

5.0 Management & Monitoring



5.3.6 Covered Species Inventory and Monitoring

► Baseline Inventory Field Surveys

The most important element of the Covered Species inventory and monitoring effort will be the baseline inventory field surveys for the 146 Covered Species. Although some historic and current information exists on species occurrences within the Plan Area, there has not been a comprehensive field survey of the distribution and status of Covered Species within the MSHCP Conservation Area. Additionally, comprehensive baseline field surveys are needed to demonstrate the conservation of 16 of the 146 Covered Species. These 16 Covered Species will be considered to be Covered Species Adequately Conserved when certain Conservation requirements are met as identified in the species-specific Conservation objectives for those species (species-specific conservation objectives for the 146 Covered Species are presented in *Section 9.0* of this document). Other species survey requirements associated with the MSHCP are documented in *Sections 6.1.2, 6.1.3 and 6.3.2* (a complete summary of MSHCP species survey requirements is provided in *Appendix E* of this document). Results of the baseline inventory field surveys will be used to develop the long-term monitoring strategy.

An important step in the inventory effort is the continued gathering and verifying of relevant existing information on the distribution of Covered Species in the MSHCP Plan Area. A large amount of information has been amassed in the UCR database for the MSHCP (over 12,800 records) and additional information from museum collections, local biologists' field notes, Master's theses, and published and gray literature continues to be found. This information will be gathered and used to verify existing species occurrences. Field reconnaissance will be used to relocate covered plant and animal species occurrences to determine whether the species still exists at the recorded location and the current status of the species (*e.g.*, abundance, breeding, etc.). Since animals are mobile and because records of wildlife are not always indicative of importance of an area (for example, turkey vulture records may represent flyover sightings only), animal species records will be verified on a case-by-case basis.

Baseline inventory field surveys will also be conducted to locate new species occurrences. To determine the most appropriate areas to focus the baseline inventory field surveys, predictive modeling will be conducted. Information from the vegetation and wildlife community inventory and mapping effort, the database records for each Covered Species, the CWHR wildlife Habitat

5.0 Management & Monitoring



relationships classification, multi-spectral imagery (*i.e.*, Landsat ETM+), and GIS data layers of abiotic attributes will be examined to determine if there is a correlation. For example, soil type, slope, Vegetation Community, elevation, and distance from open water may be correlated with species occurrences and can be used to predict other potentially occupied areas. Once these potential areas have been identified, field surveys will be conducted to determine whether the species exists at the predicted locations. Documenting presence as well as inferring absence of Covered Species along with measuring attributes of Habitats will be important in developing an understanding of predicted and potential Habitats for designing the long-term Monitoring Program.

Inventory field surveys for Covered Species will be conducted on available Public/Quasi-Public Lands every year during the initial inventory and assessment phase. The protocols for the baseline inventory field surveys will follow guidelines established by the Wildlife Agencies and will be circulated to the Reserve Management Oversight Committee (RMOC; see *Section 6.6.4* of this document) for review prior to each year's survey efforts.

► **Development of Long-Term Covered Species Monitoring Strategies**

As there are 146 Covered Species with many different life history strategies to be conserved within the MSHCP Conservation Area, it is not feasible (economically or logistically) to develop intensive monitoring strategies for all. It is important however, to ensure that monitoring efforts represent the variety of life history strategies that exist within the area. The initial phase of monitoring will include developing protocols that are species specific and robust enough to detect change (or trend) and species status.

Using a variety of quantitative estimators and qualitative variables to express species trend and change is important. Simply using conventional estimators for monitoring species (*i.e.* absolute population estimation with variance) is not always optimal. Multiple survey data methods will be considered if index level data is used. The ultimate monitoring protocols will have a mixture of high and low level monitoring efforts. High monitoring efforts will possess both representative (*i.e.*, commonly found in a particular Habitat type) and rare (or at risk) species.

It is important to link principles of conservation biology, particularly meta-population theory, to the monitoring of species. In so doing, monitoring methodologies will be developed to detect species geographic distribution, population substructure (*i.e.*, demes), and population classification. To determine population classification, establishing population profiles that document numbers and

5.0 Management & Monitoring



sizes of populations of each species is proposed. Sizes of populations should be characterized into size-class categories that monitoring efforts could provide the level of resolution to assign. These population profiles will serve as snapshots to changes in species status through time.

