

Appendix E Refuge Plant Species List

Plant Species (as per Jepson 2012)	Common Name (* = introduced; ** = invasive)	Family	Fed Status	State Status	CNPS Status	Notes
<i>Sambucus nigra</i> subsp. <i>caerulea</i>	blue elderberry	Adoxaceae				formerly <i>Sambucus mexicana</i>
<i>Amaranthus deflexus</i>	amaranth*	Amaranthaceae				
<i>Toxicodendron diversilobum</i>	western poison oak	Anacardiaceae				
<i>Apiastrum angustifolium</i>	wild celery	Apiaceae				
<i>Apium graveolens</i>	celery*	Apiaceae				
<i>Berula erecta</i>	cutleaf water parsnip	Apiaceae				
<i>Conium maculatum</i>	poison hemlock*	Apiaceae				
<i>Foeniculum vulgare</i>	fennel*	Apiaceae				
<i>Oenanthe sarmentosa</i>	marsh parsley	Apiaceae				
<i>Lemna</i> sp.	duckweed	Araceae				
<i>Wolffiella lingulata</i>	mud-midget	Araceae				
<i>Hydrocotyle ranunculoides</i>	marsh pennywort	Araliaceae				
<i>Hydrocotyle verticillata</i>	marsh pennywort	Araliaceae				
<i>Achillea millefolium</i>	yarrow	Asteraceae				
<i>Ambrosia chamissonis</i>	beach-bur	Asteraceae				
<i>Ambrosia psilostachya</i>	western ragweed	Asteraceae				
<i>Artemisia californica</i>	California sagebrush	Asteraceae				
<i>Artemisia douglasiana</i>	mugwort	Asteraceae				
<i>Artemisia dracunculus</i>	tarragon	Asteraceae				
<i>Aster chilensis</i>	aster	Asteraceae				
<i>Baccharis glutinosa</i>	marsh baccharis	Asteraceae				formerly B.

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						douglasii
<i>Baccharis pilularis</i>	coyote bush	Asteraceae				
<i>Cirsium brevistylum</i>	thistle	Asteraceae				
<i>Cirsium occidentale</i> var. <i>occidentale</i>	cobweb thistle	Asteraceae				
<i>Cirsium rhotophilum</i>	surf thistle	Asteraceae		T	1B.2	
<i>Cirsium scariosum</i> var. <i>loncholepis</i>	La Graciosa thistle	Asteraceae	E	T	1B.1	formerly <i>Cirsium loncholepis</i>
<i>Cirsium vulgare</i>	bull thistle*	Asteraceae				
<i>Conyza canadensis</i>	horseweed	Asteraceae				
<i>Corethrogyne filaginifolia</i>	California aster	Asteraceae				Jepson 2012 does not include <i>Lessingia filaginifolia</i> var. <i>filaginifolia</i>
<i>Cotula coronopifolia</i>	brass buttons*	Asteraceae				
<i>Ericameria ericoides</i>	mock heather	Asteraceae				
<i>Erigeron blochmaniae</i>	Blochman's leafy daisy	Asteraceae			1B.2	
<i>Eriophyllum confertiflorum</i>	golden yarrow	Asteraceae				
<i>Eriophyllum staechadifolium</i>	coastal golden yarrow	Asteraceae				
<i>Euthamia occidentalis</i>	western goldenrod	Asteraceae				
<i>Gnaphalium canescens</i>	everlasting	Asteraceae				
<i>Helminotheca echioides</i>	bristly ox-tongue*	Asteraceae				formerly <i>Picris echioides</i>

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<i>Heterotheca grandiflora</i>	telegraph weed	Asteraceae				
<i>Isocoma menziesii</i> var. <i>vernonioides</i>	coastal goldenbush	Asteraceae				
<i>Jaumea carnosa</i>	jaumea	Asteraceae				only known on refuge from Myrtle wetland
<i>Leptosyne gigantea</i>	giant coreopsis, giant tickseed	Asteraceae				formerly (<i>Coreopsis gigantea</i>)
<i>Madia gracilis</i>	gumweed	Asteraceae				Sparganium Pond, west side of shoreline
<i>Malacothrix californica</i>	California dandelion	Asteraceae				
<i>Malacothrix incana</i>	dunedelion	Asteraceae			4.3	
<i>Matricaria doscoidea</i>	pineapple weed*	Asteraceae				formerly <i>Chamomilla suaveolens</i>
<i>Pseudogaphalium californicum</i>	California everlasting	Asteraceae				formerly <i>Gnaphalium californicum</i>
<i>Pseudognaphalium biolettii</i>	bicolored everlasting	Asteraceae				formerly <i>Gnaphalium bicolor</i>
<i>Senecio blochmaniae</i>	Blochman's ragwort	Asteraceae			4.2	
<i>Senecio californicus</i>	California ragwort	Asteraceae				
<i>Senecio elegans</i>	red-purple ragwort**	Asteraceae				
<i>Silybum marianum</i>	milk thistle*	Asteraceae				
<i>Solidago velutina</i> subsp. <i>californica</i>	California goldenrod	Asteraceae				formerly <i>Solidago</i>

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						<i>californica</i>
<i>Sonchus asper</i> subsp. <i>asper</i>	prickly sow thistle*	Asteraceae				
<i>Sonchus oleraceus</i>	common sow thistle*	Asteraceae				
<i>Stephanomeria elata</i>	wire lettuce	Asteraceae				
<i>Xanthium spinosum</i>	spiny cocklebur	Asteraceae				
<i>Xanthium strumarium</i>	cocklebur	Asteraceae				
<i>Carpobrotus chilensis</i>	ice-plant/ sea fig**	Azioaceae				
<i>Carpobrotus edulis</i>	freeway ice-plant**	Azioaceae				
<i>Conicosia pugioniformis</i>	narrowleaf ice-plant**	Azioaceae				
<i>Azolla filiculoides</i>	mosquito fern	Azollaceae				
<i>Amsinckia spectabilis</i>	fiddleneck	Boraginaceae				
<i>Cryptantha leiocarpa</i>	beach cryptantha	Boraginaceae				
<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	seaside heliotrope	Boraginaceae				formerly <i>Heliotropium curassavicum</i>
<i>Phacelia distans</i>	common phacelia	Boraginaceae				
<i>Phacelia douglasii</i>	phacelia	Boraginaceae				
<i>Phacelia ramosissima</i>	branching phacelia	Boraginaceae				
<i>Pholisma arenarium</i>	pholisma / sand food	Boraginaceae				
<i>Brassica nigra</i>	black mustard*	Brassicaceae				
<i>Cakile maritima</i>	sea rocket*	Brassicaceae				
<i>Dithyrea maritima</i>	beach spectaclepod	Brassicaceae		T	1B.1	

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<i>Erysimum suffrutescens</i>	suffrutescent wallflower	Brassicaceae			4.2	formerly <i>Erysimum insulare</i> subsp. <i>suffrutescens</i>
<i>Lepidium draba</i>	heart-podded hoary cress**	Brassicaceae				formerly in genus <i>Cardaria</i>
<i>Lepidium lasiocarpum</i> subsp. <i>lasiocarpum</i>	peppergrass	Brassicaceae				
<i>Nasturtium gambelii</i>	Gambel's watercress	Brassicaceae	E	T	1B.1	
<i>Lonicera involucrata</i> var. <i>ledebourii</i>	twinberry	Caprifoliaceae				
<i>Arenaria paludicola</i>	marsh sandwort	Carophyllaceae	E	E	1B.1	
<i>Cardionema ramosissimum</i>	sand mat	Carophyllaceae				
<i>Silene laciniata</i> subsp. <i>laciniata</i>	Mexican pink	Carophyllaceae				formerly <i>Silene laciniata</i> subsp. <i>major</i>
<i>Atriplex californica</i>	coastal saltbush	Chenopodiaceae				
<i>Atriplex leucophylla</i>	beach saltbush	Chenopodiaceae				
<i>Atriplex patula</i>	spear oracle	Chenopodiaceae				
<i>Atriplex prostratus</i>	spearscale*	Chenopodiaceae				formerly <i>A. triangularis</i>
<i>Chenopodium californicum</i>	California goosefoot	Chenopodiaceae				
<i>Chenopodium littoreum</i>	coastal goosefoot	Chenopodiaceae			1B.2	Previously known as <i>Chenopodium carnosulum</i> Moq. var. <i>patagonicum</i>
<i>Salsola australis</i>	Russian thistle*	Chenopodiaceae				<i>iSalsola tragus</i>

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<i>Calystegia soldanella</i>	dune morning-glory	Convolvulaceae				
<i>Convolvulus arvensis</i>	bindweed*	Convolvulaceae				
<i>Cuscuta californica</i>	chaparral dodder	Convolvulaceae				
<i>Dudleya lanceolata</i>	lance-leaved dudleya	Crassulaceae				
<i>Dudleya pulverulenta</i>	chalk dudleya	Crassulaceae				
<i>Carex praegracilis</i>	clustered field sedge	Cyperaceae				
<i>Carex</i> sp.	sedge, unid.	Cyperaceae				Only found at one location - Carex bog in NE section of Refuge
<i>Cyperus eragrostis</i>	nutsedge*	Cyperaceae				
<i>Eleocharis macrostachya</i>	common spikerush	Cyperaceae				
<i>Scirpus microcarpus</i>	small-headed bulrush	Cyperaceae				
<i>Dryopteris arguta</i>	wood fern	Dryopteridaceae				
<i>Equisetum hyemale</i> subsp. <i>affine</i>	common souring rush	Equisetaceae				
<i>Equisetum laevigatum</i>	smooth scouring rush	Equisetaceae				
<i>Croton californicus</i>	California croton	Euphorbiaceae				
<i>Acmispon glaber</i>	deerweed	Fabaceae				formerly <i>Lotus scoparius</i>
<i>Acmispon heermannii</i>	woolly deerweed	Fabaceae				formerly <i>Lotus heermannii</i>
<i>Acmispon prostratus</i>	Nuttall's acmispon	Fabaceae				formerly <i>Lotus nuttallianus</i>
<i>Astragalus nuttallii</i> var. <i>nuttallii</i>	ocean bluff milkvetch,	Fabaceae			4.2	

