Note to Reviewers: *this handout presents the draft Yolo NHP Conservation Land Assembly Principles, which provide guidance to the Implementing Entity for acquiring conservation lands in a manner that will achieve the Yolo NHP biological goals and objectives. This text will be incorporated as a section of Chapter 5, Conservation Strategy, of the Yolo NHP document and is formatted as such.*

Draft Conservation Land Assembly Principles

5.2.5.1 Conservation Land Assembly Principles

The term "assembly" refers to a mechanism used in regional conservation planning to describe desired land and habitat characteristics, and to guide selection of high-value conservation lands during plan development and plan implementation. Spatial considerations that address landscape-level needs of the covered species (e.g., dispersal, seasonal distribution, migration, metapopulation structure) are important to ensure an assembly of conservation lands that achieve the Plan's biological goals and objectives. The Natural Community Conservation Planning Act (NCCPA; California Fish and Game Code Chapter 10) describes the following findings that must be made by DFG before approving a NCCP that are related to the assembly of conservation lands (Fish and Game Code 2820(a)).

> (3) The plan provides for the protection of habitat, natural communities, and species diversity on a landscape or ecosystem level through the creation and long-term management of habitat reserves or other measures that provide equivalent conservation of covered species appropriate for land, aquatic, and marine habitats within the plan area.
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> (4) The development of reserve systems and conservation measures in the plan area provides, as needed for the conservation of species, all of the following:
>
> > (A) Conserving, restoring, and managing representative natural and seminatural landscapes to maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity.
> >
> > (B) Establishing one or more reserves or other measures that provide equivalent conservation of covered species within the plan area and linkages between them and adjacent habitat areas outside of the plan area.
> >
> > (C) Protecting and maintaining habitat areas that are large enough to support sustainable populations of covered species.
> >
> > (D) Incorporating a range of environmental gradients (such as slope, elevation, aspect, and coastal or inland characteristics) and high habitat diversity to provide for shifting species distributions due to changed circumstances.
> >
> > (E) Sustaining the effective movement and interchange of organisms between habitat areas in a manner that maintains the ecological integrity of the habitat areas within the plan area.

The Plan's conservation land assembly principles are consistent with and designed to achieve the required NCCPA findings. The assembly principles provide guidance to the Implementing Entity

in the evaluation and selection of conservation lands. The assembly principles include considerations for ecosystem process and habitat functions, habitat-related requirements for associated covered species, and broad ecological and land management characteristics. The Implementing Entity will identify potential conservation lands based on the extent to which those lands meet the following assembly principles:

1. Protect patches of natural communities that support the highest functioning habitat for covered species taking into consideration the Yolo NHP implementation schedule.
2. Protect patches of natural communities that provide the highest potential for protecting and/or enhancing and restoring ecological processes on a landscape scale in the NHP Plan Area.
3. Protect lands that are of sufficient size and configuration to ensure effective management.
4. Select lands with high connectivity to other habitat areas that support other life history functions of the target covered species (e.g., acquire Swainson's hawk riparian nesting habitat areas that are located within the foraging flight distance of Swainson's hawk to foraging habitat areas).
5. Give priority to selection of lands that:
    - support ecological functions necessary to achieve multiple Yolo NHP biological objectives;
    - establish sufficient protected land area and habitat/community types to maintain dynamic landscape processes in the Plan Area, including land to address:
        - community succession and ecosystem development,
        - species migration and colonization processes,
        - natural disturbance patterns and habitat/community recovery processes, and
        - habitat-based distributions of native species sufficient to maintain them in the Plan Area or to restore them to the Plan area;
    - support smaller patches of remnant habitats that are important for maintaining the abundance and distribution of dependent native species and that are self-sustaining or could be effectively sustained through management;
    - establish connections between conservation lands within and outside of the Plan Area;
    - are occupied by covered species or connected to occupied habitat;
    - support natural disturbance regimes or that are suitable for reestablishing disturbance regimes;
    - support seeps and springs; and
    - support the most reliable hydrology for maintaining protected natural communities and habitats into the future.

Over the course of implementing the Yolo NHP, the Implementing Entity may revise these principles, consistent with NCCPA requirements for NCCPs, to improve their effectiveness in achieving the Yolo NHP biological goals and objectives. To illustrate, the following describes conservation land assembly concepts contained within the assembly principles applicable to the acquisition of conservation lands in the Hills and Ridges and Valley Landscape Units.