The measurement of the distribution of populations and approximation of population size over time will facilitate the analysis of population trajectory and the modeling of population viability. Population trend and viability are very important analyses for select species, but are problematic in that refined population parameters (*i.e.*, adult survivorship, fecundity) must be estimated in addition to understanding natural species population variation and sampling error. This may require substantial resources expended for each species, so robust estimators such as population size class and careful selection of monitoring protocols will be important. Both population trend and viability provide important feedback to monitoring in that they help forecast and determine significant population changes and help identify populations or sub-populations at risk relative to each other. Species monitoring should be capable of detecting changes to geographic distribution, as well as population size, and identify those populations needing higher resolution data.

➤ **Long-Term Monitoring of Covered Species**

To facilitate the monitoring of all 146 Covered Species, a multi-species, community approach will be used to the extent possible for the long-term monitoring program. Species will be grouped into categories for ease in collecting similar types of data. Initial groupings will consist of species found together in wildlife Habitat communities and species that occur at high elevations. Sampling stations will consist of multiple transects/plots that will enable the collection of data on the different suites of species. For example, a sampling station may contain point counts for sampling bird species, an array for sampling reptile species, and a live-trapping grid for sampling small mammal species. Species that cannot be grouped together or be sampled at a common sampling station because of rarity of occurrence, seasonality, geographic location, or other restriction may require a different monitoring strategy. As discussed previously, specific sampling protocols, monitoring strategies, and placement of sampling stations will be determined during the initial phases of the monitoring program.

The initial groupings of Covered Species are presented below. Further refinement of the groupings will occur once the initial Vegetation Community and wildlife Habitat inventory and mapping, and baseline species inventory surveys, have been conducted. The intent of the groupings is to make the complicated task of monitoring the wide variety of Covered Species as efficient and logistically

5.0 Management & Monitoring



feasible as possible. Realistically, some Covered Species could be placed in one or more of the categories, which is acceptable as long as they are included in the monitoring strategy.

- **Coastal Sage Scrub/Chaparral/Desert Scrub**

Latin Name

Aimophila ruficeps canescens
Amphispiza belli belli
Campylorhynchus brunneicapillus
Canis latrans
Chaetodipus fallax fallax
Cnemidophorus hyperythrus beldingi
Cnemidophorus tigris multiscutatus
Coleonyx variegatus abbottii
Crotalus ruber ruber
Dipodomys simulans
Harpagonella palmeri
Lepus californicus bennettii
Mustela frenata
Neotoma lepida intermedia
Phacelia stellaris
Poliophtila californica californica
Phrynosoma coronatum blainvillei
Puma concolor
Romneya coulteri
Sceloporus orcutti
Sylvilagus bachmani
Sceloperus graciosus vandenburgianus
Xantusia henshawi henshawi

Common Name

So. Cal. rufous-crowned sparrow
Bell's sage sparrow
cactus wren
coyote
northwestern San Diego pocket mouse
Belding's orange-throated whiptail
coastal western whiptail
San Diego banded gecko
northern red-diamond rattlesnake
Dulzura kangaroo rat
Palmer's grapplinghook
San Diego black-tailed jackrabbit
long-tailed weasel
San Diego desert woodrat
Brand's phacelia
coastal California gnatcatcher
San Diego horned lizard
mountain lion
Coulter's matilija poppy
granite spiny lizard
brush rabbit
southern sagebrush lizard
granite night lizard

- **Grassland (and Open Fields)**

Latin Name

Allium marvinii
Ammodramus savannarum
Aquila chrysaetos
Buteo regalis

Common Name

Yucaipa onion
grasshopper sparrow
golden eagle
ferruginous hawk

5.0 Management & Monitoring



Latin Name

Buteo swainsoni
Cathartes aura
Caulanthus simulans
Charadrius montanus
Chorizanthe polygonoides var. longispina
Circus cyaneus
Dipodomys stephensi
Elanus leucurus
Eremophila alpestris actia
Erodium macrophyllum
Falco mexicanus
Lanius ludovicianus
Perognathus longimembris brevinasus
Athene cunicularia hypugaea

Common Name

Swainson's hawk
turkey vulture
Payson's jewelflower
mountain plover
long-spined spine flower
northern harrier
Stephens' kangaroo rat
white-tailed kite
California horned lark
round-leaved filaree
prairie falcon
loggerhead shrike
Los Angeles pocket mouse
burrowing owl

● **Riparian/Aquatic Habitats**

Latin Name

Accipiter cooperii
Accipiter striatus
Catostomus santaanae
Clemmys marmorata pallida
Coccyzus americanus occidentalis
Dendroica petechia brewsteri
Empidonax traillii extimus
Falco columbarius
Gila orcutti
Icteria virens
Juglans californica var. californica
Lynx rufus
Nama stenocarpum
Picoides pubescens
Polygala cornuta var. fishiae
Tachycineta bicolor
Vireo bellii pusillus
Wilsonia pusilla

