

## EXECUTIVE SUMMARY

The authors of this report were assembled as science advisors to offer independent review of the scientific aspects of the Solano County Natural Community Conservation Plan (NCCP)/Habitat Conservation Plan (HCP), which is being prepared by the Solano County Water Agency and other applicants (herein collectively referred to as applicants). According to the scope of work for our review, we were “convened to provide expert opinion, scientific information, and data analysis,” and “may also be asked to provide technical guidance that arises during the plan development.” The three tasks we were specifically charged with completing were 1) a review of background information; 2) attendance of a two-day science workshop and orientation; and 3) preparation of a “written summary report that presents conservation and management guidelines for the Solano NCCP/HCP.”

Because the NCCP/HCP for Solano County is a regional plan, we concentrated on conservation issues that are relevant at this broad scale, many of them related to landscape ecology. As a global hotspot of biodiversity that is highly fragmented and modified by human activities, Solano County offers tremendous opportunities and challenges for conservation planning. We emphasize the utility of considering the historical conditions of the landscape as a model for present-day conservation and restoration. Although we think the planning process for the County is off to a reasonably good start, we recommend increased consideration of landscape linkages (especially because further fragmentation and loss of connectivity in the County is highly likely); attention to species that may not be listed by federal or state authorities but which are important for other reasons; and careful scrutiny of databases used in the planning process, particularly the California Natural Diversity Data Base (NDDDB).

We summarize the recommendations of our report below. Rationales for, and further descriptions of these recommendations are contained within the body of the report.

- Reserve designs should conserve and restore historic gradients between wetland and upland habitats. In particular, reserve planning should include opportunities for conservation and restoration of historic gradients of tidal marsh to vernal pool and native grasslands. Habitat linkages between Suisun tidal wetlands, low terrace – Suisun region vernal pools, and the Greater Jepson Prairie Ecosystem should be emphasized.
- Increased traffic and upgrades of roads, such as Highway 12 west of Fairfield, threaten to permanently isolate populations of many species on either side. Develop design standards, for example elevated roadways, to accommodate wildlife movement and hydrologic connectivity across roads.
- Target native predators, such as coyote, for conservation as indicators of intact food webs and as potential keystone species (i.e., species whose impact on the ecosystem is disproportionately large)

- Analyze and map habitat type and quality within open space reserves before considering their potential contribution to landscape-level reserve design.
- Identify areas of native grasslands and include them in the reserve designs. Propose strategies for restoring non-native grasslands back to native grasslands, where possible. It may be useful to designate grazed and cattle-free or low intensity grazing reserves for multiple species conservation. Although cattle and native ungulates may coexist on grazing lands, the conservation plan should consider open spaces reserves where native herbivores are free from competition with cattle.
- Preserve some floodplain areas with natural or near-natural inundation frequency and magnitude. Floodplain inundation is a necessary ecological dispersion mechanism for some species and has the added benefit of reducing flooding in downstream areas.
- Address the need for regional recreation opportunities on open space lands, while limiting human activities around and within sensitive reserves for protection of target species. We suggest the Plan identify sanctuary areas closed to all human activities and establish transitional zones with increasing levels of human use with distance from core areas. These measures are especially important for protection of clapper rails, but apply to many of the target species.
- Many “riparian” habitats within and near cities and in agricultural portions of the county are very narrow (i.e., only 1 or 2 tree canopies wide, at most) and are often characterized by non-native trees and shrubs. We suggest these areas be categorized and mapped as a separate habitat type, perhaps “degraded riparian” to distinguish it from the remnant riparian woodland (and riparian scrub) that has a greater diversity of native species and habitat values.
- Because of the high level of spatial variation in vernal pool plant communities across the county, conservation efforts should include representatives of the different plant communities in order to prevent further degradation of biological diversity.
- Fine-scale variations in Contra Costa Goldfields (*Lasthenia conjugens*) characteristics suggests that conservation efforts should consider potential differences among populations within the species range and include adequate representation of each local population in reserves.
- Because only two populations of Colusa grass (*Neostapfia colusana*) are known to occur in Solano County and because Colusa grass is threatened by conversion of habitat to agricultural uses, development, over-grazing, and non-native plants, conservation efforts should emphasize protection of both remaining populations in the county.

