Jones & Stokes

Memorandum

Date: October 10, 2006

To: Ken Schreiber, Santa Clara Valley HCP/NCCP Program Manager

cc:

From: David Zippin

Subject: **Application of Conservation Biology Principles to the Santa Clara Valley HCP/NCCP**

Introduction

A fundamental component of the conservation strategy for the Santa Clara Valley HCP/NCCP (Plan) is a system of protected lands composed of existing protected areas plus land purchased through fee title or conservation easements. This land will then be managed for the benefit of the covered species and natural communities in the Plan, as well as for overall biodiversity, ecosystem functions, and any other complimentary goals identified in the planning process such as recreation, grazing, or agriculture. In order to maximize the benefits to these resources and uses with limited funds, the protected areas must be selected carefully.

The final reserve design and assembly during implementation will be based on a variety of biological, economic, and other factors operating at several spatial scales that will dictate which lands are purchased in fee title or through conservation easements. Below is a partial list of these factors to provide context for this memorandum.

- The availability of willing sellers;
- The ability of the site to help achieve the biological goals and objectives for covered natural communities and covered species;
- Whether the site supports covered species or can support these species;
- Whether the site supports target natural communities;
- Principles of conservation biology that apply to reserve design;
- Land or easement cost and value;
- Whether compatible uses such as recreation, grazing, or agriculture occur on the site. Other uses such as wind farms may be compatible with the preserve system.

This memorandum summarizes how the scientific principles of conservation biology will be applied to the Plan to help guide the creation of a high-quality system of protected areas. We will discuss the other factors applied to reserve design and assembly in more detail later in the planning process.

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Background

One of the primary benefits of a regional HCP or an NCCP (by definition, NCCPs are regional) over a project-by-project approach is the ability to assemble multiple parcels of protected lands into a *reserve system*. In the draft HCP/NCCP glossary, we define *reserves* as "discrete areas of conserved natural communities managed as single units under the Plan"[1]. The reserve system is defined as "all Plan reserves considered collectively".

If designed properly, this reserve system can function in a manner greater than the sum of its parts. Proper design of a reserve system depends on consistent application of the scientific principles of conservation biology. To be successful, a reserve system must be designed in consideration of multiple ecologically relevant spatial scales. Small- and medium-scale considerations will be driven by the needs of covered species and natural communities. For example, at a small scale, a reserve system must contain the microhabitats necessary for target species (e.g., covered species) to survive. At a medium scale, habitat patches must be large enough to support populations or important portions of populations of covered species and the seasonal movement of species (e.g., aquatic habitat for winter breeding of amphibians and upland habitat for their aestivation [summer hibernation]). At a larger scale, reserves must be linked to allow movement of wide-ranging species for genetic exchange and for recolonization following local extirpation. At the largest scale (landscape or regional), reserves must be able to support ecological functions (e.g., watershed functions, natural disturbance regimes) and conserve regional biodiversity within a matrix of urban development, agricultural land, and other land use features. Larger-scale issues will be guided by the conservation principles for reserve design, landscape-level ecological functions, biological goals for natural communities, and biological goals for wide-ranging covered species. Proposed biological goals for natural communities and covered species will be presented in a separate memo.

Principles of Conservation Biology

Conservation biology is a relatively new scientific discipline that combines the fields of ecology, biogeography, population genetics, population biology, economics, anthropology, to provide theoretical and practical solutions to the preservation and maintenance of biological diversity around the world (Groom et al. 2006). Some have described the field as the "science of scarcity and diversity" (Soule 1986). Within conservation biology, an active area of study is the development of principles and guidelines for the design and assembly of protected areas or systems of protected areas. This is sometimes referred to as "systematic conservation planning" (Margules and Pressey 2000).

[1] The term "reserve" is used instead of "preserve" to 1) distinguish the HCP/NCCP protected areas from existing protected areas such as the Santa Clara County Open Space Authority Preserves, and 2) to denote a high level of protection and management of biological resources (e.g., California State Park Reserves provide the highest level of resource protection for that system).

We propose the following draft principles of conservation biology be used to guide the design and assembly of the reserve system for the Plan. These principles are taken from major texts and papers on conservation biology (Soule and Wilcox 1980; Soule 1986; Primack 1993; Noss et al. 1997; Margules and Pressey 2000; Groom et al. 2006). They also incorporate important regulatory requirements that will affect the reserve design of this HCP/NCCP.

The principles of conservation biology on which the reserve system will be based will include but not be limited to the following design and assembly principles.