Common Name

Cooper's hawk
sharp-shinned hawk
Santa Ana sucker
western pond turtle
western yellow-billed cuckoo
yellow warbler
southwestern willow flycatcher
merlin
arroyo chub
yellow-breasted chat
California black walnut
bobcat
mud nama
downy woodpecker
fish's milkwort
tree swallow
least Bell's vireo
Wilson's warbler

5.0 Management & Monitoring



- **Wetland/Marsh/Lake**

Latin Name

Agelaius tricolor
Ardea herodias
Botaurus lentiginosus
Falco peregrinus
Haliaeetus leucocephalus
Nycticorax nycticorax
Pandion haliaetus
Plegadis chihi
Phalacrocorax auritus

Common Name

tricolored blackbird
great blue heron
American bittern
peregrine falcon
bald eagle
black-crowned night heron
osprey
white-faced ibis
double-crested cormorant

- **Vernal Pool and Alkali Playa**

Latin Name

Atriplex coronata var. *notatior*
Atriplex parishii
Atriplex serenana var. *davidsonii*
Brachinecta lynchi
Brodiaea filifolia
Centromadia (=Hemizonia) pungens ssp. *laevis*
Hordeum intercedens
Lasthenia glabrata ssp. *coulteri*
Muhlenbergia californica
Myosurus minimus
Navarretia fossalis
Navarretia prostrate
Orcuttia californica
Scaphiopus hammondii
Streptocephalus woottoni

Common Name

San Jacinto Valley crownscale
Parish's brittle scale
Davidson's salt scale
vernal pool fairy shrimp
thread-leaved brodiaea
smooth tarplant
vernal barley
Coulter's goldfields
California muhly
little mousetail
spreading navarretia
prostrate navarretia
California Orcutt grass
western spadefoot toad
Riverside fairy shrimp

- **Species that Occur Primarily at High Elevation (Generally Forest Service Lands)**

Latin Name

Accipiter gentiles
Arabis johnstonii

Common Name

northern goshawk
Johnston's rock cress

5.0 Management & Monitoring



Latin Name

Astragalus pachypus var. *jaegeri*
Berberis nevinii
Bufo californicus
Calochortus palmeri var. *munzii*
Calochortus plummerae
Calochortus weedii var. *intermedius*
Ceanothus ophiochilus
Charina bottae umbratica
Chorizanthe procumbens
Convolvulus simulans
Cypseloides niger
Deinandra (=Hemizonia) mohavensis
Dudleya multicaulis
Dudleya viscida
Galium angustifolium ssp. *jacinticum*
Galium californicum ssp. *primum*
Glaucomys sabrinus californicus
Heucheria hirsutissima
Holocarpha virgata ssp. *elongate*
Hulsea vestita ssp. *callicarpha*
Lampropeltis zonata parvirubra
Lampropeltis zonata pulchra
Lepechinia cardiophylla
Lilium humboldtii ssp. *ocellatum*
Lilium parryi
Melospiza lincolnii
Mimulus clevelandii
Mimulus diffusus
Monardella macrantha ssp. *hallii*
Oporonis tolmiei
Oreortyx pictus
Oxytheca caryophylloides
Penstemon californicus
Potentilla rimicola
Progne subis
Quercus engelmannii
Rana aurora draytonii

Common Name

Jaeger's milk-vetch
Nevin's barberry
arroyo toad
Munz's Mariposa lily
Plummer's Mariposa lily
intermediate Mariposa lily
Vail Lake ceanothus
southern rubber boa
prostrate spine flower
small-flowered morning-glory
black swift
Mojave tarplant
many-stemmed dudleya
sticky-leaved dudleya
San Jacinto Mountains bedstraw
California bedstraw
San Bernardino flying squirrel
shaggy-haired alumroot
graceful tarplant
beautiful hulsea
San Bernardino mountain kingsnake
San Diego mountain kingsnake
heart-leaved pitcher sage
ocellated Humboldt lily
lemon lily
Lincoln's sparrow
Cleveland's bush monkeyflower
Palomar monkeyflower
Hall's monardella
MacGillivray's warbler
mountain quail
chickweed oxytheca
California beardtongue
cliff cinquefoil
purple martin
Engelmann oak
California red-legged frog

5.0 Management & Monitoring



Latin Name

Rana mucosa
Satureja chandleri
Sibaropsis hammittii
Sphyrapicus thyroideus
Strix occidentalis occidentalis
Taricha tarosa tarosa
Vermivora ruficapilla

