

General Recommendations for Preserve Design

One of the benefits of a regional conservation strategy is the flexibility it allows, both for human-associated development and for protection of biological resources. This strategy does not present specific localities for protection, but endeavors to describe the characteristics of areas that could be protected to compensate for the impacts of activities permitted under the strategy. This is relevant because protecting compensation land is one activity that the implementing entity will perform.

During the implementation of the strategy, and particularly when the protection of specific tracts of land is being considered, a number of principles, listed below, should be reviewed.

Effective Protection Depends on Quality Information

The study area consists almost entirely of private land, much of it comprised of large holdings. Large portions are inaccessible by road, especially the upland areas used for grazing and the Delta. As a result, the study area has not been completely surveyed. Clear evidence for this lies in the number of new records of target species that have resulted from the intensive study of specific areas. For example, recent studies conducted in the Delta for CDFG resulted in hundreds of new records for plant and animal species; intensive surveys in connection with the Liberty New Town project in the eastern grasslands resulted in dozens of new records, some for species previously unknown in San Joaquin County, although the soil and hydrologic characteristics of this study area closely resemble the eastern grasslands farther south in San Joaquin County. In addition, our communications with knowledgeable individuals such as the herpetologist George Hansen and the botanist John Stebbins indicate that the populations of at least some rare species in the area are incompletely known.

It is highly recommended that biological surveys continue to be carried out to better ascertain the quality and distribution of target biological resources throughout the area and that the information from future surveys be used to update the species occurrence database prepared for the strategy. The current state of information is insufficient to suggest that the best areas have already been identified for many species. It is highly unlikely that the full extent of occurrence of many target species is known in the County. Decisions on the protection of specific areas should be weighed against the state of knowledge for the species to be protected. Land proposed for protection should be reviewed by knowledgeable individuals to develop consensus that the area is indeed a good choice.

Sources of additional survey information could be academic studies conducted by researchers and their students; surveys conducted by conservation groups or wildlife

organizations, such as the Point Reyes Bird Observatory or the Audubon Society; and data collected by current land managers. In some areas, pre-activity surveys will be required. Although these surveys are unlikely to be in areas targeted for protection, the information on species occurrence generated by those surveys can add to our knowledge about the species. Finally, monitoring of dedicated compensation land is required to evaluate the success of the protection effort and to adjust land management as appropriate. Those surveys will provide information about habitat and species occurrence.

The habitat map should be updated to reflect information gathered in field surveys, as well as changes due to development or changes in cropping patterns. When the Department of Water Resources land use survey is next updated, the cropping patterns/land use information should be used to update the habitat map.

Importance of Agricultural Practices

Many of the animal species on our target list coexist with low-intensity agriculture. Some, such as the Swainson's hawk and other bird species, depend for foraging on alfalfa fields, fallow land, irrigated pasture and grazing land. The kit fox is found primarily on rangeland. The giant garter snake lives in and near irrigation ditches, unlined canals, and ponds.

In addition, many bird species nest in small areas of unfarmed land contained within a matrix of agriculture; for example, the tricolored blackbird now nests primarily in the blackberry thickets often found along ditches within agricultural lands. Many species of raptors nest in isolated trees found in rangeland or pastureland. The strategy does not cover agricultural practices, but the continued survival of many species depends on the continued existence of rangelands, alfalfa fields, grain fields, pockets of unfarmed land, and trees along waterways or standing as isolated individuals in fields.

Unfortunately, vineyards and orchards grown using conventional cultural practices have limited value for target species, yet they are highly valuable economic alternatives for much of the agricultural lands.

As suggested above, the strategy should maintain a map of agricultural uses as one component of the GIS. A good source would be the maps prepared by the Department of Water Resources, which are periodically updated to reflect changes in agricultural practices. These can be related to the protection of target species in the area.

Second, since many target species would be benefited simply by continuing current, or slightly modified, agricultural practices, it is recommended that the implementing entity work to increase awareness in the agricultural community of low- or no-cost measures to enhance wildlife habitat, and encourage voluntary commitments to protect it. For

example, American Farmland Trust is active in the effort to preserve farms and may be an effective ally in this effort. If land is to be considered protected, including land that is voluntarily protected, there must be written agreements describing how the land will be managed and what activities will be conducted on it.

