

IV. IMPACT ON SPECIES SURVIVAL

The long term result of the HCP will be the conservation and enhancement of the species of concern. The HCP provides for some development of private lands with consequent loss of habitat. The plan also provides for a planning process to minimize the effects of such development and use on the species and for a program of habitat enhancement on 2800 acres of land which will be retained in open space. The finding of no significant impact is based on a three level assessment of the HCP.

The success of the Plan rests on three key questions (shown in boldface below):

If essentially all of the habitat within the development parcels is lost, what is the incremental impact on the probability of species extinction?

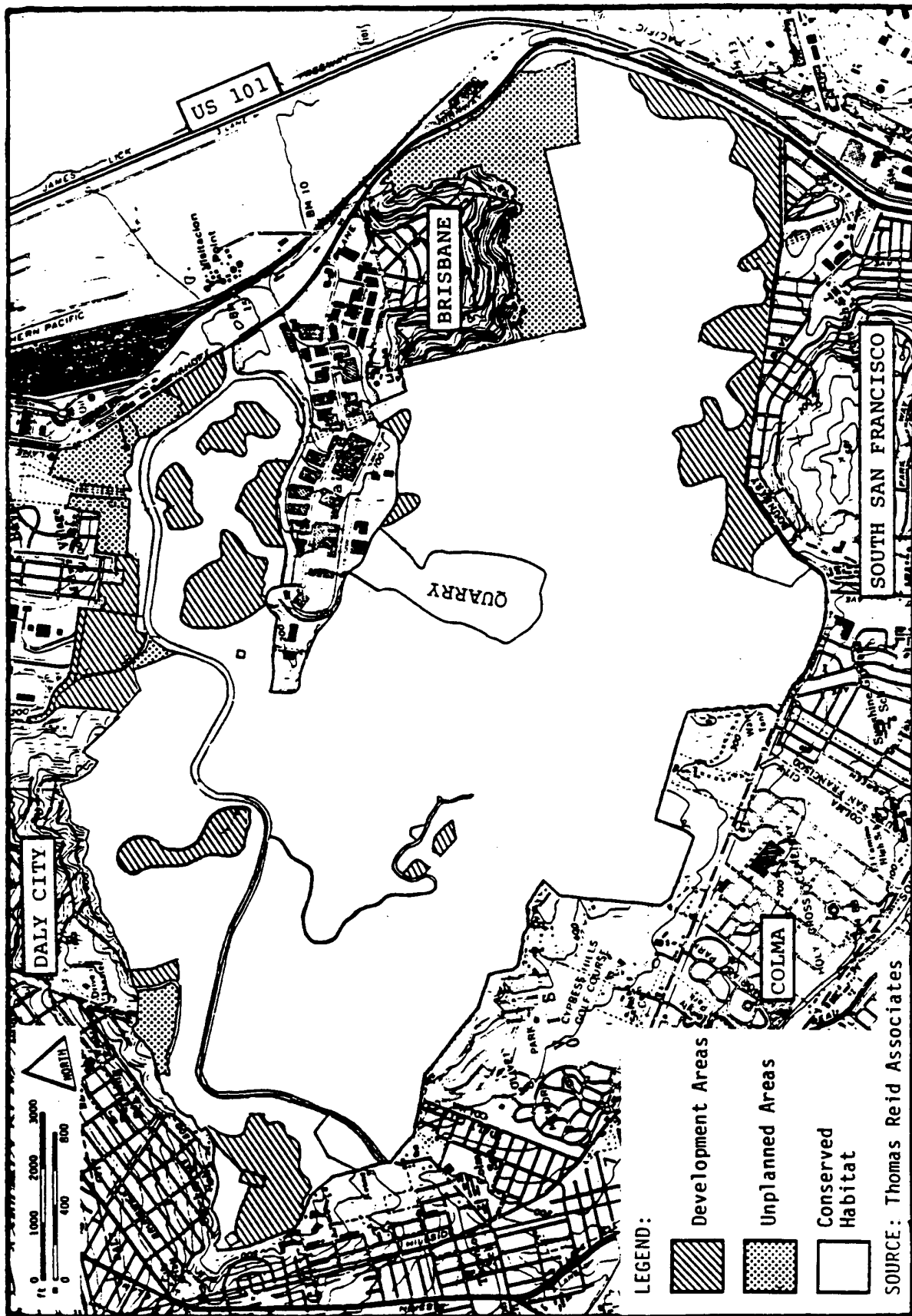
Private lands subject to possible development comprise approximately one third of Mission Blue and one quarter of Callippe habitat on SBM (See Figures III - 1, III -2, and IV - 1). If development were to destroy the habitat in these private holdings, the entire colony of Mission Blue on Reservoir Hill would be destroyed and there would be a serious loss to the Guadalupe Hills colony of both Mission Blue and Callippe. Nonetheless, the major colony of Mission Blue and Callippe is on the southeast ridge which is in public ownership and would be protected. Such a major loss would increase the likelihood that one or both of the rare species would go extinct more rapidly than without such development. However, according to the apparent size and robustness of the southeast ridge colony, it is unlikely that the loss would precipitate a significant acceleration in their extinction -- the impact is an incremental risk rather than an abrupt loss.