Common Name

mountain yellow-legged frog
San Miguel savory
Hammitt's clay-cress
Williamson's sapsucker
California spotted owl
coast range newt
Nashville warbler

- **Species that May Require a Different Sampling Strategy Due to Rarity of Occurrence, Seasonality, Geographic Location, or Other Restriction**

Latin Name

Allium munzii
Ambrosia pumila
Arctostaphylos rainbowensis
Brodiaea orcuttii
Chorizanthe leptotheca
Chorizanthe parryi var. *parryi*
Dipodomys merriami collinus
Dipodomys merriami parvus
Dodecahema leptoceras
Eriastrum densifolium ssp. *sanctorum*
Eryngium aristulatum var. *parishii*
Euphydryas editha quino
Limnanthes gracilis ssp. *parishii*
Linderiella santarosae
Microseris douglasii ssp. *platycarpha*
Raphiomidas terminatus abdominalis
Trichocoronis wrightii var. *wrightii*

Common Name

Munz's onion
San Diego ambrosia
rainbow manzanita
Orcutt's brodiaea
peninsular spine flower
Parry's spine flower
Aguanga kangaroo rat
San Bernardino kangaroo rat
slender-horned spine flower
Santa Ana River woollystar
San Diego button-celery
Quino checkerspot butterfly
Parish's meadowfoam
Santa Rosa Plateau fairy shrimp
small-flowered microseris
Delhi Sands flower-loving fly
Wright's trichocoronis

- **Intensive Monitoring of Covered Species with Additional Information Needs**

In addition to the baseline inventory field surveys and the long-term monitoring strategy for Covered Species, intensive monitoring of select Covered Species with additional information needs will be conducted as per the species objectives. The additional information to be collected ranges from

5.0 Management & Monitoring



determining reproductive success to evaluating use of corridors. *Table 5-8* summarizes the survey needs of each Covered Species based on the species-specific objectives (detailed in *Section B* of the *Reference Document - Volume II of the MSHCP*).

The information collected during the initial inventory and long-term monitoring phases will be used to determine whether Covered Species goals and objectives are being met. Changes to the status and distribution of Covered Species will provide feedback to managers. This will allow managers to evaluate the effectiveness of the MSHCP and to adapt management as appropriate to ensure that the species and vegetation/Habitat objectives are met.

Table 5-8
Summary of Survey Requirements for Covered Species as per the Species Objectives

	LATIN NAME	COMMON NAME	Baseline survey conducted within first 5 years	Survey Distrib. at least every "X" years	Survey Reproduction every "X" years	Survey Abundance every "X" years	Demonstrate Conservation	Min. level occup. of known locations (%)
A	<i>Bufo californicus</i>	arroyo toad	x	8	1 to 5			80
A	<i>Rana aurora draytonii</i>	California red-legged frog	x	8	1**			75
A	<i>Rana mucosa</i>	mountain yellow-legged frog	x	8	1**			75
A	<i>Scaphiopus hammondi</i>	western spadefoot	x	8	8			75
A	<i>Taricha tarosa tarosa</i>	coast range newt	x	8	1**			75
B	<i>Accipiter cooperii</i>	Cooper's hawk	x	8				75
B	<i>Accipiter gentilis</i>	northern goshawk	x	3	3			75
B	<i>Accipiter striatus</i>	sharp-shinned hawk	x	8				75
B	<i>Agelaius tricolor</i>	tricolored blackbird	x	5	5			75
B	<i>Aimophila ruficeps canescens</i>	Southern California rufous-crowned sparrow	x	8				75
B	<i>Ammodramus savannarum</i>	grasshopper sparrow	x	1 to 5	1**		x	75
B	<i>Amphispiza belli belli</i>	Bells' sage sparrow	x	8				75
B	<i>Aquila chrysaetos</i>	golden eagle	x	8	8			75
B	<i>Ardea herodias</i>	great blue heron	x	8				75
B	<i>Athene cunicularia hypugaea</i>	burrowing owl	x	8				75
B	<i>Botaurus lentiginosus</i>	American bittern	x	8				50
B	<i>Buteo regalis</i>	ferruginous hawk	x	8				75
B	<i>Buteo swainsoni</i>	Swainson's hawk	x	8				75
B	<i>Campylorhynchus brunneicapillus</i>	cactus wren	x	8				75

5.0 Management & Monitoring



Table 5-8 (Cont.)