Natural versus Restorable Lands

With certain specific exceptions, high-quality natural lands should be the priority for land protection. Natural lands, particularly those already supporting the target species, have several benefits. Natural lands usually cost no more than restorable land and already are known to support certain resources. It takes no input of time and money to create the desired habitat and, in most cases, requires only modest expenditures to maintain or enhance the habitat. Restorable land has the disadvantage of a considerable time lag before the benefits and results are realized, usually at great cost. Often, too, our knowledge and understanding of ecological processes is insufficient to dependably produce the habitat we aspire to create. Restorable land may be acquired as a buffer to existing high-quality habitat, and this may be particularly beneficial where natural processes would allow succession toward beneficial habitat types, such as in a riparian zone.

The two exceptions relate to wetlands. First, the requirement for restoration of 20,000 linear feet of shaded riparian aquatic habitat as part of the SB34 levee maintenance project has been incorporated into the strategy. For this purpose, new shaded riparian aquatic habitats must be developed in areas where they now do not occur. Second, the Clean Water Act and USFWS policy for wetland mitigation calls for a combination of protection natural habitat and restoration of habitat of the type impacted. Thus, some restoration of vernal pools, marsh, riparian or other wetland habitat must be considered.

Balance Impacts and Protection

Over the life of the strategy, the compensation land protected should be chosen so that the impacts to specific habitat types and species are compensated for by the protection of appropriate kinds and amounts of habitat. For example, impacts to vernal pools must be compensated for by the protection and restoration of vernal pools, in accordance with Clean Water Act and USFWS requirements.

Priority of Multiple-Species Preserves

The protection criteria for the strategy rely primarily on the protection of lands supporting multiple species. This approach has the obvious benefit of protecting more species per dollar expended. It also should allow for more efficient management and monitoring of the species involved. Also, the more species supported in a particular parcel of habitat, the

more indication that the area is in good condition ecologically.

One factor that should be considered in the initial protection and the long-term management of preserved lands is that the habitat requirements for target species may differ. An excellent riparian preserve for one species may support only marginal habitat for another species. Also, management practices that benefit one species may be marginal or detrimental for another. Thus, when lands are protected and managed, the extent and quality of *actual, occupied* habitat for each target species should be evaluated, and an attempt made to balance the protection efforts for all species throughout the area. This evaluation will call for a critical review of the species that *may* be protected (see the lists in Section 10.2) by application of a particular set of criteria. Obviously, not all protected land will protect all the species listed as occurring in that particular habitat type. Each parcel of land being considered for protection should be examined to determine the extent to which it will round out the protection of target species for the strategy.

Priority may be given to those species most at risk, which have already lost much of their habitat and/or with the fewest numbers of individuals in the County. Since the period of time covered by the SJMSCP is expected to be 30 years, the status of many species on the current list may well change, some increasing in numbers or in the known number of populations, and possibly becoming de-listed or down-listed. Others may become more rare or endangered, and the urgency of protecting remnant populations may be greater than is perceived today. It is also possible that some species on the target list may become extinct over the lifetime of the strategy and the need to protect habitat will be moot. Therefore, the protection of lands for target species must be based on the best available current information, and decisions on proposed protection should be reviewed by a number of agency and conservation representatives.

Large Blocks of Habitat vs. Small

For most species, large blocks of habitat containing large populations of target species, are superior to small blocks of habitat containing small populations. The persistence of a species is subject to many variables, including random environmental changes and catastrophes. Small populations have a reduced chance of surviving these changes given their reduced numbers and the accompanying reduction in genetic alternatives available for adapting to changes. Thus the largest possible blocks of high quality habitat should be included within management units and preserves for viable populations of species.

Likewise, large blocks of habitat are likely to remain intact if they are without roads, utility corridors, or even recreational paths.

While the general principle of "larger is better" holds for the protection of formally preserved lands that are protected by fee acquisition or conservation easement, the importance of smaller protected areas should not be overlooked where voluntary or very low-cost protection is possible. Also, some very localized populations of target species

may be most effectively protected by conservation of small areas.

Distribution of Preserves Throughout the Range of Species

Where possible, it is desirable to create preserved lands throughout the known range of the species. Species occurring in different geographic areas often have slightly different genetic and physiological adaptations that represent the full range of diversity within the species. Preservation of habitat throughout a geographic range should help to protect a better representation of the range of adaptations within the species. Also, if other regional factors change (such as adjacent land uses, climate change, or hydrology), protection of species in a broad geographic area may preserve the genetic variability to allow the species to persist.

