, etc., which may in turn increase habitat value or absolute cover of particular plant species.
- Portions of the document dealing with irrigated pastures, ponds, and habitat management should recognize that the majority of black rail habitat in the plan area is likely created by leaky irrigation pipes and canals used for livestock production (Richmond et al. 2010).
- Information on threats to oaks and appropriate management for oak woodlands and savannahs should be updated and refined based on Tyler et al. (2006).
- Section 5.5.1.5 states that "stock ponds and other human-made ponds are harmful [to foothill yellow-legged frogs] because they promote bullfrog populations." This seems to imply that such ponds should be eliminated, which could adversely affect other covered species and adversely affect ranching practices that are necessary to maintain habitat for a variety of species. We suggest rewording this to focus on the bullfrogs, rather than the ponds, as being harmful. Bullfrog management in existing ponds is a more practical and beneficial action than eliminating ponds.
- Section 5.8.5, second bullet under potential research needs: Add "and improve habitat conditions for covered wildlife species" after "abundance and vigor of… covered plant species."

Responses to Questions

Questions on Landscape and Natural Communities Conservation

1. **Are the extent, patch size, configuration, and habitat connectivity considerations for natural communities preservation presented in Tables 5-1, 5-4 and 5-5 reasonable based**

on the available data? If not, what adjustments to this Plan element do you recommend?

Table 5-1

Table 5-1 is a useful summary for planning purposes of the number of acres that will be acquired under the Plan. However, it is difficult to evaluate whether these are "reasonable based on the available data," since they are absolute values rather than percentages of total amount of each habitat type to be protected. Percentages should be added. Perhaps combining Table 5-1 with Table 5-6 (which shows percent of vegetation types protected with and without BRCP) would be useful.

Percentages in Table 5-6 suggest that some community types are underrepresented in protected areas, both with and without BRCP implementation. For example, blue oak woodlands are only 9.8% protected, with 0 additional protection planned by BRCP, and all oak woodland and savannah types have relatively low levels of proposed protection. Given the importance of these communities to some covered, planning, and local concern species, as well as to watershed functions and overall ecological values, how is this low level of protection justified?

Table 5-4

It is unclear exactly how these guidelines are to be applied in practice (as described in Section 5.2.3.5). Are the minimum patch sizes assumed to apply to isolated patches, or single acquisitions, or portions of a larger mosaic, or perhaps smaller acquisitions to increase the size of existing protected areas? The intent of the minimum patch sizes should be clarified, or the acreages increased, depending on how these guidelines will be used. Note that protecting additional small parcels of habitat to increase the size of an existing protected patch may be more valuable than protecting another isolated patch that meets the minimum size criterion.

In most cases, acreages listed as "minimum patch sizes" appear to be rounded up from the low end of a range of home range estimates obtained from the literature. If a single patch is expected to support a population of a planning or covered species, an area large enough for a single, small, home range is clearly not sufficient. Numerous such patches in close proximity without movement barriers between them would be required. If they are intended to support populations of these planning or covered species, at least over the short term, we recommend using average or larger home range estimates and areas sufficient to support at least 5 breeding pairs or females. We realize this could be infeasibly large for acquisitions in some cases, but if these guidelines are used to imply that, for example, 400 acres of grassland is sufficient to meet the needs of badgers, this is not defensible. A more defensible size would be enough for about five 2,000-acre home ranges = 10,000 acres. The size should be similarly increased for mule deer.

Yellow-billed cuckoo (YBCU)—The patch size minimum of 25 acres (Gaines 1974) seems low and should be a minimum of 50 acres according to Laymon and Halterman (1989) and Laymon (1998). Laymon and Halterman found a significant trend of increasing percent occupancy with increasing patch size: Only patches > 80 hectare (197 acres) were 100% occupied, so we recommend this as a desirable target size for riparian patches. Including bank swallow (BASW) in the column for "covered species provided for" by YBCU standards is somewhat misleading. Primary habitat for BASW is eroding banks (normally without forest vegetation) and nearby agricultural fields for foraging. However healthy populations of YBCU do provide an

"indication of the importance of a meandering riparian system with healthy hydraulics that is constantly eroding and depositing and creating young riparian habitat" (Laymon 1989). Consider adding this information to the natural community description for YBCU. This might also allow inclusion of giant garter snake under YBCU covered species as it occupies oxbow lakes and ponds that result from a meandering river.