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	locoweed					
<i>Lupinus arboreus</i>	yellow bush lupine	Fabaceae				
<i>Lupinus bicolor</i>	miniature lupine	Fabaceae				
<i>Lupinus chamissonis</i>	silver bush lupine	Fabaceae				
<i>Melilotus albus</i>	white sweet clover*	Fabaceae				formerly <i>Melilotus alba</i>
<i>Melilotus indicus</i>	sour clover*	Fabaceae				formerly <i>Melilotus indica</i>
<i>Trifolium repens</i>	white clover*	Fabaceae				
<i>Erodium cicutarium</i>	red-stemmed filaree*	Geraniaceae				
<i>Geranium dissectum</i>	cut-leaved geranium*?	Geraniaceae				
<i>Ribes divaricatum var. pubiflorum</i>	straggly gooseberry	Grossulariaceae				
<i>Ribes sanguineum</i>	red flowering currant	Grossulariaceae				
<i>Phacelia ramosissima</i>	shrubby phacelia	Hydrophyllaceae				
<i>Juncus bufonius</i>	toad rush	Juncaceae				
<i>Juncus effusus</i>	bog rush	Juncaceae				
<i>Juncus lesueurii</i>	creeping rush	Juncaceae				
<i>Marrubium vulgare</i>	horehound*	Lamiaceae				
<i>Mentha sp.</i>	mint*	Lamiaceae				
<i>Monardella undulata subsp. crispa</i>	crisp monardella	Lamiaceae			1B.2	formerly <i>Monardella crispa</i>
<i>Monardella undulata subsp. undulata</i>	San Luis Obispo monardella	Lamiaceae			1B.2	formerly <i>Monardella</i>

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						<i>frutescens</i>
<i>Salvia mellifera</i>	black sage	Lamiaceae				
<i>Lemna sp.</i>	duckweed	Lemnaceae				
<i>Dichelostemma capitatum</i>	blue dicks	Liliaceae				
<i>Malva parviflora</i>	cheeseweed*	Malvaceae				
<i>Malva sylvestris</i>	high mallow*	Malvaceae				
<i>Claytonia perfoliata</i>	miner's lettuce	Montiaceae				
<i>Morela californica</i>	wax myrtle	Myricaceae				formerly <i>Myrica californica</i>
<i>Abronia latifolia</i>	yellow sand verbena	Nyctaginaceae				
<i>Abronia maritima</i>	beach sand verbena	Nyctaginaceae			4.2	
<i>Abronia umbellata</i>	purple sand verbena	Nyctaginaceae				
<i>Camissoniopsis cheiranthifolia</i>	beach evening-primrose	Onagraceae				formerly in genus <i>Camissonia</i>
<i>Epilobium ciliatum</i>	willow-herb	Onagraceae				
<i>Oenothera elata subsp. hookeri</i>	Hooker's evening primrose	Onagraceae				
<i>Castilleja affinis</i>	Indian paintbrush	Orobanchaceae				
<i>Castilleja exserta</i>	owl's clover	Orobanchaceae				
<i>Orobanche parishii subsp. brachyloba</i>	short-lobed broom-rape	Orobanchaceae			4.2	
<i>Oxalis pes-caprae</i>	Bermuda buttercup*	Oxalidaceae				
<i>Eschscholzia californica</i>	California poppy	Papaveraceae				
<i>Hesperomecon linearis</i>	carnival poppy	Papaveraceae				formerly <i>Meconella linearis</i>

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<i>Mimulus guttatus</i>	monkeyflower	Phrymaceae				
<i>Plantago erecta</i>	annual plantain	Plantaginaceae				
<i>Plantago major</i>	common plantain*	Plantaginaceae				
<i>Plantago subnuda</i>	plantain	Plantaginaceae				
<i>Ammophila arenaria</i>	European beachgrass**	Poaceae				
<i>Avena barbata</i>	slender wild oats*	Poaceae				
<i>Avena fatua</i>	common wild oats*	Poaceae				
<i>Bromus diandrus</i>	ripgut brome*	Poaceae				
<i>Bromus hordeaceus</i>	soft-chess brome*	Poaceae				
<i>Bromus madritensis ssp. rubens</i>	red brome**	Poaceae				
<i>Cortaderia jubata</i>	jubata grass**	Poaceae				
<i>Cynodon dactylon</i>	Bermuda grass*	Poaceae				
<i>Distichlis spicata</i>	saltgrass	Poaceae				
<i>Ehrharta calycina</i>	perennial veldt grass**	Poaceae				
<i>Elymus condensatus</i>	giant wild-rye	Poaceae				formerly <i>Leymus condensatus</i>
<i>Elymus glaucus</i>	blue wildrye	Poaceae				
<i>Hordeum marinum</i>	Mediterranean barley*	Poaceae				
<i>Pennisetum clandestinum</i>	kikuyu grass*	Poaceae				
<i>Poa annua</i>	annual bluegrass*	Poaceae				
<i>Polypogon monspeliensis</i>	rabbitfoot grass*	Poaceae				
<i>Eriastrum densifolium ssp. densifolium</i>	giant wool star	Polemoniaceae				

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<i>Leptodactylon californicus</i>	prickly phlox	Polemoniaceae			4.2	formerly <i>Leptodactylon californicum</i>
<i>Chorizanthe angustifolia</i>	spineflower	Polygonaceae				
<i>Eriogonum parvifolium</i>	coastal buckwheat	Polygonaceae				
<i>Mucronea californica</i>	California spineflower	Polygonaceae			4.2	
<i>Polygonum aviculare</i> subsp. <i>depressum</i>	common knotweed*	Polygonaceae				formerly <i>Polygonum arenastrum</i>
<i>Rumex crispus</i>	curly dock*	Polygonaceae				
<i>Anagallis arvensis</i>	scarlet pimpernel	Myrsinaceae				
<i>Delphinium parryi</i> subsp. <i>blochmaniae</i>	dune larkspur	Ranunculaceae			1B.2	
<i>Ranunculus occidentalis</i>	western buttercup	Ranunculaceae				
<i>Frangula californica</i>	California coffee berry	Rhamnaceae				formerly <i>Rhamnus californica</i>
<i>Fragaria chiloensis</i>	beach strawberry	Rosaceae				
<i>Horkelia cuneata</i>	horkelia	Rosaceae				
<i>Potentilla anserina</i> subsp. <i>pacifica</i>	cinquefoil	Rosaceae				
<i>Prunus fasciculata</i> var. <i>punctata</i>	sand almond	Rosaceae			4.3	
<i>Rubus ursinus</i>	California blackberry	Rosaceae				
<i>Galium californicum</i>	California bedstraw	Rubiaceae				
<i>Galium nuttallii</i> subsp. <i>nuttallii</i>	Nuttall's bedstraw	Rubiaceae				
<i>Populus trichocarpa</i>	black cottonwood	Salicaceae				formerly <i>Populus balsamifera</i> subsp. <i>trichocarpa</i>

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<i>Salix lasiolepis</i>	arroyo willow	Salicaceae				
<i>Anemopsis californica</i>	yerba mansa	Saururaceae				
<i>Nicotiana glauca</i>	tree tobacco*	Solanaceae				
<i>Solanum douglasii</i>	Douglas' nightshade	Solanaceae				
<i>Sparganium eurycarpum</i> var. <i>eurycarpum</i>	broad-fruit bur-reed	Typhaceae				
<i>Typha latifolia</i>	broad-leaved cattail	Typhaceae				
<i>Hesperocnide tenella</i>	western nettle	Urticaceae				
<i>Urtica dioica</i> subsp. <i>holosericea</i>	hoary nettle, stinging nettle	Urticaceae				
<i>Verbena lasiostachys</i>	vervain	Verbenaceae				