Interconnectedness and Close Proximity of Preserves

Especially where there is a "center" of distribution within the County for a target species, multiple preserves aimed at protecting their habitat should be close enough to permit individual movements and genetic flow between preserves. In addition, the intervening habitat should be suitable to allow movements. From the standpoint of individual movements, interconnected preserves represent islands of managed habitat that may supply ideal habitat for foraging and breeding. From the standpoint of genetic flow, interconnected preserves tend to maintain populations naturally. Isolated events (for example, disease, flooding, unfavorable adjacent land use, predation) may cause a population at one site to diminish or become extirpated, but the site can be recolonized by other nearby populations. Likewise, if conditions permit high population numbers in certain years, interconnected preserves can allow out-migration to nearby suitable areas.

Interconnectedness is of greatest concern for mobile, non-flying vertebrates with relatively large home ranges, such as the San Joaquin kit fox and the giant garter snake. In the case of the San Joaquin kit fox, it is not possible to preserve large enough tracts of land to support a viable population within San Joaquin County. This is the case because San Joaquin kit foxes require very large areas in which to forage and the habitat remaining within San Joaquin County cannot support a population that is viable without interacting with individuals outside the County.

However, the protected areas are anticipated to act as refuges in which the kit fox can breed and forage and through which they can travel, linking populations to the north and south of the Delta. Ideally, linkages between preserves for the kit fox would consist of rangelands. For the rather mobile giant garter snake (which is reported to move up to one mile in a day), linkages between preserves would be waterways. Interconnectedness is also important for the Valley elderberry longhorn beetle. It would be of least concern for flying animals, such as birds or bats, but still is a consideration when roosting or nesting habitat is separated from foraging habitat.

Edge Effects

In general, it is easier to protect and manage lands with minimum edge for the amount of habitat protected. Compared to a long, narrow parcel, the same acreage of protected lands in a round or square-shaped parcel is less expensive to fence; less subject to outside influences, such as domestic animals; and likely would have fewer adjacent land uses to deal with. Even in riparian habitat, where the nature of the habitat is linear and many species forage at the edge, the preference is for as deep a riparian strip as possible.

Biological Resource Protection and Human Recreation

The species targeted for protection in the strategy are sensitive to human activity of various kinds and in varying degrees. Recreation consists of many activities, and the effects on target species will depend on the kind of recreation and its intensity and timing. Some general statement about kinds of recreation and resulting ecological effects are described below. However, each site under consideration for protection should be dealt with based on the species it may protect and what types of human recreation are feasible on the site.

In general, minimum vehicular activity should be allowed in protected areas. Vehicles, including bicycles, increase the likelihood of road kills (a particular problem with reptiles and amphibians), sedimentation (a problem for fish and amphibians), erosion (affects many plants), and changes in hydrologic conditions (could affect vernal pool-associated species, as well as fish and any wetland or riparian-associated species). Of particular concern would be off-highway recreational vehicular activity, which should be prohibited on any ecological preserve.

Hiking, nature study, and photography present lesser impacts than vehicular activity, but also can create conflicts with target species. Unlimited access encourages vandalism; accidental fires; and killing, harming, or harassment of target species. While it would be preferable to do without these uses, limited access taking into account the season and quantity of use might be acceptable.

Dogs should not be allowed in protected areas. If it is not feasible to exclude them, then strong leash laws should be posted and enforced. Camping should not be allowed on protected lands. Boating and fishing are both popular activities in the County. Boat wakes have been suggested as a contributing factor in the erosion of channel islands in the Delta. Noise could be a problem for some nesting birds, if water traffic and recreational activity are exceptionally heavy. Steps should be taken to reduce the potential negative impacts of boating and fishing on target species. Signage and posts could be used to reduce the speed of boats through channels near protected lands. A preliminary management plan should be prepared prior to the acquisition or other protection of lands as part of the implementation of the strategy.

Hunting may appear to be an incompatible use because of its potential for inadvertent kills of target species. However, nature reserves have been established outside San Joaquin County where limited hunting has been found to be compatible with the target species for protection. For example, duck hunting could be allowed in certain wetland or flooded fields prior to the arrival or after the departure of sandhill cranes and Aleutian Canada geese. Any hunters using a protected site must be well informed about resources being protected, their appearance, and the prohibition against harming or harassing the species. Again, the nature and extent of hunting use should be determined prior to accepting the area as compensation for impacts to the target species.