Yellow-breasted Chat—Include the words "early seral stages of riparian scrub" or similar under the description of the natural community.

Table 5.5

Valley elderberry longhorn beetle (VELB) —Habitat connectivity enhances populations for this invertebrate; isolated bushes are less likely to be occupied than others (Collinge et al. 2001).

Vernal pool invertebrates—It is not clear how the "vernal pool watershed" will be defined for planning purposes. Some recent hydrological studies (N. McCarten, unpublished) indicate that overland and subsurface water flow into a vernal pool may come from at least 250-500 m away. Rains et al. (2006) also provide information that may be useful to the development of a definition of vernal pool watershed.

Fish—We noted that Table 5-5 has blanks for habitat size criteria for all of the fishes. There is little if any scientific data available for establishing these criteria, but in the professional judgment of our fish expert (M. Marchetti), the following minimum standards seem reasonable: >150 acres of floodplain habitat, >5,000 feet of riparian cover habitat, and >2,700 feet of spawning gravels.

Yellow-billed cuckoo—See comments on Table 5-4.

Plants—Why are there no plants included in Table 5-5? Is this due to an assumption that plants don't have minimum patch size or connectivity requirements? Note that all covered species can be adversely affected if conserved in areas too small or poorly connected due to numerous edge effects, loss of symbionts (e.g., pollinators), etc. We recommend developing guidelines for plants as well as animals.

2. Are the proposed locations and requirements for the establishment of ecological corridors described under Goal LAND2 and objective LAND1.1 (Section 5.3.2.1), and in Conservation Measure (CM) 1 (see Section 5.4.1.1) to support the survival of target covered species and for general wildlife use to support biodiversity? If not, what adjustments to these Plan elements do you recommend?

The proposed corridor locations and requirements are generally defensible, but care must be taken during implementation to ensure that the corridors are continuous and unimpeded by barriers for species or processes of conservation concern (i.e., they need to be functional corridors, not just "lines on a map"). See Spencer et al. (2010) for recommendations on siting and designing local-scale corridors for focal species and for mitigating potential road and barrier effects.

Fig. 5-4 could be misinterpreted by some readers, because it shows wider swaths "within which ecological corridors will be protected" than the minimum 1.2-mile-wide corridors described in text (or the 0.6-mile-wide corridor for giant garter snake). We understand that the actual corridors will be narrower swaths then those mapped in Fig. 5-4.

In the case of a riparian corridor, does the 0.6 or 1.2-mile width include the width of the river or creek, or only the adjacent terrestrial lands? We recommend the latter.

The advisors recommend considering a 5th north-south corridor linking at least a few of the larger patches of remnant riparian patches (and meanders) along the Sacramento River (e.g. below Hwy 32 to Phelan Island). This is likely the only way to "support survival" of viable populations (minimum 25 pairs, Laymon 1998) of YBCU and other covered species (e.g. bank swallow's ephemeral nesting habitat and need for multiple colonies to ensure survival). This corridor could be a focal area for riparian and floodplain restoration efforts with agricultural set-backs or other appropriate measures.

Advisors also recommend that the corridors be designed to help maintain viable ranching and other agriculture where appropriate to meet habitat management goals. Large, contiguous and connected lands are important for agricultural management purposes, as they are for reserve design.

3. Are the types of natural community enhancement and management actions described in CM9 (section 5.4.2.6) appropriate for all BRCP preserved lands? Are there additional types of enhancement/management actions that should be considered for preserved lands?

Yes, for the most part these enhancement and management actions are appropriate. The assessment of each parcel following acquisition will also be effective for establishing baseline conditions against which management actions can be compared. We recommend the following refinements:

- Assessments should be conducted within one year of acquisition rather than two. There may be instances where conditions could change dramatically within two years (for example, if the parcel was previously grazed, then grazers were removed immediately after acquisition), which would render the "baseline conditions" to be less meaningful and informative.
- Greater flexibility should be allowed for retaining livestock grazing where appropriate to maintain habitat favorable to covered species. Recommendations for "excluding grazing" should be changed to "controlling grazing" or "controlling access for grazing" so that grazing can be evaluated and used if needed within the adaptive habitat management framework. Sometimes, exclusion does more harm than good, but this may not be known for a while. Long term management flexibility is important.
- Additional enhancement/management actions should be included to identify and if necessary mitigate areas of high road mortality (e.g. where roads lie between aquatic and nesting habitats for Western pond turtle). Potential mitigations include crossing structures (e.g., appropriately designed culverts or underpasses), signage, etc.