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Invertebrates			
<i>Ixodes pacificus</i>	western black-legged tick	Ixodidae	Acari
<i>Latrodectus hesperus</i>	black widow spider	Theridiidae	Araneae
<i>Apleurus</i> sp.	weevil	Curculionidae	Coleoptera
<i>Colocnemis californicus</i>	California broad-necked darkling beetle	Tenebrionidae	Coleoptera
<i>Cuterbra</i> sp.	rodent bot fly	Oestridae	Diptera
<i>Armadillidium vulgare</i>	pillbug	Armadillidiidae	Isopoda
<i>Acrolophus</i> sp. undet. 1	Acrolophus moth	Acrolophidae	Lepidoptera
<i>Anoncia</i> sp. undet. 1	Anoncia moth	Cosmopterigidae	Lepidoptera
<i>Comadia bertholdi</i>	Comadia moth	Cossidae	Lepidoptera
<i>Dicymolomia metalliferalis</i>	Crambid moth	Crambidae	Lepidoptera
<i>Jocara tarabalis</i>	Crambid moth	Crambidae	Lepidoptera
<i>Loxostege immerens</i>	Crambid moth	Crambidae	Lepidoptera
<i>Pyrasuta nexalis</i>	Crambid moth	Crambidae	Lepidoptera
<i>Aristotelia argentifera</i>	Gelechiid moth	Gelechiidae	Lepidoptera
<i>Aroga "paraplutella"</i>	Gelechiid moth	Gelechiidae	Lepidoptera
<i>Chionodes</i> sp. undet. 1	Gelechiid moth	Gelechiidae	Lepidoptera
<i>Eusarca falcata</i>	Geometrid moth	Geometridae	Lepidoptera
<i>Geometrid</i> moth, unid.	Geometrid moth	Geometridae	Lepidoptera
<i>Neoterpes edwardsata</i>	Geometrid moth	Geometridae	Lepidoptera
<i>Pero macdunnoughi</i>	Geometrid moth	Geometridae	Lepidoptera
<i>Pherne subpunctata</i>	Geometrid moth	Geometridae	Lepidoptera
<i>Plataea personaria</i>	Geometrid moth	Geometridae	Lepidoptera
<i>Synaxis hirsutaria</i>	Geometrid moth	Geometridae	Lepidoptera
<i>Synchlora faseolaria</i>	Geometrid moth	Geometridae	Lepidoptera
<i>Lithariapteryx elegans</i>	Heliodinid moth	Heliodinidae	Lepidoptera

Species	Common Name	Family	Order
<i>Icaria icarioides</i>	Boisduval's blue butterfly	Lycaenidae	Lepidoptera
<i>Plebejus acmon</i>	Acmon blue butterfly	Lycaenidae	Lepidoptera
<i>Plebejus icarioides moroensis</i>	Morro blue butterfly	Lycaenidae	Lepidoptera
<i>Autographa californica</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Cisthene liberomacula</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Copablepharon robertsoni</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Cryphia viridata</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Cucullia antipoda</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Euxoa formalis</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Euxoa pluralis</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Euxoa serricornis</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Euxoa sp. undet. 2</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Grammia ornata</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Lacinipolia patalis</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Notarctia proxima</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Oligia marina</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Orgyia vetusta</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Orthosia pacifica</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Parabagrotis insularis</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Pseudorthodes puerilis</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Spilosoma vagans</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Ululonche niveiguttata</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Zosteropoda hirtipes</i>	Noctuid moth	Noctuidae	Lepidoptera
<i>Furcula scolopendrina</i>	Notodontid moth	Notodontidae	Lepidoptera
<i>Chlosyne leanira</i>	Leanira checkerspot butterfly	Nymphalidae	Lepidoptera
<i>Chlosyne leanira elegans</i>	Oso Flaco patch butterfly	Nymphalidae	Lepidoptera
<i>Danaus plexippus</i>	monarch butterfly	Nymphalidae	Lepidoptera
<i>Papilio rutulus</i>	western tiger swallowtail	Papilionidae	Lepidoptera
<i>Rhagea stigmella</i>	Pyralid moth	Pyralidae	Lepidoptera

Species	Common Name	Family	Order
<i>Toripalpus tarabilis</i>	Pyralid moth	Pyralidae	Lepidoptera
<i>Apodemia mormo</i>	Mormon metalmark butterfly	Riodinidae	Lepidoptera
<i>Apodemia virgulti arenaria</i>	sand dunes metalmark	Riodinidae	Lepidoptera
<i>Smerinthus cerisyi</i>	Sphingid moth	Sphingidae	Lepidoptera
<i>Endothenia hebesana</i>	Tortricid moth	Tortricidae	Lepidoptera
<i>Phaneta misturana</i>	Tortricid moth	Tortricidae	Lepidoptera
<i>Phaneta, new species</i>	Tortricid moth	Tortricidae	Lepidoptera
<i>Arphia ramona</i>	California orange-winged grasshopper	Acrididae	Orthoptera
<i>Conozoa texana</i>	cristate grasshopper	Acrididae	Orthoptera
<i>Melanoplus cinereus ssp. cyanipes</i>	grayish sagebrush grasshopper	Acrididae	Orthoptera
<i>Melanoplus marginatus</i>	marginated spur-throat grasshopper	Acrididae	Orthoptera
<i>Microtes pogonata</i>	Microtes grasshopper	Acrididae	Orthoptera
<i>Oedaleontotus phryneicus</i>	Oedaleontotus grasshopper	Acrididae	Orthoptera
Scorpiones, unid.	scorpion, unid.	unk	Scorpiones

Scientific Name	Common Name	Family	Status	Notes
Amphibians				
<i>Anaxyrus boreas halophilus</i>	Southern California toad	Bufoidea	NT	
<i>Pseudacris sierra</i>	Sierran treefrog	Hylidae		species under taxonomic review
<i>Rana draytonii</i>	California red-legged frog	Ranidae	FT, NT	
Reptiles				
<i>Actinemys marmorata</i>	Pacific pond turtle	Emydidae	CSSC, VU	
<i>Sceloporus occidentalis bocourtii</i>	Coast Range fence lizard	Phrynosomidae		species under taxonomic review
<i>Plestiodon skiltonianus skiltonianus</i>	Skilton's skink	Scincidae		
<i>Elgaria multicarinata webbii</i>	San Diego alligator lizard	Anguidae		
<i>Anniella pulchra</i>	California legless lizard	Anniellidae	CSSC	
<i>Diadophis punctatus vandenburghi</i>	Monterey ring-necked snake	Colubridae		species under taxonomic review
<i>Coluber lateralis lateralis</i>	California striped racer	Colubridae		
<i>Pituophis catenifer annectens</i>	San Diego gopher snake	Colubridae		
<i>Thamnophis sirtalis infernalis</i>	California red-sided garter snake	Colubridae		
<i>Thamnophis elegans terrestris</i>	coast garter snake	Colubridae		
<i>Thamnophis hammondi</i>	two-striped garter snake	Colubridae	CSSC	
<i>Crotalus oreganus helleri</i>	southern Pacific rattlesnake	Viperidae		<i>C. v. oreganus</i> and/or hybrids may also be present

Status Abbreviations: CSC: California State species of special concern; FT: federally threatened; NT (IUCN): near threatened, or candidate; VU (IUCN): vulnerable, considered to be facing a high risk of extinction.

Bird Species	Common Name	Conservation Status - Federal	Conservation Status - State
<i>Accipiter cooperii</i>	Cooper's Hawk		
<i>Accipiter striatus</i>	sharp-shinned hawk		FP
<i>Aquila chrysaetos</i>	golden eagle		
<i>Buteo jamaicensis</i>	red-tailed hawk		
<i>Buteo lagopus</i>	rough-legged hawk		
<i>Buteo lineatus</i>	red-shouldered hawk		
<i>Buteo regalis</i>	ferruginous hawk		
<i>Circus cyaneus</i>	northern harrier		
<i>Elanus caeruleus</i>	white-tailed kite		
<i>Cathartes aura</i>	turkey vulture		
<i>Pandion haliaetus</i>	osprey		
<i>Anas platyrhynchos</i>	mallard		
<i>Calypte anna</i>	Anna's hummingbird		
<i>Selasphorus rufus</i>	rufous hummingbird		
<i>Phalaenoptilus nuttallii</i>	common poorwill		
<i>Charadrius nivosus nivosus</i>	western snowy plover	T	SSC
<i>Charadrius semipalmatus</i>	semipalmated plover		
<i>Charadrius vociferus</i>	killdeer		
<i>Pluvialis squatarola</i>	black-bellied plover		
<i>Larus californicus</i>	California gull		
<i>Larus heermanni</i>	Heermann's gull		
<i>Larus delawarensis</i>	ring-billed gull		
<i>Larus occidentalis</i>	western gull		
<i>Sternula antillarumbrowni</i>	California least tern	E	
<i>Himantopus mexicanus</i>	black-necked stilt		
<i>Recurvirostra americana</i>	American avocet		
<i>Actitis macularius</i>	spotted sandpiper		
<i>Arenaria interpres</i>	ruddy turnstone		
<i>Arenaria melanocephala</i>	black turnstone		

Bird Species	Common Name	Conservation Status - Federal	Conservation Status - State
<i>Numenius americanus</i>	long-billed curlew		
<i>Calidris alba</i>	sanderling		
<i>Calidris alpina</i>	dunlin		
<i>Calidris mauri</i>	western sandpiper		
<i>Limnodromus sp.</i>	dowitcher		
<i>Limosa fedoa</i>	marbled godwit		
<i>Numenius phaeopus</i>	whimbrel		
<i>Phalaropus lobatus</i>	red-necked phalarope		
<i>Tringa flavipes</i>	lesser yellowlegs		
<i>Tringa semipalmata</i>	willet		
<i>Hydroprogne caspia</i>	Caspian tern		
<i>Thalasseus elegans</i>	elegant tern		
<i>Thalasseus maxima</i>	royal tern		
<i>Columba livia</i>	rock pigeon*		
<i>Patagioenas fasciata</i>	bandtailed pigeon		
<i>Zenaida macroura</i>	mourning dove		
<i>Falco columbarius</i>	merlin		
<i>Falco mexicanus</i>	prairie falcon		
<i>Falco peregrinus</i>	peregrine falcon		
<i>Falco sparverius</i>	American kestrel		
<i>Callipepla californica</i>	California quail		
<i>Fulica americana</i>	American coot		
<i>Psaltriparus minimus</i>	bushtit		
<i>Eremophila alpestris</i>	horned lark		
<i>Chondestes grammacus</i>	lark sparrow		
<i>Bombycilla cedrorum</i>	cedar waxwing		
<i>Cardinalis cardinalis</i>	northern cardinal		
<i>Passerina caerulea</i>	blue grosbeak		
<i>Pheucticus melanocephalus</i>	blackheaded grosbeak		