Conserve Lands of Highest Value to Covered Species and Natural Communities

Efforts to conserve lands in the Plan Area should emphasize those areas with greatest overall value to covered species and natural communities. Protection of high value lands should provide the highest densities and productivities for covered and other native species, and thereby are most likely to contribute to long-term conservation. This principle encompasses lands with (1) the highest current habitat value for covered species and/or (2) the highest potential for enhancement and restoration of habitat values for the covered and other native species associated with the natural communities.

Lands with highest values for covered species, based on known species occupancy and modeled distribution of each species' habitat, are identified in the species-habitat models (Appendix A, *Covered Species Accounts*). These models were used to help develop the Yolo NHP Conservation Strategy and will be used, along with other tools that may be developed by the Implementing Entity, to help identify potential conservation lands. Selection of conservation lands for acquisition, however, will be based on site-specific ecological evaluations (see Section 5.4, *Conservation Measures*) to ensure that the lands under consideration are suitable for achieving the Yolo NHP biological goals and objectives. Areas identified as priority conservation lands should include those that support the rarest covered species, combined occurrences of species, or larger areas of relatively high quality habitat. Information on known occurrences is particularly important in selecting conservation lands for species whose occupied habitats are not easily predicted by habitat suitability models, such as the burrowing owl, California red-legged frog, and California tiger salamander.

Information on species occurrences as it accumulates over the term of the Yolo NHP will guide land conservation decisions, emphasizing protection of areas of known species occurrence (rather than relying solely on predicted occurrence based on habitat). Covered species surveys may be required in some instances to apply this assembly principle because the availability of information on species occurrence within is limited in many areas.

Habitat-based valuation of suitability, which is based on known habitat relationships and the presence of key habitat attributes, will also guide land conservation decisions. Predicted occurrences and habitat suitability for covered and other native species, and the potential to restore suitable conditions that support covered species will guide selection of high value lands.

Natural community and ecosystem values also will influence selection of conservation lands. These values are determined by specific characteristics of lands, including the presence and conditions of vegetation and other habitat resources, as well as ecosystem characteristics

embodied in the other assembly principles. These considerations include giving priority to selection of lands that support:

- the highest native species richness in each of the natural communities,
- the highest densities of native species, and
- ecological processes (e.g., disturbance regimes) on a landscape basis.

Protect Large Land Units

Protecting land in large units contributes to achieving a variety of conservation goals and objectives. Larger land areas provide for species with larger home range sizes, such as large mammals and raptors. Conservation of larger land blocks also tends to protect a diverse array of habitats at varied elevations. Selection of larger land areas also provides more interior land area that protects conservation resources from potential detrimental effects of adjacent land uses, minimizing potential conflicts between conservation management activities and other uses on adjacent lands.

Within the Hills and Ridges Landscape Unit, larger blocks lands of conserved lands can be achieved by selecting larger land areas and locating conservation efforts on lands adjacent to and connected with existing conserved lands. For example, in the Dunnigan Hills (Planning Unit 5), newly conserved lands will expand on and connect previously preserved habitats.

Many of the lands within the Valley Landscape Unit are remnants of natural communities that existed before large-scale agricultural conversion altered the landscape. Protecting the largest examples of these remnant habitats is important to maximize species diversity and the population sizes of species. Larger land units in this landscape unit may retain more varied ecological conditions and associated diversity, and enhanced ecological functions such as pollination, than do smaller areas. Large units are often more buffered from adjacent land use disturbance (for example, agricultural and developed uses) and can be managed more efficiently and effectively.

Notwithstanding the importance of protecting larger units, many key natural communities and habitats in the Valley Landscape Unit consist mainly of smaller units, such as remnant vernal pool and alkali sink habitats that support imperiled plant and invertebrate species populations and remnant patches of valley oak woodlands. Guidelines for minimum patch sizes of various natural communities and habitats can be determined based on the existing range of habitat patch sizes (see *5.4.1 Landscape Conservation Measures.)*

Conserve Environmental Gradients and Diversity

NCCPs are required to incorporate a range of environmental gradients (such as slope, elevation, aspect, and coastal or inland characteristics) and high habitat diversity to provide for shifting species distributions due to changed circumstances (California Fish and Game Code 2820(a)(4)(D)). To achieve this requirement, the Plan distributes conservation lands throughout

the Plan Area to protect the range of environmental conditions and elevation gradients that are important for conserving covered and other native species and biodiversity.