When areas are considered for protection, current and future levels of human activity should be considered. Protected lands are not synonymous with recreation lands, and in some cases recreational use could or would be adverse to the continued survival of the species targeted for protection. If any recreational use is anticipated, a management plan should be developed for the site prior to the expenditure of funds so that issues and potential conflicts can be dealt with in advance.

One advantage of allowing recreational use of protected lands is the opportunity to provide educational opportunities for people who visit them. This can increase the public awareness of the biological resources of the area and promote support for open space and protection of the plants and animals native to the area. Fisherman and hunters have long been advocates of wetland and water quality protection. Other recreationists who use protected lands could be expected to join in supporting them as well.

Integrity of Habitat

The larger and more undisturbed a natural habitat, the more likely it is to persist over time. Human activity near natural land may adversely impact the species there, with the degree of impact depending on the kind and intensity of the activity on adjacent lands. In general, the less human activity on or near a preserve, the better, although consideration should be given to the type of activity and the species being protected. The ecological requirements of the species targeted for protection will determine what kind of human activities are adverse, neutral, or beneficial. For example, farming, especially alfalfa and some row crops, is beneficial for the Swainson's hawks, whereas any cultivation or irrigation is adverse for species dependent on vernal pool habitat. Winter flooding can be beneficial for wintering migratory waterfowl and sandhill cranes, but neutral or adverse for giant garter snakes. Conversely, summer water is a necessary habitat feature for the giant garter snake but is neutral for wintering birds (since the wintering birds are not present during the summer).

In general, unsupervised human recreational or vehicular activity tends to result in increased vandalism, fire, trash, and other undesirable effects, whereas access for specific or limited purposes has much more predictable effects. A farming road often has extremely light use, often by individuals knowledgeable about and sensitive to local ecological resources, while a public road tends to have a higher level of potential impacts by a

cross-section of the population not necessarily aware of or sensitive to the resources.

Adjacent Land Uses and Buffers

In much of the area, the human-dominated landscape presents a matrix in which relatively small patches of natural habitat remain. However, for the purposes of designing protected areas, the kind and intensity of human activity can have a considerable effect on the viability of a protected area, and on the time and cost involved with managing it. Farming in the Delta, for example, is a low-intensity human activity with relatively benign impacts to nearby natural habitat. Farming also has a beneficial "good neighbor" effect: farmers tend to discourage trespass. By contrast, a preserve situated near urban lands or near areas with much recreational activity will be subject to more trespass, vandalism, and other activities that adversely impact preservation values. This is likely to be a particular problem in siting preserves in riparian lands.

Buffers can protect habitat from the impacts of adjacent land use. If buffers are needed to ensure the viability of a protected area, the buffer should be included as part of the protected land, with appropriate agreements and land management plans in place.

Inventory, Monitoring, and Management of Protected Areas is Essential to Ensure Long-term Survival of Target Species

Prior to the commitment of funds for the protection of specific parcels of land, the land should be inventoried to ascertain the presence and, at least qualitatively, the viability of populations of target species. Sufficient information is not available to do a formal Population Viability Analysis for any of the species covered by the strategy. However, the long-term viability of target populations is important for success of the strategy. Expert opinion should be sought prior to protection of a particular parcel to provide information as to whether a population of a target species is likely to persist on a site. Such input is critical to making optimum decisions on land use protection.

Once land is protected, populations must be monitored regularly and consistently to evaluate the condition of the habitats that have been protected and to determine whether there are any trends in populations or habitats that require intervention by active management. Input from professional biologists is needed to carry out such monitoring, and documentation is essential to provide continuity.

All protected lands require at least some minimal management, such as fencing, signing, patrolling, and the like. If lands are protected under conservation easements, the land owners may be performing these activities already as part of their routine ranching or farming activities. Other lands may benefit from active ecological management to maintain a mosaic of habitats, to manage the hydrologic regime, or to reduce competition

from non-native species, to name a few possibilities. Management techniques may include seasonal grazing, mowing, prescribed burning, trapping of pests, or chemical applications to control noxious species.

In addition, certain restoration activities may be undertaken within protected areas, such as the creation of berms and ditches or the recreation of microtopographic relief in the case of vernal pools. Restoration may also involve planting desired vegetation or relocating small populations to recolonize an area. The ecological justification for any active management should be carefully considered, including possible adverse effects on other target species and the ecosystem as a whole. Any active management must be thoroughly documented and the resulting changes monitored.