A total of 8,483 acres of clay soils was digitized. Approximately 2,652 acres (31%) of the total acreage of mapped clay soils would be conserved under the MSHCP, including 12% within the MSHCP Conservation Area and 19% on existing Public/Quasi-Public Lands. Of the conserved clays soils, 12% are comprised of the Altamont series, 18% of the Auld series, 23% of the Bosanko series, 37% of the Porterville series and 10% of clay pit.

A total of 28,794 acres of the Traver-Domino-Willows association was digitized. Approximately 10,540 acres (36%) of mapped soils of this association would be conserved under the MSHCP, including 17% of the Domino series, 32% of the Traver series, and 74% of the Willows series. Of the conserved soils in the Traver-Domino-Willows association, 19% are comprised of the Domino series, 31% of the Traver series, and 50% of the Willows series.

3.5 MSHCP Conservation Area Patch Size, Shape and Edge Effects

Size, shape, and spatial character are crucial factors integral to the long-term health and function of a biological reserve. A fundamental concept of conservation biology derived from island biogeography theory (MacArthur and Wilson 1967) is that patch or reserve size is important because larger reserves generally encompass a greater contiguous portion of the landscape and include a larger variety of Habitats and ecological niches than smaller reserves. Large reserves also provide greater protection for species against catastrophic events (*e.g.,* fires, flooding, and other human induced environmental changes) by including areas less likely to be affected by these events. The unaffected areas also may provide temporary refuge for species that can later colonize the affected area (*e.g.,* gnatcatchers eventually colonize burned coastal sage scrub as long at it does not type-convert to annual grassland).

While in theory large reserves usually are considered superior to smaller "satellite" reserves, several smaller reserves cumulatively may contain higher biological diversity by efficiently preserving nodes of Vegetation Communities or plant and wildlife species with limited distributions (*e.g.,* narrow endemics). Also, several smaller reserves may provide a hedge against catastrophic events that can devastate a single, large reserve. In conservation biology theory, this is known as the "single large or several small" reserves (SLOSS) tradeoff. In practice, reserves often must include both small and large reserve areas in order to preserve the greatest number and diversity of Vegetation Communities, Habitats and species.

With regard to reserve shape, large areas approaching a circular shape provide the maximum area-to-perimeter ratio. In terms of reserve function, this translates to the amount of the urban/Habitat edge relative to the amount of "interior" Habitat (*i.e.,* Habitat relatively unaffected by edge and presumably higher Habitat value). The extent that Habitats blocks are fragmented by urban and agricultural land uses is directly related to the ratio of Habitat edge to Habitat interior (the perimeter to area ratio). In general, urban Edge Effects on Habitat and wildlife are negative and may be classified as having four broad effects: (1) increased predation by mesopredators (*e.g.,* striped skunks, opossum, raccoon and domestic cats); (2) direct and indirect competition from exotic plant and animal species; (3) increased fire frequency; and (4) local or small-scale environmental changes in temperature, light, and wind (Primack 1993). Other Edge Effects may include human intrusion and disturbances (off-road vehicles, various other recreational activities, dumping, shooting), and urban runoff including pesticides and other toxic materials.

The interface between urban/agricultural development and natural Habitats represents an area of complex interactions among at least three suites of plant and wildlife species: (1) "Core Area" species that are sensitive to edge factors; (2) species that occur primarily within Core Areas, but that are not highly sensitive to Edge Effects; and (3) edge species that preferentially inhabit edge boundaries. Along urban and agricultural boundaries, edge species typically are aggressive, Habitat altering and persistent colonizers of other Habitats. Many of these species are non-natives that displace or may directly prey on native species (*e.g.,* domestic cats). Edge species are known to be detrimental to native species diversity, although specific effects depend on the local suite of species (*e.g.,* Andren and Angelstam 1988; Brittingham and Temple 1983; Gates and Gysel 1978; Alberts *et al.* 1993; Sauvajot and Buechner 1993; Scott 1993; Wilcove 1985).

Disturbance estimates of urban/agricultural Edge Effects range from between 15 meters to 5 kilometers (Laurance 1991). Because of the complexity involved in estimating the Edge Effects over a regional landscape with a wide variety of different urban and agricultural development, as well as broad variation in Habitats and associated ecological systems, no specific distances for Edge Effects have been tested and established for the Habitats and land uses in the Plan Area. An example of a practical application of presumed Edge Effects, and based on review of the literature pertinent to the southern California region, the City of San Diego Multiple Species Conservation Program (MSCP) GIS model used three zones of decreasing Edge Effects: 150, 300, and 600 feet. Although these distances are somewhat arbitrary they provide a conceptual method of identifying areas that may incur Edge Effects. This method can also provide a means to compare existing conditions within the overall Plan Area with the proposed MSHCP Conservation Area.

A. MSHCP Conservation Area Description

The following sections describe analyses of patch size, shape and edge for the proposed MSHCP Conservation Area.

3.5.1 Methods for Measuring Habitat Patch Size

The proposed MSHCP Conservation Area would be an approximately 500,000-acre network of land that includes approximately 347,000 acres of existing Public/Quasi-Public Lands and approximately153,000 acres of Additional Reserve Lands. Portions of Rural/Mountainous areas also may contribute the MSHCP Conservation Area, but they are not within actual Conservation Area boundaries and thus are not be formally analyzed here.

MSHCP Conservation Area patch number, size and distribution were analyzed by combining available GIS data, including the vegetation map, existing biological open space within the existing Public/Quasi-Public Lands coverage and a Conceptual Reserve Design that was used for the conservation analysis. (It should be noted that the Conceptual Reserve Design is a conceptual portrayal of the assembled Criteria-based reserve that was necessary to conduct GIS analyses. For this analysis the conceptual MSHCP Conservation Area is approximately 480,000 acres, or about 4% smaller than the proposed 500,000 acre MSHCP Conservation Area. This difference is due to the fact that agricultural and disturbed or developed areas were not considered patches of Habitat for the purposes of this analysis.) The existing Public/Quasi-Public Lands data base was compiled from a variety of sources and includes parcel-level mapping for open space within urban areas and more generalized mapping in the National Forests and generally undeveloped rural areas. Within urban areas, open space boundaries were sufficiently detailed to depict small-scale Development, including local roads, Agriculture and urban development.

One change was made to the MSHCP Conservation Area for the purpose of this analysis. Major roadways (primarily four- and six-lane roadways) were intersected with the MSHCP Conservation Area to depict potentially constrained Habitat connections between open spaces. Major roadways included all Interstate and State highways, except for State Highways 74, 79, 243, and 371 in the National Forests since they are primarily two-lane roads in these areas. It was assumed for this analysis that the typical two-lane paved road or single lane dirt road is not an obstacle to wildlife use and movement. Clearly this assumption is not true for all wildlife species. Ideally, patch size analyses would have to be tailored to the species being considered.