Bird Species	Common Name	Conservation Status - Federal	Conservation Status - State
<i>Piranga flava</i>	hepatic tanager		
<i>Piranga ludoviciana</i>	western tanager		
<i>Aphelocoma californica</i>	western scrub jay		
<i>Corvus brachyrhynchos</i>	American crow		
<i>Corvus corax</i>	common raven		
<i>Calamospiza melanocorys</i>	lark bunting		
<i>Junco hyemalis</i>	darkeyed junco		
<i>Melospiza melodia</i>	song sparrow		
<i>Melozona crissalis</i>	California towhee		
<i>Passerculus sandwichensis</i>	savannah sparrow		
<i>Pipilo maculatus</i>	spotted towhee		
<i>Spizella passerina</i>	chipping sparrow		
<i>Zonotrichia atricapilla</i>	goldencrowned sparrow		
<i>Zonotrichia leucophrys</i>	whitecrowned sparrow		
<i>Empidonax difficilis</i>	Pacific slope flycatcher		
<i>Carduelis psaltria</i>	lesser goldfinch		
<i>Carduelis lawrencei</i>	Lawrence's goldfinch		
<i>Carpodacus cassinii</i>	Cassin's finch		
<i>Carpodacus mexicanus</i>	house finch		
<i>Carpodacus purpureus</i>	purple finch		
<i>Hirundo pyrrhonota</i>	cliff swallow		
<i>Hirundo rustica</i>	barn swallow		
<i>Stelgidopteryx serripennis</i>	northern roughwinged swallow		
<i>Tachycineta thalassina</i>	violetgreen swallow		
<i>Agelaius phoeniceus</i>	red-winged blackbird		
<i>Euphagus cyanocephalus</i>	Brewer's blackbird		
<i>Icterus bullockii</i>	Bullock's oriole		
<i>Icterus cucullatus</i>	hooded oriole		
<i>Icterus galbula</i>	Baltimore oriole		

Bird Species	Common Name	Conservation Status - Federal	Conservation Status - State
<i>Quiscalus mexicanus</i>	great-tailed grackle		
<i>Sturnella neglecta</i>	western meadowlark		
<i>Lanius ludovicianus</i>	loggerhead shrike		
<i>Mimus polyglottos</i>	northern mockingbird		
<i>Toxostoma redivivum</i>	California thrasher		
<i>Anthus rubescens</i>	American pipit		
<i>Dendroica coronata</i>	yellowrumped warbler		
<i>Dendroica petechia</i>	yellow warbler		
<i>Dendroica townsendi</i>	Townsend's warbler		
<i>Geothlypis trichas</i>	common yellowthroat		
<i>Setophaga citrina</i>	hooded warbler		
<i>Vermivora celata</i>	orangecrowned warbler		
<i>Wilsonia pusilla</i>	Wilson's warbler		
<i>Passer domesticus</i>	house sparrow*		
<i>Polioptila caerulea</i>	bluegray gnatcatcher		
<i>Phainopepla nitens</i>	phainopepla		
<i>Regulus calendula</i>	rubycrowned kinglet		
<i>Regulus satrapa</i>	goldencrowned kinglet		
<i>Sturnus vulgaris</i>	European starling*		
<i>Chamaea fasciata</i>	wrentit		
<i>Cistothorus palustris</i>	marsh wren		
<i>Thryomanes bewickii</i>	Bewick's Wren		
<i>Troglodytes aedon</i>	house wren		
<i>Catharus guttatus</i>	hermit thrush		
<i>Catharus ustulatus</i>	Swainson's thrush		
<i>Sialia mexicana</i>	western bluebird		
<i>Turdus migratorius</i>	American robin		
<i>Contopus sordidulus</i>	western wood peewee		
<i>Myiarchus cinerascens</i>	ashthroated flycatcher		

Bird Species	Common Name	Conservation Status - Federal	Conservation Status - State
<i>Sayornis nigricans</i>	black phoebe		
<i>Sayornis saya</i>	Say's phoebe		
<i>Tyrannus verticalis</i>	western kingbird		
<i>Tyrannus vociferans</i>	Cassin's kingbird		
<i>Vireo gilvus</i>	warbling vireo		
<i>Ardea herodias</i>	great blue heron		
<i>Bubulcus ibis</i>	cattle egret		
<i>Butorides virescens</i>	green heron		
<i>Nycticorax nycticorax</i>	black-crowned night heron		
<i>Pelecanus erythrorhynchos</i>	American white pelican		
<i>Pelecanus occidentalis californicus</i>	California brown pelican		
<i>Plegadis chihi</i>	white-faced ibis		
<i>Colaptes auratus</i>	northern flicker		
<i>Melanerpes formicivorus</i>	acorn woodpecker		
<i>Melanerpes lewis</i>	Lewis' woodpecker		
<i>Picoides nuttallii</i>	Nuttall's woodpecker		
<i>Sphyrapicus ruber</i>	redbreasted sapsucker		
<i>Aechmophorus clarkii</i>	Clark's grebe		
<i>Aechmophorus occidentalis</i>	western grebe		
<i>Podilymbus podiceps</i>	pied-billed grebe		
<i>Athene cunicularia hypugaea</i>	western burrowing owl		
<i>Bubo virginianus</i>	great horned owl		
<i>Megascops kennicottii</i>	western screech-owl		SSC
<i>Tyto alba</i>	barn owl		
<i>Phalacrocorax auritus</i>	double-crested cormorant		
<i>Phalacrocorax penicillatus</i>	Brandt's cormorant		

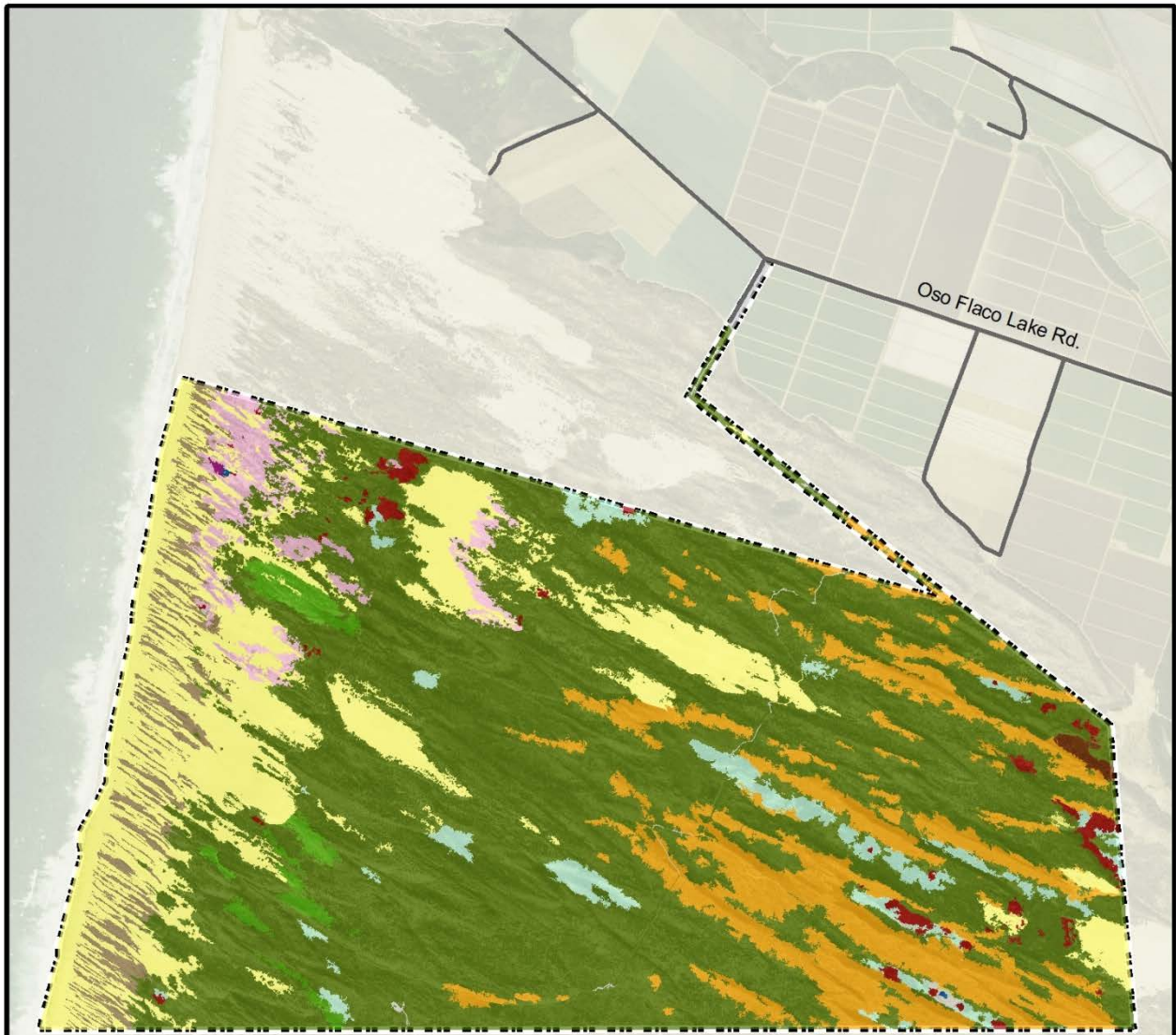
E: endangered; T: threatened; SSC: State Species of Concern