5.4.2.6.1 Oak Woodland and Savanna—It is unclear why bald eagle is mentioned here. The third bullet should be reworded as *"*Managing grazing to enhance <u>woody plant</u> survival and recruitment <u>and to improve watershed function and reduce erosion</u>.*"*

5.4.2.6.2 Grassland—It is unclear why fire, grazing and other techniques would be used to only increase absolute cover of native plants. Why not overall native plant diversity?

The following bullet should be split into two bullets to read:

- Application of herbicides to remove heavy infestations of nonnative plants
- Restoration of native plant species

Under *vernal pool and grassland swale complex*—add to the following: "Enhancement actions could also include modifying or removing structures and supplemental sources of water that increase or decrease the historical inundation period of protected vernal pools only when the enhancement activities will not adversely impact covered species." The rationale for this is that, oftentimes, when the alteration is in place long enough, the species composition in the vernal pool changes to include species that thrive in the new inundation regime. There needs to be more justification for the enhancement activity than simply returning it to what it was before the changed condition occurred.

5.4.2.6.3 Riparian Natural Community—We recommend changing the first bullet from "excluding livestock from riparian habitats" to "carefully managing livestock grazing to control invasive species and to maintain favorable habitat conditions for covered species."

Change the fourth bullet to read "installing or maintaining woody debris…"

Add a bullet: "Connecting the flood plain to the river to promote regular disturbance and regeneration of young riparian seral stages and promote structural diversity" (see RHJV 2004).

5.4.2.6.6 Agricultural Land Habitats—Add a new bullet: *"*Encourage use of owl nest boxes, raptor perches, etc., for control of rodents.*"* Add to existing bullet: "Altering cultivation, water management and/or harvest practices to increase forage and prey availability for covered and other native wildlife species."

4. Do the BRCP conservation land assembly principles (Section 5.2.3) provide sufficient guidance to ensure that the desired amount, patch size, and configuration of land conservation is provided? If not, what revisions to the principles to you recommend?

Yes, for the most part. The particular strengths of this section are 1) the emphasis on connectivity to existing conservation lands, 2) protection of environmental gradients, and 3) protection of lands sufficiently large to incorporate natural disturbance regimes.

Again, we recommend more consideration for maintaining a viable grazing industry in the area. Some covered species require grazing and irrigation. Maintaining some lands in well management private stewardship (e.g., via easements that allow adaptive management and monitoring) may be more effective and cost-effective than acquiring lands in fee simple and managing resources in other ways.

Questions Common to All Covered Species Conservation Approaches

5. Does the conservation strategy address the major covered species' stressors that can be addressed by BRCP? (See species accounts for discussion and description of stressors.) If there are species for which stressors may not be adequately addressed, what additional conservation measures do you recommend adding to the Plan?

Yes, for the most part, but with the following concerns:

- Loss of natural erosion/deposition processes (due to rip-rapping, etc.) is a stressor to riparian systems and many associated species. Restoring meander (e.g. protecting a

corridor along the river and allowing regular high water events) is important for yellow-billed cuckoo, bank swallow, and probably garter snakes and others.

- Over grazing or poor grazing practices in riparian (especially in foothill streams) will reduce understory/shrub cover and impact breeding YBCH. Also invasive (non-native blackeberry) control can impact chats in some places. Control should always be followed by replanting of natives that provide habitat and food sources.
- Swainsons hawk, white-tailed kite, tricolored blackbird (and to some extent bank swallow) need to nest near and/or forage in agricultural fields. Changes in agricultural uses (e.g. conversion of alfalfa to orchards or rangeland to row crops) may therefore impact nesting populations of these species. Losses of agricultural types that complement native habitat for such species, and that provides important habitat elements such as small wetlands and canals, could be a stressor on various covered species, including giant garter snakes and the above-mentioned birds.
- Road mortality is an important stressor for populations of many amphibians and reptiles. Giant garter snakes and western pond turtles are affected by road morality. Conservation actions for mitigating road mortality should be addressed by BRCP. Surveys of road kill can be used to identify particular areas of high impact. Areas may include migration corridors between habitat types, for example between water and nesting habitats for western pond turtle or between ephemeral waterways and permanent wetlands for giant garter snakes. Protocols could be developed for surveys to carried out during normal road maintenance and cleaning or to be carried out by contract biologists. Depending on extent of impact there are a number of appropriate strategies available to reduce road impacts on wildlife, including underpasses, reduced speed or signage to alert motorists etc. See Spencer et al. (2010, Chapter 6) for a review, recommendations, and additional citations that may be useful.