Summary of Survey Requirements for Covered Species as per the Species Objectives

	LATA*	SCIENTIFIC NAME	COMMON NAME	Baseline survey conducted within first 5 years	Survey Distrib. at least every "X" years	Survey Reproduction every "X" years	Survey Abundance every "X" years	Demonstrate Conservation	Min. level occup. of known locations (%)
B		<i>Cathartes aura</i>	turkey vulture	x	8	3			75
B		<i>Charadrius montanus</i>	mountain plover	x	8				75
B		<i>Circus cyaneus</i>	northern harrier	x	5	5			75
B		<i>Coccyzus americanus occidentalis</i>	western yellow-billed cuckoo	x	3	3			75
B		<i>Cypseloides niger</i>	black swift	x	8				75
B		<i>Dendroica petechia brewsteri</i>	yellow warbler	x	5	5			75
B		<i>Elanus leucurus</i>	white-tailed kite	x	8	3			75
B		<i>Empidonax traillii extimus</i>	southwestern willow flycatcher	x	3	3			75
B		<i>Eremophila alpestris actia</i>	California horned lark	x	8				75
B		<i>Falco columbarius</i>	merlin	x	8				75
B		<i>Falco mexicanus</i>	prairie falcon	x	8				75
B		<i>Falco peregrinus</i>	peregrine falcon	x	8				75
B		<i>Haliaeetus leucocephalus</i>	bald Eagle	x	8				75
B		<i>Icteria virens</i>	yellow-breasted chat	x	5	5			75
B		<i>Lanius ludovicianus</i>	loggerhead shrike	x	8	8			75
B		<i>Melospiza lincolni</i>	Lincoln sparrow	x	8			x	75
B		<i>Nycticorax nycticorax</i>	black-crowned night heron	x	8				75
B		<i>Oporornis tolmiei</i>	MacGillivray's warbler	x	8				75
B		<i>Oreortyx pictus</i>	mountain quail	x	8				75
B		<i>Pandion haliaetus</i>	osprey	x	8				75
B		<i>Phalacrocorax auritus</i>	double-crested cormorant	x	8				75
B		<i>Picoides pubescens</i>	downy woodpecker	x	8				75
B		<i>Plegadis chihi</i>	white-faced ibis	x	8				75
B		<i>Poliophtila californica californica</i>	coastal California gnatcatcher	x	3	3			75
B		<i>Progne subis</i>	purple martin	x	8				75
B		<i>Sphyrapicus thyroideus</i>	Williamson's sapsucker	x	8				75
B		<i>Strix occidentalis occidentalis</i>	California spotted owl	x	8				75
B		<i>Tachycineta bicolor</i>	tree swallow	x	8				75
B		<i>Vermivora ruficapilla</i>	Nashville warbler	x	8				75
B		<i>Vireo bellii pusillus</i>	least Bell's vireo	x	3	3			75
B		<i>Wilsonia pusilla</i>	Wilson's warbler	x	8				75
F		<i>Catostomus santaanae</i>	Santa Ana sucker	x	8				75
F		<i>Gila orcutti</i>	arroyo chub	x	8				75

5.0 Management & Monitoring



Table 5-8 (Cont.)

Summary of Survey Requirements for Covered Species as per the Species Objectives

	LATIN NAME	COMMON NAME	Baseline survey conducted within first 5 years	Survey Distrib. at least every "X" years	Survey Reproduction every "X" years	Survey Abundance every "X" years	Demonstrate Conservation	Min. level occup. of known locations (%)
I	<i>Branchinecta lynchi</i>	vernal pool fairy shrimp	x	8				75
I	<i>Euphydryas editha quino</i>	Quino checkerspot	x	1				75
I	<i>Linderiella santarosae</i>	Santa Rosa Plateau fairy shrimp	x	8				75
I	<i>Rhaphiomidas terminatus abdominalis</i>	Delhi Sands flower-loving fly	x	8	1**			75
I	<i>Streptocephalus woottoni</i>	Riverside fairy shrimp	x	8				75
M	<i>Canis latrans</i>	coyote	x	8				75
M	<i>Chaetodipus fallax fallax</i>	northwestern San Diego pocket mouse	x	8				75
M	<i>Dipodomys merriami collinus</i>	Aquanga kangaroo rat	x	8		1 to 8		75 & 20
M	<i>Dipodomys merriami parvus</i>	San Bernardino kangaroo rat	x	8		1 to 8		75
M	<i>Dipodomys simulans</i>	Dulzura kangaroo rat	x	8				75
M	<i>Dipodomys stephensi</i>	Stephens' kangaroo rat	x	1 to 8		1 to 8		75
M	<i>Glaucomys sabrinus californicus</i>	San Bernardino flying squirrel	x	8			x	75
M	<i>Lepus californicus bennettii</i>	San Diego black-tailed jackrabbit	x	8				75
M	<i>Lynx rufus</i>	bobcat	x	8				75
M	<i>Mustela frenata</i>	long-tailed weasel	x	8				75
M	<i>Neotoma lepida intermedia</i>	San Diego desert woodrat	x	8				75
M	<i>Perognathus longimembris brevinasus</i>	Los Angeles pocket mouse	x	1 to 8		1 to 8		75
M	<i>Puma concolor</i>	mountain lion	x	8				75
M	<i>Sylvilagus bachmani</i>	brush rabbit	x	8				75
P	<i>Allium marvinii</i>	Yucaipa onion	x	8				75
P	<i>Allium munzii</i>	Munz's onion	x	8				75
P	<i>Ambrosia pumila</i>	San Diego ambrosia	x	8				75
P	<i>Arabis johnstonii</i>	Johnston's rock cress	x	8				75
P	<i>Arctostaphylos rainbowensis</i>	Rainbow manzanita	x	8			x	75
P	<i>Astragalus pachypus</i> var. <i>jaegeri</i>	Jaeger's milk-vetch	x	8				75
P	<i>Atriplex coronata</i> var. <i>notatior</i>	San Jacinto Valley crownscale	x	8				75
P	<i>Atriplex parishii</i>	Parish's brittlescale	x	8				75