Species	Common Name	Family	Order	Conservation Status
Mammals				
<i>Odocoileus hemionus</i>	mule deer	Cervidae	Artiodactyla	
<i>Sus scrofa</i>	wild pig	Suidae	Artiodactyla	introduced pest
<i>Canis latrans</i>	coyote	Canidae	Carnivora	
<i>Urocyon cinereoargenteus</i>	gray fox	Canidae	Carnivora	
<i>Vulpes vulpes</i>	red fox	Canidae	Carnivora	introduced pest
<i>Lynx rufus</i>	bobcat	Felidae	Carnivora	
<i>Felis catus</i>	domestic cat	Felidae	Carnivora	introduced pest
<i>Felis concolor</i>	mountain lion	Felidae	Carnivora	
<i>Mephitis mephitis</i>	striped skunk	Mephitidae	Carnivora	
<i>Taxidea taxus</i>	American badger	Mustelidae	Carnivora	CSSC
<i>Zalophus californianus</i>	California sea lion	Otariidae	Carnivora	
<i>Mirounga angustirostris</i>	northern elephant seal	Phocidae	Carnivora	
<i>Phoca vitulina</i>	Pacific harbor seal	Phocidae	Carnivora	
<i>Procyon lotor</i>	northern raccoon	Procyonidae	Carnivora	
<i>Ursus americanus</i>	American black bear	Ursidae	Carnivora	
<i>Didelphis virginiana</i>	Virginia opossum	Didelphidae	Didelphimorphia	
<i>Lepus californicus</i>	black-tailed jackrabbit	Leporidae	Lagomorpha	
<i>Sylvilagus audubonii</i>	desert cottontail	Leporidae	Lagomorpha	
<i>Sylvilagus bachmani</i>	brush rabbit	Leporidae	Lagomorpha	
<i>Microtus californica</i>	California vole	Cricetidae	Rodentia	
<i>Neotoma fuscipes</i>	duskyfooted woodrat	Cricetidae	Rodentia	
<i>Peromyscus maniculatus</i>	deer mouse	Cricetidae	Rodentia	
<i>Peromyscus truei</i>	piñon mouse	Cricetidae	Rodentia	
<i>Reithrodontomys megalotis</i>	western harvest mouse	Cricetidae	Rodentia	
<i>Thomomys sp.</i>	pocket gopher	Geomyidae	Rodentia	
<i>Dipodomys heermanni arenae</i>	Lompoc kangaroo rat	Heteromyidae	Rodentia	
<i>Mus musculus</i>	house mouse	Muridae	Rodentia	
<i>Otospermophilus beecheyi</i>	California ground squirrel	Sciuridae	Rodentia	

Species	Common Name	Family	Order	Conservation Status
<i>Sorex sp.</i>	shrew, unid.	Soricidae	Soricomorpha	
Talpid, unid.	mole, unid.	Talpidae	Soricomorpha	

CSSC: CA Species of Special Concern

Appendix G Vegetation Map



base image: 2014 National Agricultural Imagery Program

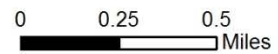
data source: USFWS

Vegetation classification based on field data collection and validated with ground truth information. Map accuracy is estimated at 82%. European beach grass and veldt grass, both invasive species, occur in areas other than those shown here, but are not dominate in those areas.



- | | |
|--|--|
| <ul style="list-style-type: none"> --- Approved Acquisition Boundary — ATV trail ■ CA wax myrtle ■ European beach grass ■ Giant coreopsis dune scrub ■ Cottonwood - willow ■ Disturbed/bare | <ul style="list-style-type: none"> ■ Dune mat ■ Dune scrub ■ Sand ■ Horkelia/sedge swale ■ Veldt grass ■ Water ■ Willow |
|--|--|

**Vegetation and Land Cover
Guadalupe-Nipomo
Dunes NWR, 2014**



Appendix H Refuge Priority Management Area

RPMA #	RPMA Area (Acres)	Description
1	88.00	at least 95% of Refuge's western snowy plover breeding activity occurs in this area; also has good examples of coastal strand and coastal dune mat communities; surf thistle present at many locations; threatened by beach grass, ice plant, and purple ragwort
2	0.82	contains Myrtle Pond and Myrtle Marsh; La Graciosa thistle seeds planted here; marsh sandwort and Gamble's watercress planted here; California red-legged frog breed here; waterfowl; western pond turtle; breeding habitat for red-winged blackbird; also contains California wax myrtle; a hiking destination that should be kept native; perimeter of this area threatened by beach grass
3	18.56	includes Oso Flaco Peak - the highest point on Refuge; good example of coreopsis dune scrub; a hiking destination with great vistas; needs treatment for beach grass and ice plant
4	91.21	largest open sand sheet on Refuge; periodically supports western snowy plover breeding
5	44.65	good coreopsis dune scrub and open sand sheet; beach spectacle-pod present
6	20.24	best and densest coreopsis dune scrub on Refuge
7	15.15	good examples of open sand sheet, coastal dunes scrub, and coastal dunes swale; this area supports one of the densest population of beach spectacle pod on the Refuge
8	85.79	Hidden Willow Valley - the number one hiker destination for the inland portion of Refuge; contains several willow riparian communities; large Juncus/Carex wetlands; good coastal dune scrub; good habitat for neotropical migrant birds present here, primarily in willows; owl and hawk roosting; threatened by beach grass; a hiking destination that should be kept native
9	51.60	Lunar Craters - a very dynamic and very scenic migrating sand sheet; popular hiking destination; has dramatic 40-foot deep hollows from wind scour; threatened by beach grass
10	34.42	Phoebe Valley - one of best examples of coastal dunes scrub in entire dunes complex; a congregation area for Say's phoebe (in winter) and mule deer (year round); threatened by veldt grass (but is still controllable)
11	25.26	tallest forested area on Refuge - cottonwood/willow forest; contains only Santa Barbara sedge wetland on Refuge (1.56 AC); several scattered willow wetlands present; good examples of coastal dunes scrub; owl and hawk roosting; portions of this area threatened by veldt grass and poison hemlock

RPMA #	RPMA Area (Acres)	Description
12	60.27	contains eastern portion of Long Valley, Woodpecker Valley, and Southeast Sand Sheet; Woodpecker Valley contains largest continuous willow forest on Refuge; Snakebite Pond provides habitat for California red-legged frog, many neotropical migrants, and two-striped gartersnake; Gambel's watercress and marsh sandwort previously planted at Snakebite Pond; good examples of dune swales present; owl and hawk roosting; some good examples of native coastal dune scrub also present; this area threatened by veldt grass and feral swine
13	4.21	west end of Sparganium Valley; contains only known population of La Graciosa thistle on Refuge; good willow forest present; California red-legged frog present; Gambel's watercress and marsh sandwort previously planted here; owl and hawk roosting; threatened by feral swine
14	9.14	Four Pond Valley - Colorada Pond, Icebox Pond, and Four Pond Valley East Pond present here; California red-legged frog breed at most of these ponds; Gambel's watercress and marsh sandwort previously planted here; La Graciosa thistle seed planted here; owl and hawk roosting; threatened by feral swine
Total Acreage	549.32	
Percent of Refuge	21%	

Appendix I Feral Swine Control and Monitoring Plan


The potential effects of implementing this Feral Swine Control and Monitoring Plan have been analyzed in the accompanying environmental assessment to the Final CCP.

Feral Swine Control and Monitoring Plan for Guadalupe-Nipomo Dunes National Wildlife Refuge

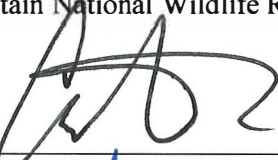


Prepared by: 
Michael Brady, Project Leader, Hopper
Mountain National Wildlife Refuge Complex

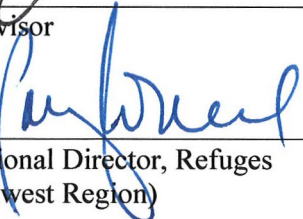
Date: 8/4/16

Concurred: 
Ken Convery, Deputy Project Leader,
Hopper Mountain National Wildlife Refuge
Complex

Date: 8/4/16

Concurred: 
Refuge Supervisor

Date: 8/12/2016

Approved: 
Assistant Regional Director, Refuges
(Pacific Southwest Region)

Date: 8.12.16

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1. Introduction

Feral swine were first observed in the 2000s within the Guadalupe-Nipomo Dunes Complex (Dunes Complex), an 18-mile long coastal dunes landscape that occupies approximately 20,000 acres of southwestern San Luis Obispo County and northwestern Santa Barbara County. The Dunes Complex is one of the largest coastal dune landscapes along the west coast of North America, and provides habitat for a variety of state and federally listed plant and vertebrate species. Guadalupe-Nipomo Dunes National Wildlife Refuge (Refuge) is part of the Dunes Complex. Feral swine not only pose threats to listed plants and wildlife, but also spread harmful invasive plants and diseases which degrade and destroy native habitats.