6. **Is the amount and location of the proposed landscape and natural community land preservation sufficient for conserving each BRCP covered species within the Plan Area? Are the habitat preservation amounts and rationales in table 5-2, table 5-3, and table 5-5 appropriate for each covered species? If not, what adjustments to the species habitat preservation amounts or the rationales do you recommend? Is the proposed distribution of habitat preservation among the six Conservation Acquisition Zones appropriate for conserving each species inside the Plan Area? If not, what adjustments to the proposed distribution and amounts of natural communities and covered species habitat preservation do you recommend?**

This is very difficult to answer. There is high uncertainty about "how much is enough" for any conservation plan, particularly for species with population and habitat needs that extend beyond planning area boundaries. The question can hopefully be answered with a bit more certainty once a comprehensive effects analysis has been performed, along the lines of what the advisors recommended in Section 7.1 of the 2007 ISA report. Nevertheless, at this point the conservation actions seem sufficient for most communities and species, with some caveats, as addressed throughout this review and below.

We would like to see additional justification for the amount of habitat conserved (see earlier comments on patch size and other related issues). If there is no justification beyond "best

professional opinion" that should be stated. There should also be provisions in the adaptive management and monitoring plan to expand or add habitat acreages, restoration areas, etc., as necessary to achieve the conservation goals and sustain covered species if new information gathered during plan implementation suggests this is necessary.

As stated earlier, the advisors recommend additional conservation and restoration along the Sacramento River corridor, if possible. Large, contiguous riparian and floodplain habitats are important to numerous covered species, and seem essential to conserving some species populations, especially the yellow-billed cuckoo and VELB. Table 5-2 has 0 or very low habitat acquisition targets in the Sacramento River CAZ for VELB, yellow-breasted chat, bank swallow, Swainson's hawk, giant garter snake, and western pond turtle, despite the importance of this area to sustaining these species. For VELB, it is not clear what evidence was used to support the statement that the habitat is "stabilized" (Table 5-3). We suspect that riparian habitats, like vernal pool habitats, have continued to decline statewide.

As also noted earlier, additional conservation for some habitat types, such as oak woodlands and blue oak savannah are very low. We recommend considering whether there will be sufficient acreage and contiguity of oak woodlands to meet conservation goals for various covered and planning species (e.g., mule deer).

Species Specific Questions

Giant Garter Snake

7. **Conservation Measure (CM) 1 (section 5.4.1.1) proposes that given all other factors are equivalent (e.g., connectivity to other habitat areas, landscape location), protecting 10 acres of rice land provides the same level of habitat function for giant garter snake as creating and maintaining 1 acre of permanent wetland designed specifically to support all habitat requirements of giant garter snake (e.g., aquatic and upland aestivation habitat elements). Is this proposed ratio reasonable (assuming all other conservation elements, such as assembly rules, minimum patch size, habitat management etc.) based on current understanding of giant garter snake use of rice land and natural wetland habitats or should the ratio be adjusted? If so, what would be a more reasonable ratio?**

The 10:1 ratio of rice to wetland for giant garter snake seems somewhat arbitrary but is the industry standard. In the absence of strong data for or against the 10:1 ratio, we see no reason to suggest anything different. Nevertheless, there is a need to critically evaluate this policy by researching carrying capacity of both rice land and designated wetlands, along with relative edge effects, immigration and emigration rates, and occupancy rates in both habitat types. We recommend including such studies within the adaptive management and monitoring plan.

Greater Sandhill Crane

8. **Conservation Measure (CM) 1 (section 5.4.1.1) proposes that given all other factors are equivalent (e.g., proximity to occupied roosting habitat), protecting 1 acre of rice land provides the same level of foraging habitat function for greater sandhill crane as creating and maintaining 1 acre of managed wetland designed specifically to support non-cultivated foraging plants, invertebrates, and other natural food items over the**

period cranes winter in Butte County. Is this proposed ratio reasonable based on current understanding of greater sandhill crane use of rice land under normal agricultural practices and managed wetland habitats or should the ratio be adjusted? If so, what would be a more reasonable ratio?