This conclusion bears on the HCP in two important regards. First, the increased risk is nevertheless sufficiently large that a strenuous program of mitigation and enhancement in the HCP is warranted. Second, the probable ability of the species to survive for an indeterminate length of time means that the impact of the development will not be disastrous even if the enhancement provisions of the HCP fail or do not succeed for many years.

What opportunities for habitat conservation exist within the privately held parcels?

Because of engineering (topographic) constraints and design criteria, the larger parcels to be devoted to urban uses can include large areas of open space which can be preserved with little disturbance from roads or grading. Much of the grassland community ecology can also be conserved within small areas providing that the areas represent a cross section of the community constituents and that the areas are contiguous with the larger areas of open space on the Mountain. The specific ecological and behavioral requirements of the species of concern are used to formulate design guides for internal open space areas. The scope of the areas and their preservation undisturbed throughout construction provide habitat within these parcels that substantially reduces the probable impact on the SBM populations as a whole.

FIGURE IV - 1
 AREAS TO BE REMOVED FROM HABITAT



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Can the open space remaining after development be used to expand the habitat of the species by reclamation and enhancement?

In many regards we are fortunate to be dealing with a community (grassland) and with species which tolerate disturbance or even require some disturbance in the long term to sustain the habitat. While direct loss of grassland to development is irreversible destruction of habitat, there is good reason to believe that areas graded during construction but not used for buildings or landscaping can be returned to habitat. Similarly, areas which are not now good habitat due to prior disturbance such as grading or exotic species invasion can be converted to good habitat.

II. PLAN IMPACT

The assessment of plan impact on the species is based first on the gross amount of habitat protected from disturbance. Then we consider the possibility of augmenting habitat through enhancement. The first assessment is based on the expected increase in extinction probability (for detailed treatment, see Biological Study).

San Bruno Mountain may be considered an "island" surrounded by urbanization, or alternatively a biological "refuge". The theory of island biogeography is a useful tool for understanding the ecological role of San Bruno Mountain, its importance to endangered species, and for estimating the likelihood of future extinction, with and without development and/or habitat management.

The number of species found on islands is proportional to their size and distance from the mainland. Large islands support more species than small islands and extinction is slower. By extension, large refuges support more species than small refuges. The species/area relationship for islands gives us a formula to test for loss of species (probability of extinction) with degrees of habitat loss. Islands (or refuges) are colonized or recolonized from outside (e.g. mainland) source areas -- the smaller and more distant the island the slower its colonization rate. Even with a constant number of species present, the actual species present changes with time on islands and in refuges.

As a refuge, San Bruno Mountain has high species diversity and supports a relatively large number of endemic species or subspecies of plants and animals. Its refuge qualities are probably related to a combination of climate, topography, and past history including lack of urban development.

Table IV-1 shows the proportion of each major colony of Mission Blue and Callippe within proposed development areas and the proportion of the entire San Bruno Mountain populations of each species in each such area. A conservative, pessimistic impact measure assumes that all the population within each parcel in private ownership could be lost due to development, with no habitat value attributed to project open space. A more optimistic measure counts only the areas of structure, road and landscaping (permanent) and grading (temporary) disturbance. Applying the Species/Area formula to the conservative measure predicts that in the areas of densest population concentration -- the Northeast Ridge development in the Guadalupe Hills colony -the development reductions in habitat area (without the mitigation measures specified in the Plan) will result in a 3 to 6% increase in the present-day

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TABLE IV - 1
DEVELOPMENT IMPACT ON POPULATION - MISSION BLUE AND CALLIPPE