5.0 Management & Monitoring



Table 5-8 (Cont.)

Summary of Survey Requirements for Covered Species as per the Species Objectives

	LAXA* LATIN NAME	COMMON NAME	Baseline survey conducted within first 5 years	Survey Distrib. at least every "X" years	Survey Reproduction every "X" years	Survey Abundance every "X" years	Demonstrate Conservation	Min. level occup. of known locations (%)
P	<i>Atriplex serenana</i> var. <i> davidsonii</i>	Davidson's saltscale	x	8				75
P	<i>Berberis nevini</i>	Nevin's barberry	x	8				75
P	<i>Brodiaea filifolia</i>	thread-leaved brodiaea	x	8				75
P	<i>Brodiaea orcuttii</i>	Orcutt's brodiaea	x	8				75
P	<i>Calochortus palmeri</i> var. <i>munzii</i>	Munz's mariposa lily	x	8				75
P	<i>Calochortus plummerae</i>	Plummer's mariposa lily	x	8			x	75
P	<i>Calochortus weedii</i> var. <i>intermedius</i>	intermediate mariposa lily	x	8				75
P	<i>Caulanthus simulans</i>	Payson's jewelflower	x	8				75
P	<i>Ceanothus ophiophilus</i>	Vail Lake ceanothus	x	8				75
P	<i>Centromadia pungens</i> ssp. <i>laevis</i>	smooth tarplant	x	8				75
P	<i>Chorizanthe leptotheca</i>	peninsular spine flower	x	8			x	75
P	<i>Chorizanthe parryi</i> var. <i>parryi</i>	Parry's spine flower	x	8			x	75
P	<i>Chorizanthe polygonoides</i> var. <i>longispina</i>	long-spined spine flower	x	8				75
P	<i>Chorizanthe procumbens</i>	prostrate spine flower	x	8				75
P	<i>Convolvulus simulans</i>	small-flowered morning-glory	x	8				75
P	<i>Deinandra mohavensis</i>	Mojave tarplant	x	8			x	75
P	<i>Dodecahema leptoceras</i>	slender-horned spine flower	x	8				75
P	<i>Dudleya multicaulis</i>	many-stemmed dudleya	x	8				75
P	<i>Dudleya viscida</i>	sticky-leaved dudleya	x	8				75
P	<i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	Santa Ana River woollystar	x	8				75
P	<i>Erodium macrophyllum</i>	round-leaved filaræe	x	8				75
P	<i>Eryngium aristulatum</i> var. <i>parishii</i>	San Diego button-celery	x	8				75
P	<i>Galium angustifolium</i> ssp. <i>jacinticum</i>	San Jacinto Mountains bedstraw	x	8				75
P	<i>Galium californicum</i> ssp. <i>primum</i>	California bedstraw	x	8				75
P	<i>Harpagonella palmeri</i>	Palmer's grapplinghook	x	8				75
P	<i>Heuchera hirsutissima</i>	shaggy-haired alumroot	x	8				75

5.0 Management & Monitoring



Table 5-8 (Cont.)