We see no reason to suggest a different ratio. Sandhill cranes prefer rice and other crops for foraging habitat if managed properly. We recommend ensuring that agricultural practices conducive to sustaining covered species such as sandhill cranes be encouraged and continued using easements or other incentives.

Butte County Meadowfoam (BCM)

9. Is the Butte County meadowfoam (BCM) habitat model (see Appendix A) reasonable based on the known physical and biological attributes of meadowfoam habitat? Do the BRCP definitions of BCM primary habitat and BCM secondary habitat adequately address the entire geographic and ecological range of suitable habitat for this species? If not, what adjustments do you recommend?

Yes, the habitat model seems reasonable based on the known occurrences and requirements. The primary and secondary habitat recommendations seem reasonable for this species. Nevertheless, we encourage a comparison with results of modeling done for this species by Bob Holland. We also recommended obtaining and inspecting the Holland model in our previous scientific advisory report, but don't see any evidence that this recommendation has been followed.

Elevation or topographic relief might be factors that need to be considered. In particular, some of the area east of Cohasset Road in the Chico B area is predicted by the model to be high quality BCM habitat, but it appears to have a high degree of topographic relief and some tree cover. Consider modifying the model using elevation, a measure of topographic relief, or tree density if these observations are correct (verify with a field visit?). Otherwise, the criteria used in the model seem appropriate.

We also recommend developing a map layer showing where surveys have been conducted for BCM to verify absence from some locations. This would decrease uncertainties about model accuracy and the overall conservation strategy for BCM. If an area is shown as high quality habitat and has been extensively surveyed with negative results, then the habitat designation should be questioned.

10. Are the proposed population groupings (and underlying assumptions), which are a primary tool for building the BCM conservation strategy, reasonable based on the available BCM genetic information (see section A.33 in Appendix A, *Covered Species Accounts*)? If not, what adjustments do you recommend?

Yes, these population groups seem reasonable based on the available genetic characterization of these populations and the substrates on which BCM occurs.

11. Are the proposed BCM conservation measures sufficient to:

a. Protect the entire genetic range of BCM? *Yes, as it is currently known.*

b. Stabilize and protect BCM populations from further habitat fragmentation and incompatible uses? *Some parts of the CBCMP are fairly close to developed areas, and there may be incompatible uses on these lands that may negatively influence these populations (e.g., via changes to runoff and sedimentation). Have adjacent land uses been investigated? Additionally, there are some small parcels in prime BCM habitat near Chico that have been identified as "BCM habitat removal" on Figure 5-5. We would like to see more of these parcels included in the preserve, if possible, since these are far more likely than areas beyond Chico to support BCM occurrences (see additional comments in "e," below).*

c. Provide adequate connectivity between BCM preserves? *Yes, especially for the north-centrally located section of the BCM preserve; not as much for the southernmost sections. Figure 5-6d is difficult to follow. Could this be revised to more clearly differentiate the two cases?*

d. Protect potential BCM pollinators and their habitat? *Since so little is known regarding pollinators of BCM, it is not clear whether the conservation measures will protect the pollinators. Typically, protecting and properly managing uplands adjacent to vernal pools is a good strategy for protecting pollinators, as well as ensuring compatible adjacent land uses (e.g., those that do not involve pesticide application that may harm native bees).*

e. Achieve self-sustaining populations of BCM? *This is very difficult to answer. Although it appears that a large proportion of known occupied habitat will be conserved, we are concerned that (1) large areas of primary or secondary habitat targeted for protection are not currently known to support populations, (2) there are large uncertainties about whether the reserves will sustain a functioning landscape that can sustain the species into the future, and (3) some areas mapped for inclusion in the reserve system have been or are being converted.*

A large proportion of the proposed, additional protected acres for BCM (e.g., the 2,500 acres of Rock Creek primary habitat shown in Table 15-5) does not currently show any BCM occurrences. This may skew the perception that the protected acreage for BCM will double (compare columns d and e in Table 15-5), because it is not clear that BCM will actually be supported in these areas. Pending verification of populations in these modeled habitat areas, we recommend focusing as much as possible on protecting existing populations.