Geographic Distribution. The Conservation Strategy provides for conserving lands throughout the Plan Area to: 1) maintain the geographic distribution and diversity of natural communities and native species, 2) increase the probability of conserving currently unknown occurrences of rare species, and 3) increase the likelihood for conserving genetic variation among native species populations, including adaptive characteristics (i.e., different microhabitat tolerances) that could be important to responding to long-term changes in climate and other physical conditions. Conserving lands in a variety of geographic areas is most important in the Hills and Ridges Landscape Unit because the greater topographic variation there creates more varied conditions for covered and other native species and other important ecosystem elements, and thus more variability in adaptation to local conditions. Such varied adaptations may be important in species response to future climate and ecosystem changes. Meeting the natural community protection targets established for each of the Planning Units is expected to result in an appropriate distribution of conservation lands throughout the Plan Area. .

Elevation Gradients. The Implementing Entity will assemble conservation lands to encompass lands with continuous connections across elevation ranges to capture the diversity of natural communities and habitats that result from differences in rainfall and temperature, as well as effects of topographic relief, soil conditions, and other factors. Ensuring a broad array of elevation ranges within conservation lands also is more likely to support future upslope migration of communities and species in response to climate change. The range of elevations are much greater in the topographically diverse Hill and Ridge Landscape Unit than in the relatively flat Valley Landscape Unit; however, protecting low elevation gradients is important for maintaining the habitat functions of natural communities associated with the Valley Landscape Unit (e.g., floodplains, vernal pools and their micro-watersheds).

Conservation of lands identified within the Hills and Ridges Landscape Unit will complement existing conservation areas by extending the elevation range of existing protected lands, and associated natural communities and habitats. In areas where existing conservation lands are limited or absent (i.e. Capay and Dunnigan Hills) new conservation lands will provide protection over a range of elevations.

Soil Conditions. The Implementing Entity will assemble conservation lands to encompass lands within and across geologic formations to capture the diversity of natural communities and habitats that result from differences in soil conditions. Many species are associated with specific soil conditions that are limited and highly localized in their distribution within the Plan Area (e.g., serpentine and alkali soil-associated plant species) or that maintain hydrologic conditions that provide habitat for covered and other native species (e.g., vernal pool shrimp and plant species). As with elevation gradients, protecting a broad array of soil conditions within conservation lands is more likely to support future migration of communities and species in response to climate change.

Protect a Diversity of Habitats to Support Covered and Other Native Species.

Preservation of natural habitat diversity contributes to maintaining the abundance and distribution of associated covered and other native species. Actively selecting conservation lands that protect, or contribute to the protection of a high diversity of natural communities, habitats, vegetation types, and species confers the conservation benefit of a diverse mosaic of physical and vegetative structure and composition that protects biodiversity. Importantly, the diversity of existing habitats should not be the benchmark for establishing conservation goals (i.e., in equal proportion to current availability) because the range of natural communities has been altered substantially from historical conditions, and many areas of existing habitat are degraded from their natural condition. Therefore, representation of diversity within conservation lands should consider:

- the ecological processes that support natural habitat conditions,
- the quality of habitat conditions for associated covered and other native species,
- natural ecological dynamic processes in the Plan Area,
- historical and current abundance,
- amounts of various habitats already in protected status, and
- the dependency of covered and other native species on the conditions.

For example, riparian and wetland habitats, which enhance the value of adjacent uplands for many species and contribute to overall habitat diversity, should be given high consideration in selecting conservation lands.