- Further research is recommended for both Colusa grass and Solano grass (*Tuctoria mucronata*) to learn more about their distribution and abundance in relation to vernal pool characteristics throughout Solano County.
- The Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*) is an important target species for the Plan because it is a Solano County endemic that is vulnerable to extinction. It is threatened by habitat fragmentation and loss, conversion of historic tidal wetlands to managed seasonal waterfowl habitat, and secondary impacts from urban development.
- Soft bird's beak (*Cordylanthus mollis* ssp. *mollis*) is a San Francisco Estuary endemic vulnerable to extinction. Current research suggests it plays an ecologically significant role in tidal wetlands. Hispid bird's beak (*Cordylanthus mollis* ssp. *hispidus*) is a California endemic known from only one location in Solano County and a total of four sites in California. There is speculation that hispid bird's beak is not more widespread in the seasonal alkaline wetlands of Solano because of grazing pressure, but the cause of rarity for this species is unknown. Research on this question is needed.
- Develop additional information on sensitive plant species such as critical life stages, dispersal characteristics, potential corridor use, genetic integrity, and critical interspecific interactions.
- For burrowing owls to survive in the County, they will require the preservation and restoration of large, contiguous tracts of natural grasslands with terrain modifications for burrows and managed for burrowing mammal (especially California ground squirrel) use. Moderate-level cattle grazing may also be required. There is an opportunity to fold burrowing owl needs into the vernal pool and grassland preservation areas with minor management adjustments.
- A map with Swainson's hawk nest sites overlaid on current agricultural land use is needed to identify the most important agricultural lands to preserve.
- Keep unobstructed corridors of natural habitat between pools for conservation of California Red-legged Frog (*Rana aurora draytonii*) and protect breeding areas from invasion by the non-native bullfrog (*Rana catesbeiana*). New development or agricultural activity adjacent to red-legged frog habitat should remain free of artificial ponds and streams that could be invaded by the bullfrog.
- If guarantees can be made that a large percentage of agricultural lands will remain with appropriate crop types, (alfalfa, tomatoes, other specific row crops), it is likely that the Swainson's hawk population will remain at its current population level, and may increase to a level which meets recovery standards.
- An appropriate framework for conservation management of steelhead would include the concept of a metapopulation comprising source and sink subpopulations, as

outlined by the National Marine Fisheries Service (NMFS white paper: “Viable salmonid populations and the recovery of evolutionarily significant units,” January 6, 2000; [www.nwfsc.noaa.gov/pubs/](http://www.nwfsc.noaa.gov/pubs/)).

- Annual monitoring of selected streams (Green Valley and Wooden Valley watersheds) over several decades should be conducted to determine the temporal patterns of population variability of steelhead and rainbow trout as well as chinook salmon and other native fishes. Other creeks (e.g., Alamo and Ulatis creeks) also should be sampled at least periodically to determine their use by steelhead, rainbow trout, and salmon during years of favorable streamflows.
- Restoration efforts for Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) should focus on establishing elderberries of all age classes and, where practical, continuous riparian corridors.
- Future developments in urban and agricultural areas should be carried out in a way that minimizes changes in peak runoff, total runoff volume, and seasonality of runoff as a solution to reducing changes to the salinity regimes of tidal areas.
- Future developments should either maintain or enhance groundwater infiltration as one solution for maintenance of crucial dry season / dry year flows and as a contributing factor for maintenance of the riparian zone along creeks.
- Assessments should be done to determine appropriate dry season environmental flows especially in Suisun and Green Valley Creeks but also in Alamo and Ulatis Creeks, and then steps should be taken to ensure that these are met.
- An assessment of historic fauna and flora of Suisun, Green Valley, Alamo and Ulatis Creeks should be done to determine the true baseline. This information should then be used to help determine how, if at all each of these creeks could be restored.
- A scientific study should be conducted to determine the relative magnitude and sources of non-point contaminants so that appropriate management techniques can be selected.
- Should studies or existing data deem it necessary, measures should be taken to reduce the runoff of sediment and contaminants from existing urban and industrial areas and new developments. Measures might include maximizing infiltration, grass swales, retention ponds, and levee setbacks.
- Should studies or existing data deem it necessary, measures should be taken to implement public education programs on the impacts/ use and/ or correct disposal of pet feces, lawn clippings and garden waste, detergents, and garden fertilizers.
- Measures should be taken immediately to improve farm management of sediment and contaminants. The current regime of minimum vegetation cover in rangeland, row

crop, tree crop farming and vineyards is likely contributing to the supply of fine sediment to creek channels. Studies should be undertaken to determine the relative sediment supply from various sediment sources so that appropriate management techniques can be applied.

- Evaluate the use of constructed freshwater wetlands for wastewater treatment to eliminate or reduce the negative impacts of freshwater discharge into Suisun tidal sloughs.
- A more thorough analysis of the population dynamics and population genetics of endemic vernal pool crustaceans should be undertaken, with the aim of determining long-term population cycles and the historic and contemporary interconnectedness of remaining populations of endangered and threatened species (including *Lindieriella occidentalis*, *Branchinecta lynchi*, *B. mesovalleyensis*, and *Lepidurus packardi*).
- Maintain existing linkages between vernal pool complexes, and conduct long-term experiments to evaluate the use of restored vernal pools in order to re-establish historical connections.