The lines on the map do a good job of capturing all known occupied habitat, but that does not equate to protection of a functioning landscape that will support the species into the future. Significant areas of the habitat targeted for acquisition for the BCM preserve, including known occupied BCM population areas, have recently been converted or are being compromised by ongoing development. One of the advisors made notes on Figures 5-5 and 5-X with comments about habitat degradation that has occurred since the maps were made. These comments are mostly based on investigations using GoogleEarth imagery to determine whether the land was still intact, but even this may be obsolete

depending on when the imagery was last updated. There is a race with the developers going on right now, and the species is losing out. It is most unfortunate that the large populations of this species are located almost exclusively within urban areas.

12. There likely are unknown occurrences of meadowfoam in the Plan Area. The conservation measures provide for protecting newly discovered BCM occurrences that are determined to be important to the survival and recovery of the species, but allow other new occurrences to be removed for urban development. What criteria might be appropriate for making such a determination as new occurrences are discovered during plan implementation? (see Section 5.4.3.8)

If species recovery is truly the goal, then any significant new populations need to be conserved to maintain their landscape function. Newly discovered populations that are large or close to other populations are high priority for protection, but populations that may be genetically unique (i.e., far isolated from other populations) should also be protected. New occurrences that may be removed could be those that are very small, not genetically unique, and redundant with more significant, already protected populations. Populations need to be conserved within large preserves that protect more than just the occupied pools, so they can be managed effectively. If an area is designated for protection within the BCM preserve area, it should be protected regardless of whether BCM is found there or not (to ensure landscape integrity and allow for potential population expansions or colonization events).

13. Overall, would implementation of the Conservation Strategy (conservation measures, monitoring, and adaptive management) and covered activities that have adverse effects on the BCM provide for the long-term survival of BCM (i.e., "recovery")? If not, what changes to the Plan would you recommend?

The overall plan for BCM seems reasonable and likely to promote long-term survival of BCM (see comments in 11 b and e, above), with the following caveats. The removal of newly discovered populations must proceed cautiously (see 12, above), and should only be done if there is evidence that BCM populations elsewhere are increasing over time. Surveys for BCM to determine existing environmental conditions (Section 5.4.1.4) should follow a standardized protocol developed by scientists with appropriate experience and qualifications. Monitoring should also include monitoring of pollinators.

The spatial configuration of the proposed and existing Preserves has been compromised and continues to be further compromised by existing and on-going development in unprotected areas. As previously mentioned, one advisor has documented at least 3 examples of conversion or disturbance activities within proposed preserve boundaries of the core Chico A and B areas. This concerns us that the preserve cannot therefore even be created as proposed. At any rate, those disturbed or converted lands need to be subtracted from the totals in the conservation tables.

Our biggest concern with the preserve design in the Chico Core A, B and C areas is with the small size of the protected habitat and its landscape context. The habitat around the airport is surrounded on all sides by development, and lands within this proposed protection area are

already being compromised. The proposed preserves in the Chico C area have a lot of edge habitat, roads that bisect the proposed preserves and no protection of land to the east. This sets them up for being completely surrounded by development. The watershed of the BCM habitat needs to be better understood and its function protected.

Maintenance of the hydrologic integrity of the site and health of the habitat with appropriate management practices may be limited by the small size and configuration of the Preserves. This is a big concern in the core Chico BCM preserve. An evaluation of the fate of small vernal pool preserves set aside as mitigation for habitat destruction was conducted for the Placer Land Trust (http://www.placerlandtrust.org/vernalpoolreport.aspx) and illustrates the challenges associated with these small preserves.

The conservation measures don't address the potential for introducing BCM into suitable habitat in order to secure the population. We think that this measure should be at least considered and evaluated given the threats to the species, even if the preserve network can be assembled as proposed. The tenuous nature of BCM habitat in the ever-expanding Chico area necessitates developing a "Plan B" that includes experimental translocation (with careful, long-term monitoring) to expand the population and reduce extirpation risks.

Grazing management could be a major factor driving the persistence and BCM population viability on a site. In cases where the population appears healthy, then documenting the past management history of the site in order to continue it into the future is critical. Likewise, a site with a population that appears to be suffering from poor management or lack of management should have that management history clearly documented as well. The default should be to maintain the current management regime if habitat conditions for the species are good (i.e., the burden of proof should fall on any proposal to change management that appears to be working). We recommend more research and citation of the literature on grazing management to make sure the management and monitoring recommendations are as scientifically sound and up-to-date as possible. We also recommend that options for using grazing within the adaptive management framework be maintained whenever possible. In other words, excluding grazing from an area may be the right decision now, but the option of using grazing again if it is deemed necessary through monitoring and research should be maintained.

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