Currently feral swine are being managed by adjacent land managers, partners and neighboring growers, but no management is taking place on the Refuge or the adjacent Chevron property. Because of the lack of swine control on the Refuge, swine are harboring on the Refuge thus reducing the effectiveness of feral swine control conducted by adjacent landowners. It is believed that the most effective and efficient means to control feral swine requires large scale action, where all adjacent land managers use bait stations and lethally remove all individuals routinely.

In accordance with Service policy, this Feral Swine Control and Monitoring Plan, a step-down plan to the Guadalupe-Nipomo Dunes NWR Comprehensive Conservation Plan (CCP), has been prepared to describe the details of future actions to control and monitor the presence of feral swine on the Refuge. The potential effects to the human environment of implementing this proposal area analyzed in the CCP/environmental assessment (EA) for The Refuge.

The Service proposes to limit the population of feral swine (*Sus scrofa*) on Refuge lands as they damage native plants, especially wetland and riparian areas which numerous listed and special status plants, including La Graciosa thistle (*Cirsium scariosum*, federally listed as endangered), Gambel's watercress (*Rorippa gambellii* [*Nasturtium gambellii*, federally listed endangered]) and marsh sandwort (*Arenaria paludicola*, federally listed as endangered). Feral swine control would also benefit a wide variety of species of plants and animals, including the western snowy plover (*Charadrius nivosus nivosus*, formerly *Charadrius alexandrinus nivosus*) and red-legged frog (*Rana draytonii*, federally listed as threatened). The Service proposes to control rather than eradicate feral swine due to the difficulty and associated costs of completely and continually maintaining the population at or near zero.

Predation by both native and nonnative species has been identified as a major factor limiting western snowy plover reproductive success, which is well documented in the Recovery Plan for the species (USFWS 2007). The Refuge annual plover reports also identify and document numerous instance of known and unknown predator depredation to eggs, chicks and adult plover (Guadalupe NWR Annual Plover Reports 2001-2013, unpublished reports). In 2008, the Service's partner and adjacent land management agency, the ODSVRA, initiated a Predator Management Plan for the protection of western snowy plover and California least tern (*Sterna antillarum browni*) (ODSVRA 2008). The implementation of this plan reduces predation of eggs, chicks and adults to support the recovery plan fledging goal of 1.0 to 1.2 juveniles per western snowy plover male adult. Feral swine are known to predate nests at the Refuge. Feral swine have been documented damaging wetlands, riparian areas and native dune habitat throughout the Refuge (M. Brady, USFWS, pers. observation). Feral swine destroy habitats of both listed wetland plants and red-legged frog.

2. Refuge Overview

The Guadalupe-Nipomo Dunes National Wildlife Refuge (Refuge) is located along the Central Coast of California within the Guadalupe-Nipomo Dunes Complex (Dunes Complex), an 18-mile long coastal dunes landscape that occupies approximately 20,000 acres of southwestern San Luis Obispo County and northwestern Santa Barbara County (Figure 1). The Dunes Complex is one of the largest coastal dune landscapes along the west coast of North America, and provides habitat for a variety of state and federally listed plant and vertebrate species.

The Refuge is located to the west of the Santa Maria River Valley, to the east of the Pacific Ocean, to the north of the Guadalupe Restoration Project (former Guadalupe Oil Field), and to the south of the Oso Flaco Lake Natural Area (a management unit of the Oceano Dunes State Vehicular Recreation Area [ODSVRA]). The Refuge landscape consists of coastal strand and active dunes, central coast foredunes, central coast dune scrub, active interior dunes, coastal dune swale, coastal dune freshwater marshes and ponds, and coastal dune riparian woodland (Holland et al. 1995).

The 2,553-acre Refuge was established in 2000 as a satellite of the Hopper Mountain National Wildlife Refuge Complex (Refuge Complex), a branch of the U.S. Fish and Wildlife Service (Service), which is headquartered in Ventura, California. The Refuge was created to conserve Central California coastal dune and associated wetlands habitats and support the recovery of native plants and animals that are federally listed as threatened or endangered. Specific Refuge goals include: 1) the conservation of federally listed species and critical habitat associations, 2) the protection and restoration of biodiversity, 3) the establishment and management of conservation partnerships, and the facilitation of safe and high-quality opportunities for compatible wildlife-dependent educational and recreational activities (USFWS 2000).

The Refuge is part of the Dunes Collaborative which was established in 2000 as a partnership between federal, state, private, and non-profit organizations committed to restoration of the Dunes Complex and recovery of threatened and endangered species. The land management agencies consist of Guadalupe Nipomo Dunes National Wildlife Refuge, the Land Conservancy of San Luis Obispo County, California State Parks, the County of Santa Barbara, and Guadalupe Nipomo-Dunes National Wildlife Refuge lands is approximately situated in the center of the Dunes Complex.

3. Refuge Resources

The Refuge was primarily established to conserve imperiled plant and wildlife habitats and species. Several specific Refuge goals include the recovery of the federally endangered La Graciosa thistle (*Cirsium scariosum* var. *loncholepis*), marsh sandwort, Gambel's watercress, California least tern (*Sternula antillarum browni*; formerly *Sterna antillarum browni*), the federally threatened California red-legged frog and western snowy plover (Service 2000). The Refuge also serves to protect designated critical habitats for the La Graciosa thistle and western snowy plover.

Many imperiled plant species and at least 118 special-status (i.e., state-listed, federally-listed, recognized by a special interest group, or a species of local interest) animal species occur in the Dunes Complex (Blecha et al. 2007). Approximately 60 of these special-status species have been observed on the Refuge.

Figure 1. Guadalupe-Nipomo Dunes Complex



4. Background

Status of Feral Swine in the Dunes Complex and on the Refuge

The first occurrence of feral swine on the refuge was documented during the summer of 2009 (Annual Plover report 2009) and adjacent farm fields reported damage to crops due to feral swine in the fall of 2008 (S. Little, California State Parks, pers. comm.). Local farmers fenced the agricultural fields and received depredation permits from California Department of Fish and Wildlife to remove swine during the fall of 2009 (M. Mills, Mills Family Growers, pers. comm.). Feral swine can be found throughout the refuge, including the coastal strand. However, the highest levels of wild swine activity tend to be located in riparian woodland, marsh, and pond habitats.

Although the population size is unknown on the Refuge, the occurrence of seeing adult swine, piglets and vegetation damage has increased. Feral swine can grow quite large and depending on food available food resources can weigh as much 250 pounds. Due to their large size, feral swine have few predators. They are sexually mature at six months of age and can have up to two litters per year with an average litter size of three to eight piglets with a high of up to 12 piglets (CDPR 2013). Once present in an area, feral swine populations can grow rapidly and dispersal can result in swine quickly colonizing and populating new areas (Waithman et al. 1999). Even though the farm fields are fenced, swine still find a way to move from the refuge to the agricultural fields. The Refuge source population is unknown, but believed to be expanding.

Effects of Feral Swine on the Environment

Feral swine are considered invasive species in California and the rest of the Americas (CDPR 2013). Although most of the freshwater ponds are fenced, feral swine use or create weak areas in fences to access water. The swine also use or create weak points in the fence between the Refuge and the adjacent agricultural fields to gain access. Once the field is accessed by swine the commercial crop needs to be destroyed due to contamination. (M. Mills, Mills Family Growers, pers. comm.).

The swine destroy and wallow in red-legged frog habitat, as well as disrupt egg mass areas, and potentially, opportunistically predate adult frogs and tadpole. Native upland vegetation and wetland destruction has been documented, additionally predation of a western snowy plover nest occurred in 2011 (M. Brady, USFWS, pers. obs.). Cushman et al. (2004) hypothesized that vegetation changes due to swine rooting and wallowing provides greater opportunities for exotic grass colonization. The presence of these grasses threatens a wide range of sensitive and unique dune habitats. Feral swine can transport invasive seeds in hair and feces. Wild swine seem to favor eating the roots from broad-leaved cattail and narrowleaf iceplant. Of particular note, wild swine leave a crater in the ground (often two feet in diameter by a foot or two deep) when they dig up the long taproots of narrowleaf iceplant. This feeding habit creates a mosaic of craters along Refuge trails, where the wild swine tend to travel and feed. Wild swine also have been rooting in the beach portions of the Refuge. As indicated by the shell remnants in their scat, wild swine seem to also be feeding on sand crabs (amphipods) that live under the beach sand near the high tide line. The first known western snowy plover nest on the Refuge lost to feral swine was documented in 2011. Fences were installed between refuge lands and adjacent agricultural fields; however, the fences are consistently compromised by persistent, aggressive swine (M. Mills, Mills Family Growers, pers. comm.).

Predators and predation can be an important factor limiting least tern and snowy plover reproductive success (Page et al. 1995, Thompson et al. 1997, USFWS 2007, USFWS 1985). Predation of nests and chicks has been identified as an important cause of population decline (Page et al. 1983, Colwell et al. 2005). Predators may impact plovers directly by depredating eggs, chicks, juveniles, or adults. Further, predators may indirectly affect plovers by increasing disturbance, which can increase time spent by adults in vigilance or avoidance behavior, and may limit incubating and brooding behavior. Depredation of

plover may result in egg abandonment or loss of dependent chicks. Predation can occur quickly, leaving little or no evidence, and it is likely that only a small percentage of events are documented. Even when monitors are present, there are limitations in the ability to detect predators. Currently, no lethal predator management activities occur on the Refuge. However, ODSVRA maintains an active predator management program throughout the breeding season. Due to the close proximity of that site, some incidental benefits of their activities may occur on the Refuge. Partners and adjacent landowners continue to participate in predator management in varying degrees as well.