AREA Parcel	MISSION BLUE % OF POPULATION		CALLIPPE % OF POPULATION	
	Entire	disturbed	entire parcel	disturbed area
GUADALUPE HILLS				
RIO VERDE ESTATES	.42	.24	0.1	0.1
CARTER-MARTIN ROAD EXT.	.27	.27	0.2	0.2
RIO VERDE HEIGHTS	3.93	1.86	0.25	0.05
PARCEL X			0.15	0.15
PARCEL Y			0.33	0.33
PARCEL Z	.03			
NORTHEAST RIDGE PROJECT	16.05	5.55	11.85	1.58
GUADALUPE VALLEY WEST	3.48		1.25	
STATE PARK	4.17		10.35	
GUADALUPE CANYON PARKWAY	.12		.3B	
GAS & TRANSMISSION LINES				
P G & E FEE	.12		.05	
S.F. WATER PIPELINES			.06*	
PARCEL W	1.8		.1	
G. V. W. WATER TANK	.09			
PARCEL V	.24			
TOTAL	30.0	7.92	25.00	5.41
SOUTHEAST RIDGE				
QUARRY	.9		.38	
OWL & BUCKEYE CANYON	3.78	1.14	6.53	.9
BRISBANE ACRES	1.80		10.2	
SOUTH SLOPE PROJECT	9.0	2.22	2.1	.15
COUNTY PARK	43.8		55.65	
HILLSIDE SCHOOL				
GAS & TRANSMISSION LINES		.37**		1.30**
JUNCOS RAVINE	1.14		.15	
S.F. WATER PIPELINES	.04*		.15*	
FIRE BREAKS	.4*		.03*	
TOTAL	60.00	3.73	75.0	2.65
RADIO RIDGE				
ANTENNA SITES	.12			
COUNTY PARK	1.88			
GUADALUPE CANYON PARKWAY				
GAS & TRANSMISSION LINES				
TOTAL	5.0			
SADDLE				
RESERVOIR HILL PROJECT	1.94	1.91		
BRISBANE SCHOOL SITE				
"47 UNITS"				
STATE PARK	.06			
GUADALUPE CANYON PARKWAY				
WATER TANK, RESERVOIR HILL				
TOTAL	2.00	1.94		
TWIN PEAKS	3.00			
GRAND TOTAL	100.00	13.59	100.00	8.06

---No Specific Development Plans Pending * Easement not added into totals

**Virtually all of this impact would not take place before 1988.

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extinction probability of the entire SBM Mission Blue population and a 2.5 to 5% increase in the likelihood of Callippe extinction. All anticipated development on the Mountain, without the conservation provisions of the HCP, would probably result in a 8 to 14% increase in the chance that the Mission Blue will go extinct on San Bruno Mountain, and a 4 to 8% increase that Callippe will become extinct. A cautious approach to endangered species dictates that any increase in extinction probability requires mitigative action, such as those provided in this Habitat Conservation Plan.

If either species were to go extinct on the Mountain, the probability of recolonization from outside is small. The nearest potential source area for Callippe, in the Oakland Hills, is considered a different subspecies; for Mission Blue, the Twin Peaks colony is itself more extinction prone than are the large colonies on the Mountain. If the butterflies continue to exist on SBM, one or both subspecies may evolve into true species, genetically distinct from their neighboring *S. callippe* and *P. icarioides* populations.

Accordingly, the objective of the Plan is to conserve the species of concern with or without urban development on SBM. This plan is necessary for that purpose because of the other pressures on the habitat (e.g. vegetative succession). The provisions of the Plan relating to development areas are intended to provide mitigation for the loss of habitat for the species of concern and to counteract the impact of development.

When dealing with biological systems, particularly in the natural (as opposed to the laboratory) environment, it is virtually impossible to guarantee that the actions one proposes will have their intended effect, and only that effect. The plan can provide, however, explicit means to measure its own ongoing success or failure; these measures may in turn suggest modifications of the plan which will boost its success.