Summary of Survey Requirements for Covered Species as per the Species Objectives

	LATIN NAME*	COMMON NAME	Baseline survey conducted within first 5 years	Survey Distrib. at least every "X" years	Survey Reproduction every "X" years	Survey Abundance every "X" years	Demonstrate Conservation	Min. level occup. of known locations (%)
P	<i>Holocarpha virgata</i> ssp. <i>elongata</i>	graceful tarplant	x	8			x	75
P	<i>Hordeum intercedens</i>	vernal barley	x	8				75
P	<i>Hulsea vestita</i> ssp. <i>callicarpa</i>	beautiful hulsea	x	8			x	75
P	<i>Juglans californica</i> var. <i>californica</i>	California black walnut	x	8				75
P	<i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	Coulter's goldfields	x	8				75
P	<i>Lepechinia cardiophylla</i>	heart-leaved pitcher sage	x	8				75
P	<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	ocellated Humboldt lily	x	8				75
P	<i>Lilium parryi</i>	lemon lily	x	8				75
P	<i>Limnanthes gracilis</i> var. <i>parishii</i>	Parish's meadowfoam	x	8				75
P	<i>Microseris douglasii</i> var. <i>platycarpa</i>	small-flowered microseris	x	8			x	75
P	<i>Mimulus clevelandii</i>	Cleveland's bush monkeyflower	x	8				75
P	<i>Mimulus diffusus</i>	Palomar monkeyflower	x	8				75
P	<i>Monardella macrantha</i> ssp. <i>hallii</i>	Hall's monardella	x	8				75
P	<i>Muhlenbergia californica</i>	California muhly	x	8			x	75
P	<i>Myosurus minimus</i>	little mouse-tail	x	8				75
P	<i>Nama stenocarpum</i>	mud nama	x	8				75
P	<i>Navarretia fossalis</i>	spreading navarretia	x	8				75
P	<i>Navarretia prostrata</i>	prostrate navarretia	x	8				75
P	<i>Orcuttia californica</i>	California Orcutt grass	x	8				75
P	<i>Oxytheca caryophylloides</i>	chickweed oxytheca	x	8			x	75
P	<i>Penstemon californicus</i>	California beardtongue	x	8				75
P	<i>Phacelia stellaris</i>	Brand's phacelia	x	8				75
P	<i>Polygala cornuta</i> var. <i>fishiae</i>	Fish's milkwort	x	8			x	75
P	<i>Potentilla rimicola</i>	cliff cinquefoil	x	8			x	75
P	<i>Quercus engelmannii</i>	Engelmann oak	x	8	1 to 5			80
P	<i>Romneya coulteri</i>	Coulter's matilija poppy	x	8			x	75
P	<i>Satureja chandleri</i>	San Miguel savory	x	8				75
P	<i>Sibaropsis hammittii</i>	Hammitt's clay-cress	x	8				75
P	<i>Trichocoronis wrightii</i> var. <i>wrightii</i>	Wright's trichocoronis	x	8				75

5.0 Management & Monitoring



Table 5-8 (Cont.)
Summary of Survey Requirements for Covered Species as per the Species Objectives

	TAXA*	LATIN NAME	COMMON NAME	Baseline survey conducted within first 5 years	Survey Distrib. at least every "X" years	Survey Reproduction every "X" years	Survey Abundance every "X" years	Demonstrate Conservation	Min. level occup. of known locations (%)
R		<i>Charina bottae umbratica</i>	southern rubber boa	x	8				75
R		<i>Clemmys marmorata pallida</i>	western pond turtle	x	3				75
R		<i>Cnemidophorus hyperythrus beldingi</i>	Belding's orange-throated whiptail	x	8				75
R		<i>Cnemidophorus tigris multiscutatus</i>	coastal western whiptail	x	8				75
R		<i>Coleonyx variegatus abbotii</i>	San Diego banded gecko	x	8				75
R		<i>Crotalus ruber ruber</i>	northern red-diamond rattlesnake	x	8				75
R		<i>Lampropeltis zonata parvirubra</i>	San Bernardino mountain kingsnake	x	8				75
R		<i>Lampropeltis zonata pulchra</i>	San Diego mountain kingsnake	x	8				75
R		<i>Phrynosoma coronatum blainvillei</i>	San Diego horned lizard	x	8				75
R		<i>Sceloporus graciosus vandenburgianus</i>	southern sagebrush lizard	x	8				75
R		<i>Sceloporus orcutti</i>	granite spiny lizard	x	8				75
R		<i>Xantusia henshawi henshawi</i>	granite night lizard	x	8				75