Swine have also been identified as carriers of both *Campylobacter* and *Escherichia coli* O157. In 2006 an outbreak of *Escherichia coli* O157 was associated with three human deaths, caused by consuming spinach from an agricultural field from the Central Coast of California (Jay 2007). The cause was later linked at least partially to the dense population of feral swine. Although domestic cattle are the primary reservoir for *Escherichia coli* O157, wild swine are the most significant potential source of contamination. (Jay-Russell et al. 2012). This is due to the fact that agricultural fences are adequate to keep cattle out but are not a secure way to exclude feral swine.

A good deal of research has attempted to relate rooting disturbance to feral pig density or abundance (Hone 1988, Vtorov 1993, Choquenot et al. 1996). Results of these studies suggest a curvilinear relationship between pig density and rooting disturbance. In other words, a moderate reduction (20 to 30 percent) in pig density may lead to little or no reduction in damage, whereas a reduction of 40 to 50 percent may significantly reduce rooting in an area (CDPR 2013).

Past Management Actions

Local farmers have removed numerous swine on their properties through a depredation permit. Fences were installed around refuge ponds and wetlands, originally to exclude cattle, but now protect listed plants from rooting caused by feral swine. Additional fences were installed in 2012 around two recently created ponds. These fences need to be monitored and maintained, and have been continually compromised by digging feral swine

5. Project Purposes

The purpose of feral swine management is to minimize and reduce feral swine damage and predation of natural resources (listed species), minimize spread of invasive plants, and reduce human health threats to neighboring agricultural fields. Eradicating feral swine from the Refuge is unlikely. Therefore, seasonal control of feral swine populations on the Refuge is the goal of this plan.

Another purpose for preparing this plan is to complete the necessary planning steps and required analysis under the National Environmental Policy Act (NEPA) to enable the Service to become a participant in any coordinated efforts which may take place with partners in the Dune Collaborative on a Dune Complex wide initiative.

The Federal, State, tribal and local governments and agencies participating in the Dunes Collaborative may propose to implement an integrated western snowy plover predator management or feral swine damage management approach wherein the most effective, selective and environmentally desirable method or combination of methods allowed would be tailored to site specific field conditions. Based on variables encountered in the field such as location, topography, land use, vegetation type, specific predator, the Collaborative would have wide latitude and available options to manage swine. The selected action can be implemented at different levels depending on funding levels and ability to carry out the effort. A Memorandum of Understanding would be created to access funding and to ensure goals and objectives are met.

6. Consistency with Pest Management Laws and Policies

In accordance with 569 FW 1 (Integrated Pest Management) of the Service Manual, plant, invertebrate, and vertebrate pests on units of the National Wildlife Refuge System can be controlled to assure balanced wildlife and fish populations in support of refuge-specific wildlife and habitat management objectives. Vertebrate pest control on Federal (refuge) lands is also authorized under the following legal mandates:

- National Wildlife Refuge System Administration Act of 1966, as amended (16 USC 668dd-668ee);
- Plant Protection Act of 2000 (7 USC 7701 et seq.);
- Food Quality Protection Act of 1996 (7 USC 136);
- Executive Order 13112; and
- Animal Damage Control Act of 1931 (7 USC 426-426c, 46 Stat. 1468)

Department of the Interior (Department) policy 517 DM 1 (Integrated Pest Management policy) defines pests as "...living organisms that may interfere with the site-specific purposes, operations, or management objectives or that jeopardize human health or safety," and defines an invasive species as "a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health." Similarly, Service policy 569 FW 1 defines pests as "...invasive plants and introduced or native organisms that may interfere with achieving our management goals and objectives on or off our lands, or that jeopardize human health or safety."

Applicable elements of the Service's pest management policy include: 1) promote and adopt pest prevention as the first line of defense by using a pathway management strategy to prevent unintended spread of species and biological contamination; and 2) focus on conserving more pristine habitats, monitor these areas, and protect them from invaders. Service policy also states that we will manage pests if:

- The pest is causing a threat to human health and well-being or private property, the acceptable level of damage by the pest has been exceeded, or State or local government has designated the pest as noxious;
- The pest is detrimental to resource objectives as specified in a refuge resource management plan (e.g., CCP, habitat management plan); and
- The planned pest management actions will not interfere with attainment of resource objectives or the purposes for which a refuge was established.

Control of animal species identified as damaging or destroying Federal property and/or considered detrimental to the management program of a refuge is also permitted as described in 50 CFR 31.14 (Official Animal Control Operations).

The specific justifications for pest management activities on Guadalupe-Nipomo Dunes NWR include:

- Protecting human health and safety/food safety;
- Preventing substantial damage to important Refuge resources, including federally listed threatened and endangered species and cultural resources;
- Protecting newly introduced or reestablished native species;
- Controlling non-native (exotic) species in order to support existence for populations of native species; and
- Providing the public with quality, compatible wildlife-dependent recreational opportunities.

Recovery plans for various endangered and threatened species present on the Refuge list predation as a threat to the listed species (USFWS 2007, USFWS 2011). Achieving the Refuge's establishment purpose of protecting, managing, and restoring habitats for federally listed endangered and threatened species and migratory birds and maintaining and enhancing the biological diversity of native plants and animals will entail reduction of deleterious effects.

The control of feral swine conforms to Refuge goals presented in the CCP, as well as the following objective:

Objective 1.8 By 2017, implement a seasonal feral swine control plan in order to reduce threats to La Graciosa thistle, marsh sandwort, and California red-legged frog.

7. Selected Action

The selected action to monitor and control feral swine on the Refuge is an integrated feral pig damage management approach wherein the most effective, selective, and environmentally desirable method or combination of methods allowed under this alternative would be tailored to site-specific field conditions. Based on variables encountered in the field such as location, topography, land uses, vegetation type, and numbers of swine, the Service would decide which of the allowable control methods would be most suitable for implementation on the Refuge. The selected action can be implemented at different levels of intensity depending on the amount of funding that is received to carry out the effort. Project activities and control methods are described below.

The initial steps of this Refuge step-down plan include:

- Keeping apprised of current trends in feral swine dispersal and colonization within the region;
- Establishing agreements for controlling feral swine on the Refuge well in advance of determining the extent of their presence on the Refuge; and
- Periodically inspecting Refuge lands for evidence of feral swine activity, adjusting the frequency of these inspections based on current sighting information in the area and regional survey results.

As part of this action, the location(s) and level of infestation would be determined and the extent of resource (e.g., biological, cultural, watershed) damage would be documented. This information would be provided to our regional partners to assist in prioritizing control actions and determining the appropriate method of control. Most animals will be lethally removed by trapping conducted by a contractor in a systematic way.

Inventory Feral Pig Populations and Areas of Resource Damage

Refuge staff and contractors will conduct periodic surveys by UTV and spotlighting in the early morning and/or late evening to looking for signs of feral pig activity. Frequency of surveys could be every few days during the winter and spring when swine are actively foraging or as few as once a week in the fall or summer. In addition, areas that have been damaged by feral swine will be mapped and the extent of damage described. Feral swine location data will be acquired by ground surveys, habitat mapping and modeling, and a review of existing documentation concerning the location of feral pig populations. Future efforts to identify the location of swine may include trail cameras, which can be used to track size and habits of sounders of swine (a family group of swine made up of sows, typically related and representing about three generations, and their piglets). All of this information will help concentrate trapping and hunting efforts in key areas and make those efforts as effective as possible. Contact with other land managers will also be maintained to track swine sightings on nearby lands. If swine activity is identified on the Refuge, staff will respond immediately to initiate the control methods that follow.

Removal

Two methods, trapping and dispatch of individuals, would be employed to remove feral swine from public lands within the project area. The methods will be used strategically and in coordination to maximize the reduction in feral swine numbers. It is believed that most animals will be removed by trapping, with professional ground-based marksmen used to pursue and shoot (dispatch) “trap-averse” animals after trapping efforts have taken place. No more than one to two contracted personnel will be involved in the control effort.

Trapping

Trapping is expected to be the largest part of feral swine control effort on the Refuge. In general, corral style traps large enough to hold multiple animals will be utilized in areas frequented by swine. Open corral-style traps allow large non-target wildlife such as deer to escape. Other trapping options include drop-nets, cage traps, padded leg hold and/or box traps. Traps would be checked on a daily basis, as state law requires. It is expected that no more than eight traps would be in use at any one time and these would be located throughout the Refuge. The number of traps utilized would be based on available and qualified personnel and the population of feral swine in a treatment area. The size of traps may be up to 20 feet wide by 20 feet long.

Determinations as to where traps will be located will be based on the results of ongoing efforts to monitor swine populations and their impacts. They will likely be set near water sources (ponds), riparian areas, swales, or groves of trees where swine are likely to congregate and forage, as well as travel corridors. Traps will be set to avoid resource damage within areas of sensitive biological, cultural, or watershed resources (e.g., wetlands, riparian zones). Trapping would generally take place inland of the beach area. In the event that a trap is necessary on the beach, traps would only be permitted outside the western snowy plover breeding season.

Trapping in areas easily accessible by or visible to the public will be avoided as much as possible. If an important trapping location is used that is accessible or visible by the public, small-scale temporary closures may be erected. Installation of traps by hand may involve minor ground disturbance associated with the installation of fence t-posts and anchors, as well as the activity of the swine themselves while they are inside the traps. Traps will be baited with grain or other food attractive to feral swine.