The term "recovery benchmarks", in accordance with the Recovery Plans for endangered species under Section 4 (g) of the Endangered Species Act, has been suggested as the measure of the success of the HCP in promoting the conservation of endangered species. "Recovery benchmark" is not a meaningful term if it is meant to imply that once the population of Mission Blue, for example, on SBM, reaches 20,000 adult animals (or any other figure), it is no longer endangered. Recovery of biological species is not a static phenomenon, but an ongoing process. Meaningful measures of plan success, or species recovery which can be achieved through the monitoring procedures proposed in this Plan include:

Evidence that the populations of species of concern are stable in size on the mountain as a whole, and not fluctuating wildly in number from year to year. In measuring stability, the population levels measured in the 1980 though 1981 years of the Biological Study can be used as a baseline. Even though these may not by any means represent the maximum levels that Mission Blue and Callippe have achieved on SBM, and as discussed in the Biological Report, have probably been adversely affected by past disturbance and fragmentation of habitat on the Mountain, the 1980-81 levels (9000 to 17000 adult animals) are robust enough to serve as a good baseline for a survival level against which to measure future changes. If the populations, under the HCP are stable from year to year, or slowly increasing, this is a good measure that the plan is working.

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If, on the other hand, they are steadily declining, or characterized by outbreaks followed by crashes, this indicates that near-term extinction is likely.

- The total area of habitat utilized by species of concern on the Mountain;
- Evidence that species of concern are utilizing new habitat areas, or newly created subdivisions of former habitat areas, including areas revegetated after development, open space areas of development parcels and areas treated to enhance habitat. An appropriate measure of utilization would be that the density of animals (and host plants) in these areas were comparable to the densities observed in the colonies as they existed in 1980-81.

In evaluating the impact of the Habitat Conservation Plan it is important to recognize that species of concern could suffer major declines, due to natural processes, in spite of protection efforts, and that such declines would have occurred even in the total absence of new development. A severe drought, for example, lasting three years or more, could severely impact host plant germination, or growth, or force early senescence which would make it impossible for the majority of the butterflies to complete their life cycle. This effect would be felt in the richest butterfly colonies (Southeast Ridge) and if the species were extirpated on SBM as a result, it would be extremely unlikely that the absence of development alone would have preserved them.

Since SBM, although large in itself, is now virtually the last refuge of the particular subspecies of Mission Blue and Callippe, local extirpation would destroy that subspecies since there are no longer any "pockets" of these animals up and down the Peninsula to serve as source areas to colonize the Mountain. Nonetheless, P. icarioides missionensis and S. callippe callippe are taxonomic subspecies, members of a larger, but closely related species which appear physically distinctive because the microclimatic regime of SBM gives rise to characteristic expression of their genes for small size and dark wing coloration. It is likely, at this time, that the same genes now expressed by the SBM population still exist in the populations of related subspecies elsewhere (such as the East Bay, Sierra Nevada etc), and if transplanted to San Bruno Mountain, these forms would soon express these genes and closely resemble the subspecies now found there. Transplantation is, as described in 3 C. of this plan, both expensive and extremely risky, it is only mentioned as an alternative in the circumstance where these animals were actually extirpated on the Mountain.

Comparison with No-Protect Alternative

The No Project/No Action Alternative is taken to mean status quo -- no habitat conservation or enhancement, and no additional urban development. Under these conditions, the species of concern on San Bruno Mountain would continue to suffer the effects of the existing threats to their survival: habitat loss due to off-road vehicles, soil erosion, spread of exotic species, wildfire, and natural succession within the grassland and from grassland to brush. Based on the Biological Study, we believe that the continued operation of these threats results in a significant risk that the species would go extinct on SBM within 5 to 20 decades from now.

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2. Enhancement

At this point in plan formulation, the full scope of enhancement programs has not been determined. Much of the range of enhancement undertaken through the HCP depends on appraisals of biological effectiveness, likelihood of damage to other species, and cost effectiveness which will be revised during the early phases of plan implementation.

Reclamation of graded areas cannot be considered true enhancement since it mitigates a habitat loss to development provided by the plan itself. Nonetheless, successful reclamation would offset some of the impact described above. Overall, nearly 100 acres of graded land is available to be returned to habitat.

True enhancement, restoration of former habitat areas and improvement of present habitat, would be centered on the higher, western portion of the Guadalupe Hills (County Park 1-09-01) and on the broad, brushy zone of the Guadalupe Hills at the upper end of the Guadalupe Valley Industrial Park (County Park 1-09-02 and Guadalupe Valley West 1-08-01, 1-08-02). The objective in the former is primarily expansion of existing habitat for Mission Blue and Callippe by grassland successional management and control of off road vehicles. In the latter, the objective is partially improvement of existing habitat, but primarily for the purpose of improving inter-colony movement of the insects to offset the impact of the industrial park and the quarry on the integrity of the SBM population of these animals. In the major enhancement units, it may be possible to provide some 200 acres of habitat with long term value to these insects.