* Taxa A=Amphibian; B=Bird; F=Fish; I=Invertebrate; M=Mammal; P=Plant; R=Reptile

** Surveys conducted every year for first 5 years and then as determined by Reserve Management Oversight Committee

➤ Evaluating Linkages and Roadway Crossings (e.g., culverts, underpasses)

Maintaining the effectiveness of Linkages and roadway crossings is an important component of the MSHCP. The species objectives (*Section 9.0* of this document and *Volume II, Section B, MSHCP Reference Document*) have identified specific roadway crossings in key areas that will need to be evaluated for their adequacy to convey bobcats, mountain lions, and coyotes. The intent is to ensure that the movement of species between Habitat blocks is maintained. Monitoring of wide-ranging, land-based species such as the mountain lion, bobcat, and coyote will provide information on the distribution and “active” use of Linkages and roadway crossings between otherwise fragmented blocks of wildlife Habitat in the MSHCP Conservation Area.

5.0 Management & Monitoring



An efficient method of investigating the use of Linkages by mountain lions is to use GPS radio-collar transmitters. The transmitters can record several locations per day for at least a year; they can then be removed remotely from the animals and picked up so the data can be downloaded. Animals can be monitored periodically (2-4 times a month from the air or ground) to track their general locations.

Conventional and/or GPS radio-collar transmitters will be used to monitor use of Linkages and roadway crossings by coyote and bobcat. Capture, collaring, and monitoring of these species movement patterns, seasonal ranges, and use of Habitats will be a focused process study within the overall Biological Monitoring Program to examine the suitability of the Plan Area for meeting the requirements of larger mammals.

Additional methods that will be used as needed to inventory and monitor use and effectiveness of Linkages include track surveys, remote camera stations, reported depredation/damage to livestock and pets, and road-kill reports. In addition to determining the active use of Linkages and roadway crossings by wide-ranging animals, the more passive use of linked patches of Habitat by animal species and by plant species will be assessed through the long-term monitoring of species distribution changes and proximity to Linkage areas.

➤ Species Used to Provide Information about Condition or Health of Vegetation Communities/Wildlife Habitats

Where data from the initial inventory and monitoring phases indicate it is appropriate, additional data will be collected on selected species to provide information about the condition or health of Vegetation Communities/Wildlife Habitats. Monitoring of a species as an indicator, flagship, umbrella, surrogate, focal, or representative species is proposed; however, in the absence of adequate data and analysis it is difficult to predict whether the species will adequately serve the intended role. The adaptive monitoring strategy will seek to identify species that could fulfill these roles. Consequently, developing the list of Covered Species that will be more intensively monitored will be accomplished during the initial five years of the MSHCP's implementation. This selected list of species will include a combination of representative and at-risk Covered Species for which the following assumptions are made:

- a) The presence of a species provides information about the health or condition of the ecosystem;

5.0 Management & Monitoring



- b) Information on some species is highly correlated with other species, and therefore, intensively monitoring of all species provides little additional information about the system;
- c) By intensively monitoring an appropriate subset of species, impacts that may present a risk to species not being intensively monitored can be assessed; and
- d) Impacts that do not affect the intensively monitored species similarly do not impact other Covered Species.

The above assumptions recognize association among species at a wildlife community level. Covered Species will be selected from the wildlife Habitat community groupings established for long-term monitoring. Representative species not on the Covered Species list, but are more common and easy to survey for, and species that are considered threats to the Covered Species (*e.g.*, brown-headed cowbird, European starling, bullfrog) may be selected if they are found to be good indicators of the health or condition of the ecosystem.

➤ **Adaptive Strategy**

Monitoring of the status and distribution of Covered Species is proposed to occur at a minimum of every 8 years. Intensive monitoring of select species may occur every year depending on the types of information needed and on the survey requirements stated in the species objectives. Likewise, in years of low annual rainfall, monitoring of some species may not be possible (*e.g.*, fairy shrimp, annual plants). The scheduling of species monitoring must be flexible enough to adapt to unanticipated events or opportunities. If and when large acreages (5,000 or more acres), rare Habitats (*e.g.*, vernal pools), or key Linkage areas are added to the MSHCP Conservation Area, then Covered Species inventory of these areas would be implemented the following field season. Similarly, events such as wildfire, flood, or apparently rapid species invasions would also prompt re-consideration of the monitoring schedule.

The trend in species populations will vary based on numerous natural and human-induced factors. If, during the initial years of the MSHCP, indications suggest that time intervals between sampling periods for species distribution and abundance may be too short or long, then a more or less frequent sampling interval will be considered for the entire area, or for the particular vegetation/Habitat types undergoing rapid change. Indicators for this modification would include a greater than 10 percent change in species distribution and/or abundance.