Protect Lands that Accommodate Natural Disturbance Regimes

Natural disturbances, including erosion, deposition, flooding, fire, drought, high winds that uproot trees, and herbivory, are important ecosystem processes that have formed and continue to maintain the natural diversity of the lands within the Plan Area. The ability to maintain, reestablish, or mimic natural disturbance, as well as other ecosystem processes, is important to maintaining natural diversity and habitat conditions. Fire, in particular, is a source of natural disturbance in the Hill and Ridge Landscape Unit, although disagreement exists regarding the importance of fire as an ecosystem process in maintaining natural communities. Disagreement over the natural role and frequency of fire is the main impediment to the application of natural fire regimes. The use of prescribed fire for ecosystem management also is constrained by the presence of human assets that increase risk of loss and the cost of protection during fire use, including the presence of adjacent development, low density homesteads, and agricultural development. Herbivory's relevance as a disturbance factor has changed since prehistoric conditions. Increased intensity and duration of grazing by domestic livestock contributed to a higher proportion of grazing-adapted non-native species in grassland communities. When properly managed, grazing can be a useful tool to control undesirable non-native species.

Flood control activities have dramatically altered historic flood frequency, extent, and duration in lowland areas of the Valley Landscape Unit, resulting in reductions and modification of riparian, wetland, and aquatic communities. Nonetheless, fluvial processes still play an

important role in creating and maintaining existing habitat conditions and in determining potential for enhancement and restoration of these communities.

The degree to which hydrologic and other physical disturbance processes maintain natural community dynamics and ecological conditions will inform which lands are identified for protection in the Hills and Ridges Landscape Unit. Therefore, lands with modified hydrology, due to agricultural or other water use improvements, are lower priority for conservation than watersheds with little evidence of hydrological modification.

Adjacent Sources of Disturbance

Conservation land selection will incorporate consideration of potential effects of adjacent land uses on habitat functions of protected lands for covered and other native species and potential effects of conservation land management activities on adjacent land uses. Adjacent developed and disturbed areas, including roads, towns and agricultural lands, have the potential to introduce a variety of influences that may disrupt natural processes and degrade resource values, including noxious weeds, pesticide drift, free-ranging pets and non-native wildlife, unplanned fire events, noise, poaching, ground disturbance from trespass use, and other disturbances. Considering the effect of adjacent disturbances on conserved lands reduces potential conflicts from external disturbance.

Acquire Lands with the Ability to Maintain or Restore Ecological Functions

Some covered and other native species are limited more by the quality of habitat in the Plan Area, than by areal extent of habitat. Therefore, land selection needs to consider both the ability of lands to sustain existing high value ecosystem functions, and the potential to restore these functions.

Past and current land uses degraded many of the examples of natural communities within the Plan Area. Therefore, enhancement of ecological conditions will be an important part of the Conservation Strategy. For example, while grasslands remain relatively abundant in the Plan Area, especially in the lower elevation areas of the Hills and Ridges Landscape Unit, past and present management practices in many areas may not produce suitable conditions for grassland-dependent covered species, including several plants, California tiger salamander, and western burrowing owl. Other herbaceous natural communities, especially in the Valley Landscape Unit, occur on levee slopes, within canals, and on roadsides that undergo regular maintenance. Invasive giant reed and tamarisk have also reduced habitat values in many areas along Cache Creek.

Many remnant natural communities in the Valley Landscape Unit are located in areas where enhancement or restoration may be difficult or impossible. Lands selected for conservation should focus on examples of communities in less disturbed settings or where reversing the effects of land use practices through enhancement and restoration is practical. Many patches of valley oak woodlands are degraded remnants retained as shade trees at farmsteads, agricultural equipment yards and processing areas, or roadside utility corridors. Such remnants should be

evaluated to determine if they are capable of persisting through the replacement by younger trees over the long term.

Select Lands to Complement and Enhance Existing Protected Lands

Proximity to existing protected lands, including land managed by the Bureau of Land Management (BLM), University of California Natural Reserve System, California Audubon, local land trusts and conservancies, is an important criterion for conservation land protection. Selecting lands adjacent to existing protected lands efficiently increases the ability to protect areas of large size (see *Protect Large Land Units* above). Augmenting existing conservation areas also supports other assembly principles, including protection of greater elevation range and habitat diversity.

Conservation lands will be selected to augment the conservation benefits of existing protected areas by adding habitat to increase the range of elevations represented within conserved lands, increasing the diversity of protected habitats, providing habitat corridors to connect existing preserves, and maintaining rarer natural communities and habitats (e.g., serpentine grassland, juniper woodland). Decisions regarding selection of future conserved lands during Yolo NHP implementation will be based in part on the configuration of conservation lands in place at that time.