All proposed trapping locations on the Refuge would be flagged on the ground and GPS locations provided to Service archaeological and biological staff to avoid or minimize impacts to biological and cultural resources. Using GIS location data for proposed trapping locations, Service archaeologists and biologists would complete a records review and field survey, if necessary, to ensure that trapping locations are not located within a cultural resource site, or a site that may have deleterious effect on sensitive species.

Humane treatment of captured feral swine will be emphasized throughout the control program. During all capture operations, traps would be set in the afternoon/evening and checked early the following morning to avoid the possibility of feral swine overheating in traps. Captured swine would be euthanized quickly in the early morning hours by gunshot to the head using non-lead ammunition. For scientific purposes and for evaluating the progress of the control effort for changes in population age structure, basic biological and wildlife disease data will be collected. After euthanasia, all carcasses will be removed as soon as possible and transported off Refuge for disposal in compliance with California Department of Fish and Wildlife codes and regulations and any other applicable laws and regulations. Blood and tissue remaining in or around the traps will be covered with soil or diluted with water to avoid attracting other wildlife. Alternatively, swine carcasses may be used to feed wild condor flock if it can be determined that potential for lead is low.

Through trapping would take place year round as needed, high intensity trapping where as many as eight traps may be used on the Refuge, will take place in the winter and/or spring when swine are out foraging. During the first intensive trapping session of each year, all traps will be set for captures for a minimum of five consecutive nights. Traps should then be locked open and pre-baited for five to seven days prior to being set for another five-day capture period. Traps would typically be in one place no longer than two or three weeks to avoid acclimatizing swine to the traps in those locations. Successive pre-baiting and capture periods would continue for the duration of the trapping session.

Trap locations will be in already disturbed areas adjacent to trails and roads. All trap sites will be preapproved by Refuge Manager or Wildlife Biologist. Technicians would move traps to new locations when no additional captures occur. If large numbers of non-target wildlife are caught, the trap would be moved. At the end of the first session of intensive trapping, all traps would be removed from trapping locations, cleaned, repaired, and stored until the second trapping session. Periodic surveys for fresh rooting disturbance would be used to assist trackers in locating areas with active groups of feral swine.

Although feral swine could and should be removed during any season, intense trapping would generally occur during the winter and spring as new piglets will be present. Additionally, the fall and winter when food resources are low they will enter corral traps more readily (E. Covington, USDA Wildlife Services, pers. comm.).

Ground Euthanasia, Potentially with Trained Dogs

Dispatch of individual feral swine may also be conducted without the use of traps. This method would entail professional, trained personnel to systematically cover terrain and work through swales to track swine. The person could use trained dogs if deemed necessary to assist capture. The dogs will be trained to bark and corner swine, but trained not to attack them nor harass wildlife. Dogs will be outfitted with radio collars and/or GPS units so marksmen will be aware of their locations at all times. Feral swine that have been bayed by dogs will be euthanized as soon as possible to prevent injury to the feral swine or to the dogs. Once cornered, swine would be shot by the marksman. Night dispatch with the use of night vision technology may occur. Non-leaded shot will be used. If pigs are found on the beach, they may also be individually dispatched by trained marksman (traps will only be permitted on the beach outside the western snowy plover breeding season).

Fencing

Fencing will be used to protect environmentally sensitive areas from feral swine damage. Feral swine fences would be constructed with openings at ground level so as not to restrict the movement of rodents, other small mammals, and wildlife. In addition, all temporary fencing would be installed as to not preclude migration patterns of any large native mammals.

Monitoring

As described previously, basic biological information from trapped or dispatched swine will be obtained. Intermittent long-term monitoring on the Refuge is expected to take place indefinitely. Monitoring methods could involve the use of trail cameras and visual surveys of likely use areas for signs of fresh rooting. Local volunteers may be used for monitoring efforts. Monitoring data would be used to adaptively manage where search, trapping, and dispatch activities should occur.

Adaptive Management

If after 5 years of intensive efforts, resource impacts from feral swine have not been reduced from the Refuge, then project goals shall be re-evaluated. If it is determined at that time that control of feral swine from the Refuge is not an effective objective, then efforts would be discontinued.

Public Safety

Public and worker safety will be a top priority during all feral swine management activities. Professional marksmen are highly trained individuals who will only take shots when a target is visible and identifiable. If operations need to occur in an area with public access, there may be temporary trailhead created. Any signage posted will be in English and Spanish and will use standard universal symbols to express the closure.

8. Conservation Measures

The following conservation measures will be implemented as part of the selected alternative to avoid negative effects to resources and public safety as a result of implementation:

- Pre-Activity Surveys for Feral Swine Damage and Focused Removal Efforts: Prior to initiation of feral swine removal activities, surveys will be carried out to identify specific locations being impacted by feral swine. Swine removal efforts will be highly focused and limited to such areas.
- Trap Placement and Vegetation Trimming: Proposed trap locations and vegetation trimming activities will be screened and/or surveyed to ensure that no ground disturbance or vegetation removal is proposed that could impact an archeological site or would result in disturbance within or damage to designated critical habitat, sensitive vegetation communities, or other habitat supporting threatened, endangered, and sensitive species. Traps may be placed in riparian areas, but will not be placed directly in or directly adjacent to wetlands to avoid water quality impacts. In addition, no riparian vegetation will be destroyed or removed. Trap placement will avoid areas visible from recreation trails and interpretive infrastructure to protect recreation resources and avoid potential vandalism. A qualified biologist will periodically visit active trapping sites to ensure that all practicable measures are being employed to avoid incidental disturbance of stream habitat and any listed or sensitive species.
- Lead Free Ammunition: To avoid lead contamination and the potential for adverse effects to wildlife, only lead free ammunition will be used during aerial and ground dispatch and the euthanization of trapped swine.
- Short Term Closures: During periods of active ground based dispatch operations, limited areas of the Refuge might be closed to public access for safety reasons. Closures will be restricted to the minimum size and duration needed for public safety. Closures during weekends and holidays will be avoided whenever possible.
- Use of Weed-Free Feed for Traps: Certified weed-free feed will be used in traps to minimize chances of introducing non-native and noxious weeds into the project area.

9. Approvals

Following the approval of this step-down plan, the Service may choose to enter into a Memorandum of Understanding with other agencies to participate in the implementation of a five- year integrated feral swine eradication and control approach wherein the most effective, selective, and environmentally desirable method, or combination of methods allowed under this alternative, would be tailored to site-specific conditions.

10. Monitoring

The numbers and locations of feral swine within the region will be monitored during the implementation of this plan. In addition, sites where control has occurred will be surveyed to determine if the actions taken successfully removed all swine from the area. Monitoring on the Refuge will initially address whether or not swine activity or swine have been identified on refuge lands, and areas in proximity to the Refuge where swine have been documented will be noted.

11. Alternatives Considered

No Action

In addition to the selected monitoring and eradication plan presented above, the No Action alternative for addressing the control of feral swine on the Refuge was considered. Under this alternative, no feral swine control efforts would be undertaken on the Refuge. As stated in the CCP/EA for Guadalupe-Nipomo Dunes NWR, no action to stop feral swine from establishing populations on the Refuge would result in an expanding swine population throughout the Refuge along with the associated damage to sensitive habitats and species, cultural resources, and water quality. Allowing swine to establish populations on the Refuge would hamper the efforts of other land managers to control feral swine populations on their lands. This alternative would also be inconsistent with Department and Service policy related to integrated pest management, Refuge goals and objectives for protecting the Refuge's sensitive natural and cultural resources, and regional conservation goals.

12. Justification

Feral swine represent a serious threat to the diversity of habitats and species protected within the region's conserved lands, including the range of listed and sensitive species supported on the Refuge. Their presence also threatens the integrity of cultural resource sites, the quality of habitats and water within our protected watersheds, and potentially human health. There is currently an opportunity to successfully eradicate feral swine from the region, however, this effort requires participation by a range of land managers, governments, tribes, and other stakeholders, including Guadalupe-Nipomo Dunes NWR. Actions to eliminate this threat are consistent with Service policy and regulations, are compatible with the purposes for which the Refuge was established, and will assist in achieving the goals and objectives for the Refuge as stated in the Guadalupe-Nipomo Dunes NWR CCP.

Consultation and Coordination with others

The management of predators for the benefit of listed species is best conducted over a larger geographic area. The refuge is 1.8 miles of plover habitat in the center of 18 miles of continuous plover habitat. Many of the partners within the Dunes Collaborative are currently managing for feral swine and there is a benefit for the Service to manage cooperatively in a consistent and unified way. The Service participation with partners on this issue would be more cost effective.

The Federal, State, tribal and local governments and agencies participating in the Dunes Collaborative may propose to implement an integrated feral swine damage management approach wherein the most effective, selective and environmentally desirable method or combination of methods allowed would be tailored to site specific field conditions. Based on variables encountered in the field such as location, topography, land use, vegetation type, specific predator, the Collaborative would have wide latitude and available options to manage swine. The selected action can be implemented at different levels depending on funding levels and ability to carry out the effort. A Memorandum of Understanding would be created to access funding and to ensure goals and objectives are met.

The partners would be consulted annually during an annual meeting to discuss the feral swine management. Any new techniques of predator management could be discussed for employment in future seasons. Any new techniques would be draft in a Memo and attached to the Predator Management Plan prior to enacting.

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