- **Maximize Size Efficiently.** The reserve system should be as large as possible within funding and management limits. It must be large enough to mitigate impacts of covered activities and contribute to the recovery of covered species in the Plan area. A large reserve system is important to ensure viable populations or portion of populations of covered species, to maximize protection of species sensitive to disturbances from adjacent land use, and to maximize the protection of biodiversity. Large reserves tend to support more species for longer periods of time than small reserves. Large reserves are also generally easier to manage on a per-acre basis because, for example, a large reserve reduces conflicts that may arise when managing for covered species with very different habitat requirements. Large reserves also better allow for large-scale management treatments such as prescribed burning and livestock grazing and the maintenance of natural disturbance regimes such as flooding. The only way to maximize size within funding and other constraints is to protect areas efficiently.

- **Preserve Irreplaceable and Threatened Resources.** Irreplaceability is a measure of the degree to which conservation goals can be met by preservation of multiple sites. A site with high irreplaceability has unique species or natural communities that cannot be preserved or restored elsewhere. Threatened resources are those most under threat from natural or human-caused factors. The reserve system should first protect biological diversity and natural communities that have a high level of irreplaceability and a high degree of threat.

- **Preserve the Highest-Quality Communities.** The reserve system should preserve the highest-quality natural communities and habitat for covered species in the study area. *Highest quality* is defined using various parameters and differs according to community type, but highest-quality habitats are frequently characterized by a high abundance and diversity of native species, intact natural processes, and few roads or other evidence of human disturbances. Degraded communities may need to be preserved as well to capture unique habitats or populations of covered species, to link preserve areas together, or to provide opportunities for habitat restoration required by this Plan.

- **Preserve Connectivity.** The reserve system should link existing protected areas and proposed reserves inside and outside the study area to maximize habitat connectivity. This will maintain and enhance the ability of organisms to move between reserves; facilitate exchange of genetic material, species migration, dispersal, and colonization; and increase the integrity of the network of reserves (e.g., reducing the extent of reserve edge that is in contact with adjacent land uses). Linking reserves may require acquisition of disturbed habitats that can be restored to facilitate better habitat and wildlife movement value. A single large reserve is generally better than several small, linked reserves of equal area in the context of maintaining viable populations of species. In some cases, however, small or isolated reserves are necessary to protect certain features or populations with high biological importance (e.g., covered plant species populations, unique or especially diverse land-cover types such as serpentine grassland or scrub). Preserving connectivity will also tend to minimize habitat fragmentation.

- **Minimize Edge.** The reserve system should share a minimum amount of edge (i.e., should have the greatest possible area-to-perimeter ratio) with non-preserve land, especially urban development, to minimize the indirect effects of adjacent land uses on the preserve resources and to minimize management costs. For example, preserves should tend towards round or square configurations rather than long and narrow ones. In some cases, however, preserves with low area-to-perimeter ratios may be appropriate to protect linear features with high biological value, such as streams, riparian woodland, valley bottoms, or ridgelines essential to wildlife movement.

- **Fully Represent Environmental Gradients.** The reserve system should include a range of contiguous environmental gradients (e.g., topography, elevation, soil types, geologic substrates, slopes, and aspects) to allow for shifting species distributions in response to catastrophic events (e.g., fire, prolonged drought) or anthropogenic change such as global warming.

- **Consider Watersheds.** The reserve system should include, when possible, entire watersheds, subwatersheds, and headwater streams that are not already in protected status; this approach can help to maintain ecosystem function and aquatic habitat diversity.

- **Consider Full Ecological Diversity within Communities.** The reserve system should include the full ecological diversity within natural communities in the study area (e.g., species composition, dominant species, physical and climatic factors) in order to maintain sufficient habitat diversity and species and population interactions. This principle is also called “representativeness” and “comprehensiveness”.

- **Buffer Urban Impacts.** When adjacent to existing urban areas, the reserve system should include buffer land within its boundaries. New development that occurs adjacent to the reserve system must include an adequate buffer on the development side of the line. In both cases, the purpose of this buffer land is to reduce indirect effects on covered species and natural communities from urban development and to provide a zone for fuel load management to reduce the risk of wildland fire spreading to adjacent development. The size of the buffer will depend on site-specific conditions such as topography, the intensity of adjacent urban development, the natural community being separated from the development, the condition of the buffer lands, and whether covered species are or will be present near these lands.

- **Consider Management Needs.** Reserves should be manageable. That is, desired management treatments such as livestock grazing, prescribed burning, or exotic species control must be feasible on the reserve units and within the reserve system. In general, larger reserves are easier to manage on a per-acre basis, but other factors such as adjacent land uses and parcel configuration must also be considered. Management needs may be driven by factors on or off site (e.g., adjacent land uses, watershed processes such as upstream erosion or ongoing contamination).

We welcome comments from the Management Team, Wildlife Agencies, Stakeholder Group, and others on these draft landscape-scale reserve design and assembly principles.

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